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Sep^t 23rd / 59

R. A. College - Christchurch -

THE
AGRICULTURIST'S MANUAL;
BEING A FAMILIAR DESCRIPTION OF THE
AGRICULTURAL PLANTS CULTIVATED IN EUROPE,
INCLUDING PRACTICAL OBSERVATIONS RESPECTING THOSE SUITED TO THE
CLIMATE OF GREAT BRITAIN;
AND FORMING
A REPORT OF LAWSON'S AGRICULTURAL MUSEUM
IN EDINBURGH.

BY
PETER LAWSON & SON,
SEEDSMEN AND NURSERYMEN TO THE HIGHLAND AND AGRICULTURAL SOCIETY
OF SCOTLAND.

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TO
THE HIGHLAND AND AGRICULTURAL SOCIETY
OF SCOTLAND,

THIS PUBLICATION
IS MOST RESPECTFULLY INSCRIBED

BY
THE AUTHORS.

PREFACE.

FEELING a sincere pleasure in promoting whatever appears to us to have a tendency towards the diffusion of a taste for rural improvement, and in contributing as far as in our power to give it a useful direction, we have been induced to lay before the public a description of the various agricultural plants cultivated in Europe, and of which specimens may be seen in our collection. The spirited conduct of our friends, the Messrs Drummond, who had formed an Agricultural collection at Stirling, suggested to us the advantages likely to be derived from a similar exhibition in Edinburgh, where it might naturally be expected to have a much more extended influence. Following the laudable example set before us, we accordingly, in the autumn of 1833, fitted up an Agricultural Museum on our premises here, judging that by its means we might have it in our power to present to those honouring us with a visit, samples of the various improved vegetable productions connected with agriculture and rural economy, and to bring under their notice the successful efforts made to facilitate improvement in these highly important branches of science. Our endeavours met with more than expected countenance and support, insomuch that, by the end of the year 1834, we were enabled, through the medium of the *Quarterly Journal of Agriculture*, to lay before the public a report of the state of our Museum, more ample than at its commencement we could have

anticipated. Encouraged by the increasing number of respectable visitors, and the efficient aid of skilful and kind contributors, we determined to persevere in our scheme; and from the success which has attended our labours, we feel justified in presenting the Report of our Museum this season in form of a separate publication, being convinced that a descriptive enumeration of the various objects which it contains cannot fail to be of considerable interest to all more directly concerned in the advancement of agriculture.

To such as are desirous of knowing the peculiar qualities of the different species and varieties of the agricultural plants cultivated in Europe, or capable of being with advantage introduced into the field culture of this country, our catalogue may be confidently recommended, on the ground of its containing more information on the subject than is to be obtained in connection in any work with which the authors are acquainted.

It had been long believed that too little attention was paid by farmers to the selection and culture of improved varieties of plants, and the palm in that respect was generally assigned to their brethren of the spade, whose pursuits brought the physiology of vegetation more directly under their observation, and whose success in producing improved varieties of fruits, flowers, and esculent vegetables had been held forth as an excitement to emulation. In our report we hope to be able to make it appear that any ground of charge against farmers for remissness in this matter no longer exists—and we sincerely trust that what has already been achieved will stimulate to redoubled exertion.

Of the Cereal Grains, we are enabled to exhibit more than eighty distinct varieties and species of Wheat, many of which possess superior qualities, so diversified, however, as to afford ample means of selection for sowing on strong or light soils—in

autumn or spring, on low or elevated situations, while some of them are suited for greater heights than any at which this species of grain has hitherto been cultivated in Britain. A great proportion of these Wheats, as well as the other specimens of Plants exhibited, have been grown in our own experimental grounds, and the remarks attached to each kind will enable our readers to judge of their comparative merits.

Of Barley we are enabled to shew twenty distinct varieties of various excellence. Of these the Chevalier, Annat, Dunlop, and Italian, attract merited attention, and lead to the anticipation of still greater success in the improvement of this species of grain.

Our collection of Oats amounts to thirty-six distinct sorts, some of which are little known in this country, and affords an opportunity of comparing the merits of several varieties cultivated on the Continent, with those generally cultivated in Britain. Of Rye, Millet, Maize, and other kinds of grain, there are also many varieties.

The Leguminous Plants cultivated for their seeds are next enumerated. Of the more important of these, the Bean, the Pea, and Kidney-bean, the varieties will be found not less numerous than those of the cereal grasses.

Of the plants cultivated for their Herbage and Forage, and which are for the most part referred to the three sections of Gramineous, Leguminous, and Cruciferous, the collection is pretty extensive, and we are enabled to speak with some confidence of their comparative merits. In this department, however, we are sensible that there is still much to learn; and our object being to promote the culture of sorts possessing superior qualities, and to discourage that of worthless kinds, we shall feel indebted to our practical friends for any useful hints on the subject, accompanied by specimens. Appended to this section will be found an article on the kinds and quantities of

Grass Seeds for sowing down land, in which we have given tables exhibiting the proportions and mixtures adapted for the various kinds of husbandry and soil.

The various Plants cultivated for their uses in the Arts and Manufactures, and for other Economical purposes, also form a considerable branch in the exhibition. The Esculent Roots, particularly those of the Potato, Turnip, and Beet, which are greatly distinguished above the others by their superior utility, have an imposing appearance in a collection, and will be found to occupy in our catalogue a space proportioned to their importance. Of the very numerous varieties of the former of these plants which have been submitted to comparative investigation by us, we have given a table exhibiting the peculiar merits. Fifty-one varieties of Turnips are specified, and details are given respecting those presented by various individuals to the Museum.

Arboriculture forms a distinguished feature in the rural improvement of the country. In this department, however, we believe there is still much room for exertion ; and to assist us in our inquiries relative to it, we earnestly solicit the contributions of such of our friends as have paid attention to this most important subject. The growth of trees is so variously affected by soil, climate, and management, that sections of trunks from different forests or plantations, accompanied by judicious remarks, could not fail to afford interesting and useful information. The breadth of the annual layers, considered in connexion with the meteorological phenomena of the corresponding seasons, or as affected on one side of the tree by the size and position of the branches or roots ; the commencement and progress of decay, whether proceeding from the tap-root and affecting the centre, or from the lateral roots ; and the diseases beginning near the surface of the tree, while the heart remains sound, af-

ford subjects of observation not less interesting to the physiologist than to the forester.

The valuable addition made to the British Arboretum by the introduction of the larch in the course of the last century, renders it very probable that many important accessions to our forest scenery yet remain to be obtained from the natural order *Coniferæ*. To the introduction and propagation of species of this tribe our attention has been especially and not unsuccessfully directed. The Museum contains living specimens of the genus *Pinus* from various parts of the Continents of Europe and America, and from Nepaul and the Himmalayan Mountains, some of which may yet not only rival, but surpass the larch in the forests of Scotland.

Brief notice is taken of the different Horticultural productions and models presented to the Museum. In this department, however, we are especially indebted to the Highland and Agricultural Society of Scotland, for the liberality with which they have permitted their valuable series of models to be placed for a limited period in the Museum, to which they have given such an interest as it could not otherwise have possessed.

The descriptions of the various specimens have been given with as much conciseness as was judged consistent with perspicuity. Botanical terms are frequently explained in ordinary language, to render the remarks intelligible to the general reader; and observations derived from experience are offered respecting the culture and uses of the different plants. In short, as we consider this report to form a standard, to which future reports, embracing the additions annually made, will be supplementary, we have not spared pains in endeavouring to render it as complete and useful as possible. For the zeal and ability with which we have been aided in our endeavours to render the catalogue worthy of public approbation, we have pleasure

in here expressing our obligation to our friend Mr WILLIAM GORRIE.

A General Index is subjoined, accompanied by an index of the names of the Contributors mentioned under the different articles. To those who have thus generously lent their aid to our undertaking we tender our best acknowledgments. Should any omissions be here detected, our friends, we are assured, will not attribute them to any want of respect, and we shall not fail to rectify them in our first Supplement.

EDINBURGH, 3. HUNTER'S SQUARE,
10th May 1836.

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THE
AGRICULTURIST'S MANUAL.

PLANTS CULTIVATED FOR THEIR FARINACEOUS
SEEDS, TOGETHER WITH THEIR STRAW OR
HAULM.

I. CEREAL GRASSES.

(*Gramineæ.*)

TRITICUM—WHEAT.

GENERIC CHARACTERS.—Inflorescence spiked; glumes two-valved, equal, or nearly so; spikelets alternate, two-rowed, many-flowered, transverse, or placed so that the edges of the florets are towards the rachis; paleæ two, surrounding the seed; the external or lower one pointed or awned, and the internal or upper one cleft at the point.

Botanists generally divide the common beardless and bearded wheats into two distinct species, terming the former *Triticum hybernum* or winter wheat, and the latter *T. æstivum* or summer wheat. But the propriety of this may well be questioned, more particularly as the chief distinguishing character between them consists in the varieties of the former being beardless, or nearly so, while the awns of the latter are generally two, three, or more inches in length; and it being an established fact, that the awns or beards in grasses form by no means a permanent specific distinction, and that in many cases they do not even constitute a variety, so much does their presence or absence depend upon the effects of culture, climate, soil, &c. To the above some have added, as distinctive characters of the bearded wheats, that their ears are smaller, spikelets more remote, grains smaller and

more elongated; but even these distinctions, although generally applicable, are not found to apply with propriety in all cases. But the principal objection to the names commonly used is, that they make no proper practical distinction between the two great classes—WINTER and SPRING WHEATS; for instance, under *T. hybernum* are included several of the earlier, and, without doubt, the best sorts of spring wheat; and under *T. æstivum* are included several bearded wheats equally hardy, and requiring as long time to arrive at maturity as our common winter sort.

Taking the above considerations into view, it has, in the present case, been judged most expedient to include both bearded and beardless common wheats under the name of *T. sativum* (Cultivated Wheat), as has been done recently by some French authors; at the same time making such divisions as are calculated to facilitate the descriptions, and more easily to admit of reference; not, however, including under this name the turgid wheats, and some others which possess characters sufficiently distinct to admit of their being included under different species to be afterwards described.

TRITICUM SATIVUM—COMMON CULTIVATED WHEAT.

SPECIFIC CHARACTERS.—Spike slightly compressed; spikelets generally containing three fertile florets, the under paleæ of which have each a hard bristly point, which in some instances becomes elongated into an awn; terminal florets of the spikelet barren. Glumes terminated by a rigid point, which is sometimes elongated so as to resemble a short awn, gibbous or swollen like, contracted at the base, with a nerve running up the back, which is more distinct toward the bristled point; root fibrous. Annual.

* *Varieties of TRITICUM SATIVUM, generally termed WHITE BEARDLESS WHEATS, having whitish coloured ears or spikes, and light coloured grain or seed; and which are generally cultivated as Winter Wheats.*

1. COMMON WHITE WHEAT.

This is a name given to whatever white wheat is generally cultivated in any district where its culture may not have been superseded by one or more of the superior and less mixed varieties. It is not strictly applicable to any one distinct variety, but rather to an almost infinite number of varieties of white wheats, not even excluding the velvet-eared, and some of the bearded sorts. Its cultivation

is now, however, giving place to varieties less mixed, and which produce superior samples.

Specimens in Museum of the common wheat of East Lothian in grain and straw, weight per bushel 63 lb.; ditto ditto of the Carse of Gowrie, weight 63 lb.; and do. of Morayshire, weight $62\frac{1}{2}$ lb.

2. HUNTER'S WHEAT.

Is so named in compliment to the late Mr Hunter of Tynefield, East-Lothian, who first discovered it growing in a field on Coldingham Muir, Berwickshire. During the last thirty years this sort has received a very extensive cultivation in the Lothians, and adjacent districts; and at present it may be considered the most extensively cultivated of any genuine or unmixed variety in Scotland. Ear medium sized, thick, tapering a little towards the point, slightly pendant or bending to one side; grain rather large, elongated, tapering very slightly towards the extremity, plump, and of an uniform dull white or very light brownish colour throughout.

Specimens by Captain Hunter, Tynefield, of crop 1833, weighing $65\frac{1}{2}$ lb. per bushel, grown on the same farm for at least sixty years, without change of seed; of crop 1834, sown in spring, after turnips, weight $63\frac{1}{2}$ lb., produce per imperial acre, $5\frac{3}{4}$ quarters; and of crop 1835, weighing from 64 to $65\frac{1}{2}$ lb. A sample in straw by the late Rev. William Stark, Dirleton Manse.

Sown at Meadowbank Nursery, 31st October 1834; in ear June 30, and ripe August 24. 1835.

3. MUNGOSWELLS WHEAT.

This variety is the produce of a few ears presenting a superior appearance, which Mr Patrick Shirreff, Mungoswells, East-Lothian, discovered in a field some years since. It is generally accounted a few days earlier, and tillers more freely in spring than the preceding; it is also said by some to be more prolific, but this again is disputed by others. In sample this sort is so like the preceding as often to be mistaken by dealers for it, and *vice versa*.

Samples in grain from Mr Patrick Shirreff, and in straw by Mr A. Gorrie, Annat Garden, Carse of Gowrie.

4. UXBRIDGE WHEAT.

Is so named from being originally from the neighbourhood of Uxbridge, in the county of Middlesex. Ear large, and very compact,

tapering very little towards the point, and hanging a good deal to one side. Grain rather small, short, plump, and of a very white colour, forming altogether a beautiful sample, and is much esteemed by the London millers, by whom it is preferred to any other variety.

Sample in grain by General Durham of Largo, Fife, weight per bushel 65 lb.; and by Messrs Jacob Wrench and Sons, seedsmen, London. Sample in straw by the late Rev. William Stark, Dirleton Manse.

From the trials which have been made of the Uxbridge wheat in this country, it appears to be perfectly suited to our climate, very prolific, and deserving of attention from cultivators. It may be considered two or three days later in ripening than the last mentioned variety.

5. CHIDDAM WHEAT.

This variety was procured last year from Marklane, by Mr Robb, Gorgie Mains, near Edinburgh, under the above name. Its grain is slightly more elongated than that of the preceding, rather thinner in skin, and more transparent or flinty like.

Samples in grain by Mr Robb, weight about $65\frac{1}{4}$ lb. per bushel.

It is a prolific variety, a free grower, and tillers freely in spring.

6. WHITE ESSEX WHEAT.

This variety resembles the Uxbridge wheat in its ears, and Hunter's or Mungoswells in the size and shape of its grains; but differs from them in being of a whiter colour, more transparent, and thinner skinned. This is also an esteemed sort by the English millers, but has not been sufficiently tried in Scotland to ascertain whether or not it be well adapted for our climate.

Samples of crop 1834-5, by Messrs Jacob Wrench and Sons, seedsmen, London, weight 65 lb. per bushel.

Sown at Meadowbank Nursery, October 31. 1834. In ear July 6, and ripe August 28, 1835, being about four days later than Hunter's wheat; and was also considerably longer in straw than any of the preceding, which were grown side by side with it.

7. JEFFRAY WHEAT.

Ear and grains smaller, and tapering more towards their points than those of Hunter's wheat, than which it is five or six days longer in arriving at maturity, and shorter in straw.

Sample in grain, crop 1833, by the Very Rev. Principal Baird.

8. GREGORIAN WHEAT.

Compared with either Hunter's or Mungoswells' wheat, the ears of this sort are longer, but its spikelets are more remote, the straw is more stiff and upright, the ear being less bent to a side, and the grains are shorter, rather lighter in colour, and more transparent. It is hardy, tillers well in spring, and is deservedly esteemed.

Specimens in ear by Messrs Drummond and Sons, nursery and seedsmen to the Agricultural Association of Stirling; and by Mr Thomas Shaw, Rait, Carse of Gowrie.

9. WHITE GOLDEN DROP.

Easily distinguished from all the preceding by the closeness of its spike, and by having more generally four grains in each spikelet (a circumstance of rather rare occurrence in the varieties of *T. sativum*, they having in general but three). In this respect it may be supposed a variety of *T. turgidum*, but it differs from that not only in the shortness of its awn, which is seldom more than the length of the floret, and that only towards the point of the spike, but also in its not possessing that strong and coarse appearance, both in straw and sample, for which the turgid wheats are so distinguished.

Samples in grain and straw, crop 1835, by Mr A. Gorrie, who discovered it the previous season, in a field of common wheat. Chaff of a dull white or very light brown colour. Grain light brownish-yellow or copper coloured, large sized, and of medium quality. Straw rather above the average length. Ears a good deal pendant.

10. TALAVERA WHEAT.

This variety was originally introduced from Spain into the south of England, and from thence into France about 1814 or 1816. Some years since it was a good deal cultivated in the Lothians and other wheat districts of Scotland. But at present an opinion is prevalent amongst farmers that it is too tender to withstand the ungenial weather so frequent in this country during the spring months, and that it does not tiller freely. Its cultivation has therefore been in a considerable degree abandoned. Straw about an average length; ears long, thin, tapering to the extremity, and upright; grains very large, and of a whitish semi-transparent colour.

Sample in straw by the late Rev. W. Stark, and in grain under the name of *Froment de Talavera* by Messrs Vilmorin and Co. seedsmen, Paris.

Sown October 31. 1834; in ear 18th June, and ripe about the 18th of August 1835, being about a week earlier than any of the common winter wheats; from which circumstance it might be advantageously sown as a spring wheat. At present there is scarcely a genuine unmixed sample of this sort to be procured, but it might repay the trouble and attention requisite in raising it unmixed.

11. WHITE DANTZIC WHEAT.

Straw medium length; ear long, tapering, small, and thinly set; grain elongated, very small, and of a beautiful white colour. Although this sort yields a most beautiful sample, yet from its unproductiveness it does not appear that its cultivation in this country would be attended with any beneficial advantage.

Sample in grain by Mr L. Marshall of Gibson & Co., Dantzic; weight $62\frac{1}{2}$ lb., crop 1834; and in straw and grain by Mr A. Gorrie, crops 1834, 1835, grown at Annat Park.

12. RED DANTZIC WHEAT.

This variety differs so little from the last, that it has been considered as well not to separate them, by placing the present amongst the red wheats. The colour of the ears is a light reddish-brown, and that of the grains is only a slight shade darker than those of the last sort; in other respects they bear a marked resemblance.

In grain and straw by Mr A. Gorrie; and by Mr L. Marshall of Gibson and Co. Dantzic, a sample of mixed Dantzic wheat, weight $61\frac{1}{2}$ lb., and another of high mixed do. weighing $62\frac{1}{2}$ lb. per bushel.

These Dantzic wheats are rather late in ripening, and the samples from Mr Gorrie, which were grown by him in the Carse of Gowrie, are very inferior in appearance to those by Mr Marshall from Dantzic; thus shewing that our climate is not so well adapted for its culture as that of the countries adjacent to the Baltic, from whence it is imported, and where, in 1834, the crop was abundant and of excellent quality.

13. WHITE VELVET OR WOOLLY-EARED WHEAT.

Also known in Sussex and Kent, where it is much cultivated, by the names of Hoary, White, and Stuffed wheats; also by the name of Hedge wheat (*Blé de Haie*, Fr.); but this latter is also applied to other varieties. Straw short, ears small, but close and compact; chaff white, covered with a fine velvety-like down; grains middle

sized, well formed, of a semi-transparent whitish colour. This is a favourite variety with the London millers, on account of its yielding little bran and a fine white flour. In Scotland its cultivation has often been attempted, but never carried to any great extent, from an opinion being prevalent amongst growers, that its woolly chaff is apt to retain the moisture in damp seasons, thereby materially injuring the sample, by discoloring it, and causing it to sprout. It is therefore seldom met with in this country, except when mixed among the common white (No. 1).

Sample in straw and grain by Messrs Drummond and Sons, Stirling, under the name of Downy Kent wheat; and in grain by Messrs Vilmorin and Co., Paris, under the names *Blé de Haie ou Froment blanc velouté*.

Introduced into France from the south of England upwards of twenty years since, and is now cultivated pretty extensively in that country.

14. WHITE HUNGARIAN WHEAT.

Froment blanc de Hongrie.—Fr.

Note.—This, and all the other cereal grains which have the French synonyms attached, were procured from Messrs Vilmorin, Andrieu and Co., seedsmen, Paris.

The white Hungarian wheat is said to have been first introduced into the neighbourhood of Blois (province of Orleanois) from England some years since, and its cultivation is now attended with much success both in that district and in several others of the north of France, where it is sometimes known by the name of *Froment blé Anglais* or *English Wheat*. Spike white, of medium length, very compact, and square-like, terminating abruptly, or not tapering to the extremity; chaff smooth and thin, spikelets containing four grains, which are small, short, and rounded, white, and slightly transparent.

Weight 66 lb. per bushel, being the heaviest as well as the finest and most beautiful sample in the Museum.

Of all the foregoing varieties, this bears most resemblance to the *Uxbridge* and *Chiddam* wheats, from which, however, it is easily distinguished; it is a week or nearly so longer in ripening than the common sorts, but is, from its superior qualities, well deserving of a fair trial in this country.

15. WHITE FLANDERS WHEAT.

*Froment blanc de Flandres, Froment blanc de Zee, Ou Froment
Blé blaze de Lille.—Fr.*

This variety is held in great esteem in the Northern Departments of France; it apparently differs little from the White Essex (No. 6), and that small difference may be merely the effects of climate and cultivation.

16. WHITE NAPLES WHEAT.

Richelle blanche de Naples.—Fr.

Is much cultivated in the southern provinces of France. Spike long, not very compact; terminal spikelets, having short awns (from a quarter to an inch long); chaff delicately tinged with a dull yellow or copper colour; grains large, considerably elongated, and of a yellowish-white colour; weighs well in sample.

This sort has been introduced for some years into the neighbourhood of Paris, but not with the expected success, the climate being considered too cold for it in winter. There is therefore no chance of its being grown to advantage in this country, particularly as it ripens very late in the season, and the grains, although equally large, acquire more of a hard, horny, or flinty nature than when grown in the south of France.

17. WHITE TOUZELLE WHEAT.

Touzelle blanche.—Fr.

Ear or spike rather more compact than in the last variety, chaff of the same colour, but exceedingly thin and brittle, so that when very ripe the grains are apt to be shaken out by the least wind. Grain of a brownish-yellow colour, but said to be much whiter when grown in Provence, and other parts of the south of France, where only it is cultivated, it being also too tender to endure the winters in the latitude of Paris.

18. WHITE BEARDLESS ODESSA WHEAT.

Froment blé d'Odessa sans barbes.—Fr.

Of a considerable number of wheats introduced into France from Odessa at various times, this seems to be almost the only one meriting, or at least retained in cultivation. It was first introduced into the province of Auvergne, by M. Bonfils, where its cultivation is rapidly increasing, notwithstanding it is more sensibly affected by

cold than the common wheats of the country. Spike rather loose and irregular, in colour inclining to a light brown; grains long, and tapering slightly towards the point; above an average size, and whitish coloured.

The French say that it is equally applicable for spring as for winter sowing, but, be this as it may, a sample sown last year in Meadowbank Nursery was later than any of our common winter wheats by nearly a fortnight.

*** Varieties of T. SATIVUM, generally termed Red Beardless Winter Wheats, from the reddish colour of their spikes or ears, and their being more particularly adapted for winter sowing.*

19. COMMON OR OLD RED WHEAT.

This seems to be the same with the *Froment rouge ordinaire sans barbes*, or *Common Beardless Red Wheat* of the French. Spike medium sized, nearly upright, spikelets not very close set; grain elongated, and of a dull reddish colour.

It is still cultivated to a pretty considerable extent on very strong clay or tenacious soils in the north of France; but in this country it is almost entirely superseded by some of the more prolific and superior varieties, particularly the next following.

20. BLOOD-RED WHEAT.

This sort was introduced some years ago into East Lothian from the London market, and its cultivation has now extended over most of the wheat districts of Scotland. It is very prolific; but, like the rest of the red wheats, less esteemed than the white sorts; millers and bakers not giving so much per quarter for it by two or three shillings; they, however, find it often very convenient to mix its flour with that of the white kinds, in the proportion of a fourth part or so. The straw of the blood-red wheat is long, rather stout, and not apt to become lodged. Ears large, of rather a bright brownish-red colour, tapering very slightly to the point. Spikelets close and spreading. Grain medium sized, of a dark yellowish or copper colour, especially at the thickest end; the other being generally darker, and more transparent; slightly triangular or cornered on the sides.

Samples in grain and straw by Mr A. Gorrie; and in straw by the late Rev. W. Stark, Dirleton.

21. GOLDEN OR RED ESSEX WHEAT.

This differs from the last variety, by its ears being less compact, longer, and more tapered towards the point; and in its grains being longer, not so round and compact, and more obtusely angled on the sides. It is also very hardy, prolific, and much esteemed.

Specimens in grain and straw by the Rev. Mr Noble, St Madoes; and by Mr Smith, Dumgreen, Carse of Gowrie, Perthshire.

22. RED KENT WHEAT.

Spike resembling that of the last, but its grains are much larger, of a more uniform and darker colour, and also more transparent, hard and flinty.

Specimens in grain by Messrs Jacob Wrench and Sons, seedsmen, London; weight 65 lb. being considered a very superior sample.

23. LAMMAS OR RED ENGLISH WHEAT.

Froment blé Lammas; ou, Blé rouge Anglais.—Fr.

Originally from England to the north of France, where it has been cultivated with a considerable degree of success; but although taken from a northern to a southern latitude, it is found less adapted for withstanding the winter in the neighbourhood of Paris than the common red wheat (No. 19). This can only be accounted for by the winter in that part of France being generally colder than in England. Form of the ears more waved than in those of the last mentioned sort, also thinner, and not so much reclined or bent to the side. Spikelets bright red towards the extremity, lighter and more of a copper colour towards their insertion into the rachis.

The French consider this sort as yielding the finest sample of any of their red wheats. It is, however, liable to be shaken when fully ripe, and should, therefore, be cut a day or two before arriving at full maturity. In the quality of its sample, this variety very much resembles that of the Red Kent, to which it also bears a marked resemblance in its general character; so that they are very probably of the same origin, and owe any distinction more to the effects of a difference in climate, soil, or culture, than to any thing else.

24. RED GOLDEN-DROP WHEAT.

Spike similar to that of the *Blood-red* (No. 20); straw shorter, and requiring a few days longer to arrive at maturity. Grain about the same size. More uniform and lighter in colour; also rather

more elongated and rounded on the edges. It is, however, no better liked by the millers.

Sample from Marklane, crop 1834; and also by Mr A. Gorrie. In straw and grain, crop 1835.

25. PURPLE STALKED GOLDEN-DROP.

Spike darker in colour, and more compact than that of the last; straw also of a dark purple, particularly a few days before ripening. Grain rather brighter in colour; in other respects similar.

Specimens in grain and straw by Mr A. Gorrie, Annat Garden, who picked it and the three following sorts in a field of common wheat, 1834. This variety seems deserving of cultivation.

26. WHITE-STALKED MOUSE-TAIL RED WHEAT.

So named from its having a long thin tapering pointed spike. Grain elongated, of a brownish-yellow colour, irregularly interspersed with dark semi-transparent spots or blotches. Seems rather unproductive, and not deserving of cultivation.

27. RED-STALKED MOUSE-TAIL WHEAT.

Distinguished from the last by having purple coloured straw, and darker red ears; grain also darker in colour. Seems also an inferior sort.

28. SULPHUR-COLOURED WHEAT.

Ears somewhat more compact than those of the two last sorts; grain shorter, more plump, and of a yellow sulphur-like colour. May be considered as rather a good sort.

29. RED BEARDLESS CAUCASIAN WHEAT.

Blé du Caucase, rouge sans barbes, Fr.

Spike dull red, long and upright; spikelets remote, large, and spreading; chaff thick and hard; grain elongate, semi-transparent, rather above the medium size, hard and flinty.

This is one of the earliest red winter wheats; and is in France sometimes sown as a spring wheat. The sample appears very inferior, and seemingly not deserving of cultivation in this country.

30. VELVET OR WOOLLY-EARED RED BEARDLESS WHEAT.

Spike short and compact; grain slightly elongated, dark red, and flinty. Medium prolific; but like the White Velvet-eared variety little esteemed, from its woolly ears being supposed to retain the moisture in damp weather.

31. RED VELVET OR WOOLLY-EARED WHEAT OF CRETE.

Blé rouge velu de Crete.—Fr.

Spike deep red, downy, compact; spikelets large and spreading, containing four and often five grains, which are short and slightly angular, of a reddish opaque-yellow colour.

Sample rather of a superior quality.

32. HECKLAN'S RED WHEAT.

A new variety obtained from England this season, said to be extraordinary productive.

Sample in grain by Mr Dudgeon, Leith.

*** *White Wheats, varieties of T. SATIVUM, more particularly adapted for spring sowing; but which, from having no, or at least very short, awns or beards, belong to that class generally termed varieties of T. hybernum or Winter Wheats.*

33. LEGHORN OR TUSCANY WHEAT.

Grano Marzolino.—Ital.

Cultivated in the south of Europe for its straw, which is there employed for the purpose of making the famous Leghorn plait; it was introduced into this country for the same purpose, but is now entirely superseded by the common rye. This name, however, appears not to apply to any one particular variety, but rather to a mixture of White, Red, Bearded, and Beardless sorts; the white beardless varieties seem, however, to be the most numerous. The whole seem to belong to the early or spring sorts, which is no doubt caused by their being sown in their native country always in March, on light sharp sandy soils on the banks of the Arno. When intended for plait, the seed is sown very thick and the plants pulled when in flower, or before the grain is formed, when they are generally about eighteen inches in height. It is then bleached and tied up in the same manner as we do flax, previous to selecting the portion of the stalk to

be used in the manufacture, which is that between the ear and the first knot or joint of the straw.

34. WHITE BEARDLESS TUSCANY WHEAT.

Spikes long, spikelets not very close set ; grains light coloured, clear, transparent, and thin skinned, forming a good sample, and seems to be very prolific.

Specimens in grain and straw by Mr A. Gorrie, who is cultivating this variety for a spring wheat. He picked it some years ago in a field for Leghorn wheat, the seed of which he had from Messrs Lawson and Son, who imported it from Leghorn.

Weight of the above mentioned sample in grain about 63 lb. per bushel.

35. COMMON WHITE BEARDLESS SPRING WHEAT.

Froment de Mars blanc sans barbes.—Fr.

Spike long, small, and tapering ; spikelets remote ; grain short, plump, and of a dull yellow or brownish colour. This variety is cultivated as a spring wheat in the central districts of France to as great an extent as any of the winter sorts. But in general, it is much mixed with the Common White Bearded Spring Wheat of that country.

36. WHITE SPRING WHEAT OF FELLEMBERG.

Froment blé de Mars de Fellemborg.—Fr.

Spike very white ; spikelets broader and more closely placed than in the last sort ; grains small, slightly elongated, of a clear transparent reddish colour, very hard or flinty. This seems a very vigorous growing wheat ; but, owing to the smallness and hardness of its seeds, and its great liability to shake when ripe, its cultivation in France is by no means extensive.

37. HARD SPRING WHEAT.

Froment blé pictet de Mars.—Fr.

This sort is considered by the French as merely a subvariety of the last ; and, like it, also procured by them originally from the neighbourhood of Fellemborg. It differs, however, in having less flinty grains and stronger chaff, on which account it is not so easily shaken. Neither this nor the last sort are, however, much cultivated in France, No. 34. being considered much superior to either.

* * * * *Red Beardless Wheats, varieties of T. SATIVUM, which are more particularly adapted for Spring Sowing, although not included by botanists under the specific name of T. ÆSTIVUM or Spring Wheat, from their having almost no awns.*

38. RED BEARDLESS TUSCANY WHEAT.

Ear of a darkish red or brown colour, large, rather compact, and bending to one side, bearing a considerable resemblance to the Blood-red Wheat, than which its grains are larger, more pointed, and of a more uniform yellowish-brown colour; it is also eight or ten days earlier in ripening than when sown at the same time.

Specimen in grain, by Mr A. Gorrie, who gathered it some years since from Leghorn Wheat, along with No. 33.

It seems to merit cultivation, and, as well as the *White Tuscany*, ripens almost as early, although sown in March, as if sown in autumn.

39. COMMON RED BEARDLESS WHEAT OF FRANCE.

Froment blé de Mars rouge sans barbes.—Fr.

Originally introduced into France from the north of Germany; spike pale red; spikelets close set; grain reddish, rather hard or flinty, and of medium size.

In France this sort has not received a very extensive share of cultivation, neither does it seem deserving of such.

* * * * * *This division consists of White Bearded Wheats, generally termed varieties of T. ÆSTIVUM or Summer Wheats; a name, however, by no means applicable to some of them, which are equally hardy, and require as long to arrive at maturity as the generality of the Beardless Winter Wheats. Those more particularly adapted for spring sowing are marked thus †.*

40. COMMON WINTER BEARDED WHEAT.

This variety is scarcely to be met with in cultivation. It may however, often be seen mixed in small quantities with Common White Winter Wheat (No. 1). Spike thin, short, and tapering to the point; grain small, elongated, of a light reddish colour, rather hard and flinty. Awns considerably longer than the spike.

This is a comparatively worthless variety.

41. WHITE BEARDED SHANRY WHEAT.

Ears longer and more compact than those of the preceding ; beards or awns much shorter ; grains larger and softer, of a light yellowish colour.

Specimen in grain and straw, by Mr A. Gorrie, who picked it in a field on the Farm of Shanry ; hence its name.

This is certainly a very superior variety of bearded winter wheat.

† 42. WHITE BEARDED TUSCANY WHEAT.

The appearance of the ear differs little from that of the former, except in having rather longer awns ; grain longer, more plump, and of a very light colour ; it is also earlier, and better adapted for spring sowing.

Sample very superior in quality. In straw and grain by Mr A. Gorrie, who selected it some years since from a quantity of Leghorn Wheat, and is cultivating it for spring sowing.

† 43. CHINESE BEARDED SPRING WHEAT.

This variety was introduced from Germany by J. C. Loudon, Esq. conductor of the Gardener's Magazine, &c. and by him distributed amongst several cultivators in various parts of Britain. Such as were tried in Scotland were so completely destroyed by rust in the ears during the first season of their growth, that not one seed could be got capable of vegetating, and thus the variety was completely lost for that time. Its liability to be so much affected by rust might be supposed to argue a tenderness in its constitution, and consequent unfitness for this climate ; but this by no means follows, it being a well-authenticated fact, that wheats imported from the Continent are often very much affected in the same manner the first season, although afterwards they became as hardy, and free from that disease, as our common winter sorts. Ear nearly similar to that of the last ; grain white, slightly transparent, a little elongated, and well filled forming an excellent sample.

Mr Lawson procured a small sample of this sort when in Russia (summer 1834), from Professor Fischer, St Petersburg, under the name of Kalmynta or Chinese Wheat, which was grown at Meadowbank Nursery last season, along with the rest of the collection ; it was, however, much injured by rust, but a few grains have arrived at that maturity which warrants a fair chance of their vegetating.

† 44. VICTORIA WHEAT.

“Of the wheat in the neighbourhood of Victoria, in the Province of Caraccas, which Humboldt, in his *Personal Narrative*, p. 104-7, has noticed as being very productive, and as ripening in Victoria in seventy or seventy-five days from the sowing, Dr Hamilton, No. 15. Oxford Place, Plymouth, has received seeds from Sir R. K. Porter, and distributed them in small quantities to various individuals in Britain. He has sent us 125 grains, which we have placed in hands that will properly apply them,” &c.—*London's Gardener's Magazine*, vol. ix. p. 700.

Sample in straw, crop 1834, by Mr A. Gorrie, being the produce of part of the above mentioned seeds received from Mr London. Also a sample in grain, received by Mr A. Gorrie from Dr Hamilton, who had it direct from Caraccas, 14th August 1834; and in straw, part of the produce of this sample, which was sown at Annat Garden 10th June, and cut 16th September 1835, nearly ripe. Straw rather shorter than that of common wheats; ears also short, but pretty compact, whitish coloured; awns fully as long as the ears, spreading; grain long, reddish coloured, slightly cornered and flinty, rather small in size.

45. LIGHT YELLOW-BEARDED WINTER WHEAT.

Froment barbu d'hiver à épi jaunâtre.—Fr.

Spike compressed; beard long and spreading; grain medium sized, reddish-yellow in colour.

This wheat was formerly very much cultivated in France; but as agricultural improvement advances, it seems to give place to the white beardless varieties. It is nevertheless hardy and productive, and still cultivated pretty extensively in the province of Ardeche. It is also, according to M. Creuze-Delessor, the principal wheat in the department of Vienna, where it is much esteemed, both by millers and bakers.

† 46. COMMON BEARDED SPRING WHEAT OF THE FRENCH.

Froment blé de mars barbu ordinaire.

Spike small, and more pyramidal than that of the last; grain shorter, and a shade lighter in colour.

Formerly the most extensively cultivated spring wheat in France.

† 47. TUSCANY WHEAT (for making Straw Hats).

Froment blé de Toscane à chapeaux.—Fr.

This sort very much resembles the last, but grows rather taller, and is a shade yellower in colour when ripe. It differs also from the *White-bearded Tuscany* (No. 42) in being smaller, and less compact in the ear, and in its grains, which are also smaller, flinty, and of a light reddish colour.

† 48. CAPE WHEAT.

Froment blé du Cap.—Fr.

Ears white and long; spikelets and awns spreading, the former placed closer on the rachis than in the generality of bearded wheats; grain elongated, larger, and in general well filled, whitish coloured, and forming rather a superior sample.

The French reckon this one of their best spring wheats; they find, however, that it is apt to degenerate unless the seed be often changed. And it does better in the south than in the north of France.

† 49. SMALL SICILIAN BEARDED SPRING WHEAT.

Froment blé de Mars barbu de Sicile.—Fr.

This differs from all the preceding varieties of bearded wheats, in the closeness of its spike, and in the hard-like, smooth, shining appearance of its chaff, which resembles in some degree that of the large Sicilian wheat (No. 71), but differs also from it in the shape and texture of its grain. Ears rather under the medium size; spikelets contracted, and slightly imbricated; grains rather above the medium size, slightly elongated, and flinty; awns upright, longer than the spike.

50. WOOLLY-EARED WHITE-BEARDED WHEAT.

Differs from the *White-bearded Shanry Wheat*, (No. 41), in having its ears covered by a fine wool or down.

Specimen in straw by Mr A. Gorrie, who found it along with the Shanry Wheat above mentioned.

There are doubtless many sub-varieties of this as well as of the other downy or woolly wheats (enumerated in the present list under the name of *T. sativum*), possessing various degrees of merit, but as cultivators seem to have a prejudice against woolly wheats in general, the varieties are hitherto little known.

***** *Red, awned or bearded Wheats, varieties of T. SATIVUM, but which are generally denominated varieties of T. ÆSTIVUM, or Summer Wheat. Those more particularly adapted for Spring sowing are marked thus †, as in the last division.*

† 51. FERN WHEAT.

Spike very long (about six inches), compressed, of a light reddish colour; spikelets and awns spreading, the former very remote and often containing four grains, and the latter considerably shorter than the spike; grains elongated, and of a bright light reddish colour, rather flinty.

Specimens in grain and straw by Mr James Young, land-surveyor and valuator, Perth, grown by him at Pitfour, Carse of Gowrie, sown 11th March and reaped on the 11th August 1834; average produce per acre, $4\frac{3}{4}$ quarters. Specimens also in grain and straw by Mr A. Gorrie, crop 1835.

This variety of wheat was introduced into the Carse of Gowrie in 1829, by Mr James Ross, then farmer at Moorhall, who procured it from a corn factor at Marklane. Mr Young has grown it for four years, generally sowing it in the last week of March, and has always found it to ripen as early as any of the winter wheats sown in October or November previous.

The following extract, from an account of the Fern wheat, by Mr Young, published in the Report of Dickson and Turnbull's Agricultural Museum at Perth, 1834, serves to shew its value as a spring wheat, compared with some of the commonly cultivated winter sorts:—

“When sown along with *Common White*, and *Red Essex Wheats*, on the 26th March 1833, the Fern was cut on the 27th August, and the others on the 30th of September, making a difference in favour of the Fern wheat of thirty-four days.

	Produce per acre.	Weight per bushel.
Fern Wheat, . . .	4 qrs. 4 bush.	63 $\frac{1}{4}$ lb.
Red Essex, . . .	3 do. 6 do.	62 $\frac{1}{2}$ lb.
Common White, . .	3 do. 3 $\frac{1}{2}$ do.	60 $\frac{1}{4}$ lb.

“This difference both in quantity and quality in favour of the fern wheat arises entirely from its early ripening; the weather having set in dull and wet for two weeks previous to the other sorts being cut, and continuing so the greater part of the time they were in stook. It requires to be carefully pickled before sowing, being

very liable to smut, and should not be allowed to stand till over ripe, being very apt to shake." The fern wheat is cultivated as a spring wheat in several parts of the Carse of Gowrie.

† 52. RED BEARDED MENDOZA WHEAT.

Introduced from Mendoza by Sir John Sinclair, Bart. This sort bears a considerable resemblance to the last; but has stronger chaff, with larger and coarser grains.

† 53. RED CHINESE WHEAT.

Froment blé de Mars die Chine.—Fr.

This variety resembles the *Small Sicilian Spring Wheat* (No. 48) in all its parts, except the colour of its chaff and grain, which are of a dark reddish colour.

54. VELVET OR WOOLLY-EARED RED-BEARDED WHEAT.

This is a prolific early and hardy winter wheat, and might probably be found suitable as a spring wheat. Ears long, downy, and rather compact, of a dark reddish colour; grains large, flinty, and rather course; chaff hard, and not allowing the seeds to be easily shaken by the wind.

II. TRITICUM COMPACTUM.—COMPACT OR SQUARE-EARED WHEAT.

The different varieties to which this name is applied are distinguished from the common beardless wheats by the compact or square form of their ears; but as this alone is not sufficient to constitute a distinct species, they might more properly be also comprehended under the name of *T. sativum*. But from the specific name *compactum*, being more explanatory of the appearance of this tribe, it is in the present instance retained.

† 55. CHILI SQUARE WHEAT.

Blé de Chili—*Blé carré de Chili.*—Fr.

Straw and ears very smooth and white, of a stiff upright habit of growth; the latter seldom exceeding an inch and a half in length by about three quarters of an inch in breadth, a little compressed on two sides; spikelets narrow, two or three-seeded, placed remarkably close on the rachis (about six to the inch), and so as to form with it

an angle of 45° or thereabout ; grains about forty in each ear, small, elongated, and of a whitish colour.

† 56. SMALL SQUARE SPRING WHEAT.

Blé de Mars à épi carré.

Ears about an inch and a half in length by three quarters of an inch in breadth ; more square or less compressed than those of the *Chili Wheat* ; of a brownish-red colour, and, together with the straw, stiff and upright in habit of growth ; spikelets close set as in the preceding, and considerably more spread, containing in general three grains each, which are small in size, slightly elongated, and well filled ; forming a pretty sample, not unlike that of Red Dantzic wheat.

† 57. SQUARE SICILIAN SPRING WHEAT.

Blé de Mars carré de Sicile.—Fr.

This sort differs little from the last, except in the awns on the point of the spike being elongated to rather more than the length of the spikelets (they being almost wanting in the two last sorts) ; the grain is also of a brighter red, and more flinty.

This is reckoned in France to be one of their earliest spring wheats.

III. TRITICUM TURGIDUM.—TURGID WHEATS.

SPECIFIC CHARACTERS.—Spike always bearded (but in some of the varieties the beards or awns are easily detached by winds when fully ripe, which gives them a beardless appearance), compact ; generally but not always, with four equal sides ; when otherwise, the two narrowest sides are generally those on which the spikelets are attached to the rachis. In most of the varieties the awns and angles are arranged in four straight parallel lines. Spikelets close set, generally much spread. Glumes much swollen, and terminated abruptly, with their dorsal nerves very prominent, and ending in acute points. Grain large, irregularly angular-shaped or depressed, caused by their being so much crowded together in the spike or ear.

Samples on the whole coarse, and of rather inferior quality, compared with those of the more common varieties of *T. sativum*.

The Turgid wheats are generally hardy, vigorous, and very productive ; having long, hard, and often almost solid straw, so coarse in quality as to be disliked by cattle ; where, however, straw thatch

is reckoned an article of importance, no sort, excepting perhaps the next species (*T. compositum*), could be cultivated to more advantage, provided the soil and climate are suitable. The soils best adapted for the growth of the Turgid wheats, are those of a strong rich clay or tenacious nature, and such as the common wheats are apt to become lodged in, the strong straw of the Turgid wheats, notwithstanding the heaviness of their ears, being fully capable of standing under any ordinary circumstances. They may all be said to belong to the latest class of winter wheats, and, therefore, are only adapted for earlier climates. With all these qualities and defects, the Turgid wheats are not cultivated to any great extent in Britain, or in France except in the southern districts.

* *Turgid Wheats, having smooth ears.*

58. SMOOTH WHITE TURGID WHEAT OF MONGOKE.

Blé de Mongoke.—Fr.

Spike very large, white, and square, or having the lateral florets pressed in, as it were, so as to give the spike somewhat of a cylindrical form; awns long, straight, and rigid; grains long, irregularly shaped, large, white, and thick skinned; straw very long, and nearly solid.

Specimen in Museum, two ears brought by Mr Lawson from the Continent in 1833.

59. SMOOTH WHITE TURGID WHEAT OF TAGANROCK.

Poulard blanc lisse, epaule blanc du Gatinais, blé de Taganrock.—Fr.

Spike scarcely so long as in the last, and a shade darker in colour; spikelets not so close; straw shorter, softer, and more hollow; grain smaller than in most of the Turgid wheats, and more regularly formed, of a yellowish-brown colour, seldom transparent or flinty.

This is one of the earliest, as well as one of the most esteemed Turgid wheats.

60. LOZERE TURGID WHEAT.

Blé Garagnon de Lozère.—Fr.

Spike shorter than in the last, not so close, and less regular; seed whitish-yellow, thin skinned, and of excellent quality.

This variety is much cultivated about Lozere, where it is often used, boiled or cooked in the same manner as rice.

61. RED SMOOTH TURGID WHEAT; LARGE RED WHEAT, OR RED UPRIGHT WHEAT OF GATINAIS.

Poulard rouge lisse; gros blé rouge; épaupe rouge des Gâtinais.—Fr.

Spike long, square and compact, of a dull reddish colour; glumes very smooth and shining; grains reddish, slightly compressed on the sides, or angular, soft, and of medium quality.

Very much cultivated in the central districts of France.

62. CHINESE TURGID WHEAT.

This variety was received by Mr Lawson in St Petersburg, 1834, from Professor Fischer, under the name of *Doragana*. Ears white, large, and very compact, square, and slightly pendulous; glumes a little elongated and shining; awns liable to be broken off by wind when ripe; grains rather large and flinty.

*** Turgid Wheats with Downy, Woolly, or Velvet Ears.*

63. CONE RIVET, ANTIFLY, OR GERMAN THICKSET WHEAT.

Described by Miller in his Gardener's Dictionary under the names *T. quadratum*, *Square Wheat*, *Pendulum Wheat*, &c.

Poulard blanc velu.—Fr.

Ears very white and velvety, about four inches long and three quarters of an inch in diameter at the base, tapering towards the point, square, very regular and compact; awns straight, about as long as the ears, placed in four straight rows, on the angles of the spike, with two rows of shorter awns arising from the outer paleæ of the middle fertile floret in each spikelet. These short awns lie close upon the ear, not spreading as the larger ones. Spikelets containing three or four fertile florets, and generally two towards the point of the spike; glumes and paleæ short and very round, the latter scarcely covering the seed when ripe; the ears become pendulous as they approach maturity, and contain on an average about seventy-two grains; the awns are generally broken off when ripe, particularly if the weather should happen to be windy, so that the whole assumes the appearance of beardless wheat; grain a little compressed and wrinkled, whitish-yellow, soft, and considerably larger than that of common wheat.

Sample inferior, and not well liked by bakers; straw long, strong,

and hollow ; requires nearly a fortnight longer to ripen than common wheat (No. 1).

This sort has been cultivated, although sparingly, in the Carse of Gowrie for the last six or eight years. It is found to answer best in strong clay soils, and although a vigorous grower, it yields a scanty supply of foliage, and is thought to be rather an impoverishing crop for the soil. Some years since, when the wheat-fly was so destructive, this variety was found to be scarcely affected by it, hence it has received the name of Antifly. On favourable soils, it often yields several bolls per acre more than the common sorts, and is certainly one of the most beautiful wheats when growing which can well be imagined.

Sample in straw by Mr Hogg, nursery and seedsman, Dunse ; from Mr Smith, Mountmorns, communicated by Mr James Bishop ; by Messrs Jacob Wrench and Sons, seedsmen, London ; and in straw and grain by Mr A. Gorrie.

64. COMMON RIVET WHEAT OF ENGLAND.

Spike smaller and less compact than that of the last ; awns more adhesive when ripe ; glumes and paleæ considerably larger and more elongated than those of the Cone Rivet ; grains also longer and more flinty.

This sort requires still longer to arrive at maturity than the preceding, on which account it may be deemed unfit for the climate of Scotland. In the south of England it is cultivated on the strongest clay soils.

65. POLE RIVET WHEAT OF ENGLAND.

Spikes of a lightish brown colour, more compressed and irregularly shaped than those of the last, broadest side (contrary to the generality of Turgid wheats) that on which the spikelets are inserted into the rachis ; spikelets towards the base containing four grains, and three in those towards the top of the spike ; grains long, reddish, and flinty ; awns falling off when ripe.

Like the former, this variety is very late, and only grown on strong soils in England. It seems the same with that known to the French under the name of Polard rouge bleu, Gros blé rouge, &c. which is much cultivated in the south and eastern departments of France.

66. TURKEY WHEAT.

Blé gros Turquet.—Fr.

This seems a subvariety of the preceding; ears larger, thicker, and more regularly square, of a reddish ash colour, with larger and darker coloured seeds; sample rather coarse.

This variety is from a fortnight to three weeks later than Common White Winter Wheat (No. 1).

67. GIANT ST HELENA WHEAT.

Blé geant de St Helena.—Fr.

This sort was first introduced to France from St Helena, and latterly from the Baltic, under the name of *Blé de Dantzic* (certainly not the Common Dantzic Wheat), so that it probably might have been originally imported from thence to St Helena. Spikes larger and more irregularly formed than those of the preceding varieties, the lower spikelets being more enlarged, and diverging to the sides in a zigzag manner; grain also large (in length about $3\frac{1}{2}$ to the inch), and flinty, similar in quality, but more prolific than the last. Also a late sort.

68. RED, GREY OR BLUE, CONE OR RIVET WHEAT.

Poulard bleu, blé bleu conique.—Fr.

General appearance of the ears (except the colour, which is a reddish-blue or ash) the same as in Antifly, or Cone Rivet Wheat (No. 63), compared with which its grains are also darker in colour, and rather more flinty. Cultivated in England and the north of France, generally on strong clay and rich soils. It requires about the same time to ripen as the last, and is very hardy.

69. BLACK PETANIELLE WHEAT.

Pétanielle noire.—Fr.

Amongst all the varieties of Turgid Wheat, this is most conspicuous for the dark colour of its ears, and awns; the height of its straw, the size and abundance of its grains; its glumes and paleæ are of a bluish-black shining-like colour, and the awns, which are also dark coloured, fall off when ripe. In the neighbourhood of Paris this wheat has been much in demand for the last three years; but has not as yet had sufficient trial to ascertain whether or not it be so well adapted for the north as for the south of France, from whence it was first procured. Its grains are harder, darker coloured, and possessing the other defects peculiar to all the Turgid wheats.

IV. TRITICUM COMPOSITUM.

70. EGYPTIAN WHEAT.

Blé de Miracle, Blé de Smyrna.—Fr.

This is sometimes known by the name of Abyssinian Wheat. It is generally allowed to constitute a different genus from any of the preceding, botanists placing the distinguishing characteristics on the compound form of the spike; which is caused by the lower florets becoming elongated, and formed so as to make the whole resemble several spikes tied together, or a compound spike. This compound form is, however, by no means permanent, and when the spike assumes a simple form, it is not to be distinguished from the Turgid wheats. Glumes and paleæ of a glaucous reddish colour, and slightly downy; grain short, whitish-brown, and rather flinty; straw stiff and long, nearly solid, or filled with pith.

Samples, both with simple and compound ears, by Mr R. Hogg, nursery and seedsman, Dunse; Mr Stark, Cow-rigs, Kelso; and by Mr A. Gorrie.

Egyptian Wheat has often been introduced into several parts of Scotland, under different names, and has received sufficient attention, but its general produce and quality does not warrant its cultivation in this country. It is, however, partially cultivated in the southern parts of England, and France in particular.

V. TRITICUM DURUM—HARD OR HORNY WHEAT.

Froment dur, ou corné.—Fr.

This name is applied to a class of wheats which are easily distinguished from all the preceding, by their long-shaped, hard and flinty, or horny grains; large broad compressed ears; elongated spikelets; and large hard-like shining chaff. They are all awned, have stiff, short, upright straw, broad foliage, and the ears are in general very short in proportion to their breadth. The hard wheats are in general very early, and may be sown in spring; their cultivation has been several times attempted in Britain, but with little success, owing partly, no doubt, to the unsuitableness of our climate, and partly to their peculiar hardness, and, in the estimation of our bakers, inferiority of their samples. The chief range of their cultivation lies along the shores and in the islands of the Mediterranean, and along the shores of the Levant, as also in Arabia, Persia, and some parts

of India. The Arabs cook some of them in the same manner as they do rice, which they all resemble in the hardness of their grain.

Wheats of this sort are often imported for the London markets, but were at first very much disliked by millers, from the ordinary millstones being unsuitable for grinding.

71. HARD SICILIAN WHEAT.

Blé de Mars pictet de Sicile.—Fr.

This variety, together with the other Sicilian Wheat (No. 49), seems to form, as it were, the connecting link between the *common* and *hard wheats*, the latter bearing most resemblance to the *common*, and the former to the *hard* sorts. Spike square or approaching to a cylindrical form, about one-third of an inch in diameter, by about three in length; beards or awns considerably longer than the spike; glumes and paleæ long, smooth, white, and shining; grain medium-sized, elongated, hard, and horny, of a lightish-red colour.

72. GEORGIAN WHEAT.

Spike about 2 inches long, by from one-half to three-sixths of an inch in breadth, subcylindrical, compact, and a little irregular towards the base; spikelets long and pointed; glumes and paleæ long, whitish, and slightly downy; awns about twice as long as the spike; grains about one-third of an inch in length, by less than one-sixth in diameter at the middle, slightly triangular, and curved towards the ends, light red, very hard and flinty, or horny. Straw short, upright, and quite solid.

73. SIBERIAN WHEAT.

Spike and spikelets shorter and more compact than in the last, of a light brownish colour, and more distinctly downy; grains rather shorter, equally hard and flinty; straw a little hollow.

74. MOROCCO OR TANGIER WHEAT.

Spike larger and more irregularly shaped than in any of the preceding; grains larger, same colour, and equally hard.

This sort, together with several more varieties in mixture, differing from it chiefly in colour, was sent to this country several years ago by the British Consul at Tangier; they were tried in several parts, but their cultivation has been abandoned, or they are only to be met with in collections. Straw hard and upright, but generally hollow.

VII. TRITICUM POLONICUM.

75. POLISH WHEAT.

Glumes or outer chaff more than an inch in length, or twice the length of the florets; spikelets containing four florets, seldom more than two of which are fertile, the others being barren, at least when grown in this country; spikes long, loose, nodding to a side, and awned; awns about three times as long as the glumes, very brittle, and easily broken off when ripe; grains about half an inch in length, reddish, transparent, and very hard.

This wheat is at once distinguished by its long, loose, and chaffy-like spike, and its large grains. It is also named Polish Rye, Astracan Rye, Grecian Wheat, Wheat of Cairo, and sometimes Egyptian Wheat; but this name is more properly applied to the *Triticum compositum*, (No. 70). In Morocco it is known by the name of Mogadore Wheat. It seems quite unfit for cultivation in this country, and even in the north of France its tenderness, after repeated trials, has prevented the extension of its culture.

Although generally termed Polish Wheat, yet it appears to be rather a native of Africa, in various parts of which it is cultivated extensively.

Sample in straw, by the late Rev. Wm. Stark, Dirleton.

A wheat brought by Mr Lawson from Russia, 1834, and which was said to be cultivated extensively in the south of Siberia, turns out to be the same as the above.

VII. TRITICUM ZEA.

76. ZEA OR FAR.

This wheat is so named from being supposed to be the kind of grain termed Zea by the Greeks (the Far of the Romans), and not from any resemblance it has to the Zea Mais (Indian Corn), although sometimes termed Mays-like wheat, a name which to it is wholly inapplicable, nothing being more different in appearance than the thin meagre spike of *T. Zea*, compared with the large and closely filled ear of the Zea Mais. Ears long, almost beardless, thin, and upright; spikelets not so long as two joints of the rachis, three flowered, middle one barren; glumes and paleæ adhering to the grain, which is reddish and flinty, elongated and triangular. In threshing, the spikelets do not separate from the rachis, but break it, each retaining a joint attached.

This wheat was cultivated as food, and used in sacrifices by the ancient inhabitants of Italy. It is seldom to be met with now, except in botanical collections.

Sample in seeds by Mr C. A. Fischer, Inspector of the Royal Botanic Garden, Gottingen.

VIII. TRITICUM BENGALENSE.

77. BENGAL WHEAT.

This wheat was brought by Mr Lawson from Germany, under the above name, two years ago. It bears some resemblance to the last in the shape and remoteness of its spikelets, which adhere with equal firmness to the rachis; the straw and ears are, however, much longer, the latter containing about thirty-six grains, which are longer and more easily detached from the chaff than those of *T. Zea*. It is of a more luxuriant growth, and has an awn from two to three inches in length. This is altogether a much superior variety to *T. Zea*, and is remarkable as being the earliest wheat in the whole collection.

These two, viz. *T. Zea*, and *T. Bengalense*, seem to belong to a tribe of wheats having adhesive chaff and remote spikelets; *Epeautre* of the French, and named by them *T. spelta*, but which differ essentially in the form of the ears from our *T. spelta*, which they term *T. amyleum*.

IX. TRITICUM SPELTA.—SPELT WHEAT.

T. amyleum of some French authors, and also termed in France *d'epeautre*, *d'amylon*, ou *d'amilkorn*.

Spike compressed, bearded; spikelets long, closely imbricated, or overlapping each other, and smooth, containing three florets, but generally only two perfect seeds; chaff adhering to the grain, as in the two previous sorts; grain long, and irregularly triangular in shape, colour reddish, and transparent, but not hard. The sorts having red chaff have also their grains a shade darker in colour, as in the common wheats.

78. WINTER SPELT WHEAT.

Spike long, and slightly bending to one side; spikelets about as long as three joints of the rachis, containing generally two seeds, but sometimes three, especially towards the base of the spike; chaff whitish, rigid and shining; root leaves of the young plants narrow, and prostrated or lying on the ground.

79. SUMMER OR SPRING SPELT WHEAT.

This sort differs little from the last except in being about ten days or a fortnight earlier ; and the leaves of the young plants assume a stronger and more upright habit of growth.

80. RED OR BROWN TWO-ROWED, OR SPELT WHEAT.

Triticum dicoccon rufum of Germany.

This variety differs from the two last in the colour of its spike, which is reddish-brown, and slightly glaucous, particularly before ripening, and in its grains also being a shade darker.

81. WHITE BROAD SPIKED SPELT WHEAT.

Triticum platystachion of Germany.

Spikes considerably shorter, much broader, thicker, and more compact than those of the last three varieties ; spikelets more generally three-grained, about as long as four joints of the rachis.

82. RED OR BROWN BROAD SPIKED SPELT WHEAT.

Triticum platystachien rufum of Germany.

Spikes similar to the last in form ; colour reddish-brown, generally more or less of a glaucous or bluish hue, particularly before ripening.

X. TRITICUM MONOCOCCUM.

83. ONE-GRAINED WHEAT.

Froment ungrain et Petit epeautre.—Fr.

Spikes small, very much compressed, two-rowed, resembling barley ; spikelets close and imbricated, about as long as four joints of the rachis, two-flowered, only one of which are fertile ; barren floret with a short, and fertile one with a long beard or awn ; leaves and straw very small and rigid ; grain small, triangular, transparent, but soft and mealy.

In the four last mentioned species and their varieties, the chaff adheres so closely to the grain, as to be separated with difficulty, and only by the aid of machinery. Their culture has never been attended to in this country, but some of the spelts, particularly Nos. 78 and 79, might be cultivated on the high land, where the common wheat is either too tender to withstand the winter, or too late to allow of its ripening. Amongst the Alps of Switzerland the winter spelt is found to withstand the severest winters, at altitudes far above that at which

the range of the naked or commonly cultivated sorts terminate. And, independently of its grain, it might be substituted as an herbage plant for yielding a crop of green food for cattle early in spring, in late cold districts, from its tillering well, and yielding a considerably quantity of foliage. It is cultivated in Spain, France, Switzerland, and other places in the south of Europe, as also in some parts of Germany. The winter variety is sown in October, and the spring sort in February or March. The flour of the spelt wheats contains more gluten than that of the common sorts; it makes a superior, very white bread, and is much used by confectioners for pastry.

The cultivation of *T. monococcum* is chiefly confined to the mountainous parts of Switzerland. Its flour makes a good dark-coloured bread, but is more particularly adapted for gruel. It is equally hardy with the spelt wheat, but far inferior to it in quality and produce; however, it thrives on the poorest dry calcareous sandy soils where few others of the cereal grains would subsist, and yields straw, which, although short, is, from its firmness and durability, well adapted for thatching; for which the straw of the spelt-like wheats in general seems much better adapted than for fodder.

The following sorts have been lately added, so that an opportunity has not yet been afforded of growing and comparing them with the preceding.

By Messrs Drummond and Sons, Stirling.

CRAWLEY RED WHEAT, a turgid wheat, and seemingly the same as the *Red Cone* or *Pole Rivet wheat* of England. Also CREEPING RED; SMOOTH, AND BEARDED ITALIAN WHEATS.

By Professor Low, Edinburgh.

Specimen of *T. atratum* (Black Wheat).

Specimen of *T. hordeiformum* (Barley-like Wheat).

By Professor Fischer, St Petersburg.

A spelt-like wheat, under the name of *T. præmorsum*.

By Vilmorin and Co., Paris.

Froment gogrande mars; F. blé de mars d'Odessa; F. blé à barbu et bulbe violette; F. blé pictet de mars; and F. blé conzelle rousse.

Quantity of Seed required on different soils, and under different circumstances.

On rich lands in good condition, where the soil is strong loam or clay, and well drained, $2\frac{1}{2}$ to $2\frac{3}{4}$ bushels per imperial acre may be

sufficient, of the ordinary varieties. As spring sown wheat does not tiller well, one-half to three quarters of a bushel more may be necessary, but strong clays are not well adapted for spring sown wheat, although it is quite possible that a suitable variety may be obtained from the preceding collection for that purpose.

On medium soils one half bushel more may be requisite for each season of sowing, regulating the quantity to the quality and condition of the soil, and the preceding crops; where potatoes have been raised in the fallow division, at least two to three pecks more will be necessary than after a clean fallow.

On high and light lands, wheat, after fallow, should be drilled in from two to three inches deep, to prevent throwing out in spring; with this precaution, if the land is in good condition, little more seed will be wanted than on medium soils, but on such lands wheat holds best after grass, and in that case requires two or three pecks more seed than under any other circumstance. Grass lands are generally sown in autumn.

SECALE CEREALE.—RYE.

The chief Generic distinction between Wheat and Rye consists in the two glumes or outer chaff of the spikelets in the latter being bristly or awl-shaped, while those of the former are large and valved or hollowed, so as to contain a considerable portion of the lower floret of the spikelet.

1. COMMON OR WINTER RYE.

Although rye, comparatively speaking, is little cultivated in Britain, yet on the Continent it is in some parts considered as being of the utmost importance in domestic economy. Besides forming the principal bread for the inhabitants, it is used both in the brewery and distillery, and in many parts, after undergoing a species of bruising or coarse grinding, it is used alone or mixed with barley, oats, beans, pease, or tares, which have undergone a similar operation, and formed into a kind of coarse bread for feeding domestic animals, particularly horses. Although its bread contains a less quantity of nutritive matter than that of wheat, it is found to keep longer, and forms almost the only bread eaten by the inhabitants of the high countries where the soil and climate are both unsuited for the growth of wheat.

It is particularly adapted for poor moorish soils in elevated places, and indeed for all kinds of inferior dry soils in whatever situation.

Besides being cultivated for its grain, rye is also grown as green spring food for cattle, either alone, or what is still preferable, mixed with winter tares; in either case forming a valuable food for milch cows and young cattle, between the period when turnips and other roots are finished, and the cutting of grass and clover.

In some parts of Scotland, as Orkney, Argyleshire, &c., it is grown exclusively for the manufacture of straw-plait.

Specimens in straw, from the home farm of Sir James Miles Riddell, Bart.; by Mr James Carmichael, Strontian, Argyleshire.

2. SPRING RYE.

A sample of this sort, from M. Vilmorin and Co. Paris, sown last summer beside the Common Rye, was of a more upright habit of growth from its commencement, did not tiller so well, was about twelve days earlier, shorter in straw by at least one foot, and had a shorter ear than the common sort. Notwithstanding the seeming decided difference, however, it is asserted by French writers, who have repeatedly tried the experiment, that if sown frequently under similar circumstances with Winter Rye, it acquires the same habit and appearance.

3. MIDSUMMER RYE.

Le Seigle de la Saint-Jean.

This variety differs very much from either of the above, being considerably later in running to ear and ripening than the Winter Rye. It also produces longer straw, much longer ears, and more root foliage.

In France, and other parts where this sort is grown, it is often sown in the end of June and eaten down with sheep in the autumn months and spring until the latter end of April, when it is allowed to run to seed, and is said to yield a better crop of grain after being so treated, than if it had been cultivated in the usual manner. The great length of time between its brairding and running to seed, peculiarly fits it for being treated in this manner. It was originally introduced into France from Tuscany by M. Vilmorin, and its cultivation is rapidly increasing.

Grown in Meadowbank Nursery last season beside Common or Winter Rye, it was fully a fortnight longer in coming into ear, and ten days later in ripening.

4. PERENNIAL RYE, var. of *Secale fragile*.

Seeds smaller than the preceding; sown in the beginning of April; it has as yet (December) no appearance of running to ear. Nothing more is as yet known concerning this sort. Mr Lawson received it last year from Professor Fischer, director of the Imperial Gardens, St Petersburg, under the above name.

In the case of Rye, the quantity of seed is from two and a half to three bushels per imperial acre, but when grown for straw-plait this quantity is more than doubled.

The culture of this grain in Scotland has gradually decreased for some time past, but its value as green food mixed with tares, and the variety suited for temporary sheep-pasture, and, above all, its use in the straw-plait manufactories, may bring that genus, more into notice.

 HORDEUM—BARLEY.

GENERIC DESCRIPTION.—Inflorescence spiked; spikelets one-flowered, three together; the two lateral often barren (as in the two-rowed barleys); glumes two, equal, opposite, so small as to resemble short awns or bristles; paleæ two, the lower one-bearded, the upper with two keels; scales two; stigma feathery; seed surrounded by the paleæ.

I. HORDEUM VULGARE.

From the descriptions given of this species by botanical writers, it is almost impossible to decide which of the following sorts this name is intended to mark:—Millar, in his *Gardener's Dictionary*, says of *H. vulgare* (spring barley), that "all the florets are hermaphrodite and awned, with the grains in two very upright rows;" and, again, "the spike is as it were *distich*, though there are several rows." Loudon, in his *Encyclopædia of Plants*, mentions that in *H. vulgare* "the florets are all hermaphrodite, bearded, seeds in four rows," &c.; and in his *Encyclopædia of Agriculture*, that it is "the same with *Orge carré sucron de printemps* of the French," (which see).

In the following arrangement, therefore, the specific name *vulgare* is used to denote a class of Barleys similar in their botanical character to the common bear, *Hordeum hexastichon* of Professor

Low (Elements of Practical Agriculture), but to some of which the term Spring Barley is wholly inapplicable, from their being the principal winter barleys sown. The distinguishing characters of this species are as follows:—

HORDEUM VULGARE (generally termed four-rowed barley).—Florets all hermaphrodite ; fertile ; middle grains on each side forming a distinct straight row ; lateral ones forming a kind of double row towards the base, but uniting so as to form one row towards the extremity of the spike ; so that instead of being named four or six rowed, they might with more propriety be named four and six-rowed barleys.

1. COMMON BEAR, BARLEY-BIG, OR ROUGH BARLEY.

Ear about two and a half inches long, number of grains in each about sixty ; grains much pointed or tapering towards both ends ; awns about three and a half inches long, adhering to the grain. Cultivated chiefly in the Highlands of Scotland, and in the Lowlands on exposed inferior light soils.

Sample in grain and straw by Mr John Graham, Mill of Con, Aberfoyle ; and two samples in straw grown on a light peat or mossy soil at Strontian, Argyleshire, by Mr James Carmichael.

Sown at Meadowbank Nursery, April 7, in ear June 27, ripe August 12, 1835.

2. SQUARE BARLEY.

Orge carrée, Sucrion de printemps.—Fr.

In grain by Vilmorin and Co., Paris, weight per bushel 49½ lb. ; differs from the Common Barley-big, in being three or four days sooner ripe, and having a thinner skin, properties which it may have acquired by being grown successively in the more genial climate of France, and is likely the same variety. It is little cultivated in France, but extensively in some parts of Germany.

3. WHITE FOUR-ROWED WINTER BARLEY.

Orge carrée d'hiver.—Fr.

Ears thicker, and rather longer ; grains larger, thicker skinned ; and sample altogether coarser like than any of the preceding.

The lower three or four tier of florets are often barren, notwithstanding which it is considered by the French as being more productive than any other variety of barley whatever. It is much cultivated in the north of France, and said to be very well adapted for the making of beer. It is generally sown in autumn, and ripens

before any of the spring sown sorts : but if sown in spring, it is a week or a fortnight later in ripening than the latest of them.

4. AFRICAN, TANGIER, OR MOROCCO BARLEY.

Straw and ears much shorter than the last ; grain larger, thicker skinned, and not so plump ; foliage when green remarkably broad, and greedily eaten by hares and rabbits ; awns long and spreading, and not easily separated from the grain.

Samples in grain and straw by Mr A. Gorrie, grown by him for several years ; but he has now abandoned its cultivation on account of its shortness of straw and inferiority of sample.

Introduced to this country some years ago by the British Consul at Tangier, Morocco.

5. BENGAL BARLEY.

Resembles the last, but is not so strong in the straw. From its not being sown until near the end of May, an opportunity was not afforded of making a satisfactory comparison.

Samples in grain from Mr George Drummond, Bengal, communicated by the Messrs Drummond, Stirling.

6. BLACK WINTER BARLEY.

Orge carrée noir.—Fr.

Spike long, containing from sixty to seventy grains of a black or dark bluish colour, larger than those of common big ; awns adhering to the grain, long and dark coloured ; it is very prolific, but maltsters and brewers generally have a strong prejudice against it, more by reason of its colour than any thing else. It is not so hardy as the white winter sort (No. 3), but by being earlier, it is better adapted for sowing in spring. However, when it is sown as a spring barley, that operation should not be deferred much beyond the end of March, otherwise it will not shoot equally, but rather take on a biennial habit, no part of it running to seed until the season following ; on which account it is sometimes sown by the French in June and July, and eaten on the ground by sheep, as in the case of rye (No. 3). When treated in this manner the Black Barley is found to withstand the winter better than when sown in September or October.

7. FOUR OR SIX ROWED NAKED BARLEY, SIBERIAN BARLEY.

Hordeum gymno-hexastichon, but more properly *Hordeum vulgare*,
var. *nudum*.

The ear is similar in shape to No. 1, but rather more distinctly six-rowed, containing a much greater number of grains, which are small compared with those of the other naked barleys; awns rather upright, and easily broken when ripe.—(The difference between naked and other barleys, consists in the paleæ or husk separating from the grain in thrashing, as in common wheats.)—This sort is also known by the name of Siberian Barley. See *Martyn's Edition of Miller's Gardener's Dictionary*, from which, the following extract is taken:—"Siberian Barley was introduced in 1768, by Mr Haliday, who, having near a quart of seed, sowed the whole in drills. The first week in May, the produce was hung up in the ear, and in the beginning of April 1769, was thrashed out, and found to produce near a bushel. On the 19th and 20th of that month it was sown again, and was reaped on the 15th and 16th of August following: the produce was thirty-six bushels of clean corn,—two bushels, weighing 132 lb., being sent to the mill, yielded 80 lb. of fine flour, equal to the London second: 40 lb. of a coarse sort, and 12 lb. of bran superior to that of wheat. The best flour made excellent bread, and so retentive of moisture, as to be as good at twelve or fourteen days after baking as wheaten bread on the fourth day. And 12 lb. of barley, and the same of wheat flour being made into bread, and baked in the same oven, the wheaten loaf weighed 15 lb., and the barley 18 lb. Two bushels of it being malted, were brewed into a half barrel of ale, and another of small beer, both of which proved very good."

Notwithstanding the above favourable account, the cultivation of this barley is now almost given over, and, indeed, it was never extensive in Britain; but whether arising from prejudice or its being found unsuitable to the climate, is now difficult to determine. It is extensively grown in the north of Europe, and even in some parts of France, and certainly deserves a fair trial in this country, particularly in the north of Scotland, where it might form a valuable acquisition on account of its earliness, it being ripe about a week before Common Bear (No. 1).

Sample in grain from Messrs Vilmorin and Co., Paris; weight per bushel 64 lb.

8. NEPAUL OR HIMMALAYA NAKED BARLEY, NEPAUL WHEAT.

Hordeum nepalense; *Hordeum trifurcatum*.*Orge trifurque*.—Fr.

This sort was first introduced into Britain from the Himalayan Mountains (where it grows near the line of perpetual snow) in 1817, under the name of Nepaul wheat, and said to be a new and early variety, capable of ripening two crops in one summer. It is found, however, possessed of all the characteristics of the genus *Hordeum* (barley), and differs from the last mentioned variety chiefly in the form of its awns, which are very short, about half as long as the grain, generally bent down upon the inner paleæ (inner chaff or covering of the grain), with the wings of the outer paleæ rising to about one-eighth of an inch on each side, and forming with the awn a three-forked like termination to the floret; hence the specific name *trifurcatum*. This distinguishing characteristic of the awn is, however, by no means permanent, for on being cultivated for some time in this country, the awns occasionally become elongated, as in the last variety; and on the same ear is often to be seen the two extremes, long and short, with all the intermediate forms and sizes of awns, but even in this case it is easily distinguished from the preceding by its larger, more round, and darker coloured grains. It is also rather earlier than the last; straw short, except when sown late or in late situations, stiff, and upright; foliage when young, broad, and of a glaucous green colour; weight per bushel about 62½ lb.

Specimen in grain and ears by Alexander Thomson, Esquire, of Banchory; the latter shewing the aptitude of the awns to become long and straight by being cultivated in this country.

II. HORDEUM HEXASTICHON.

9. TRUE SIX-ROWED BARLEY, POMERANIAN BARLEY; also termed SIX-ROWED WHITE WINTER BARLEY.

Hordeum hexastichon-zeocriton, (*Low's Elements of Agriculture*).*Orge de Six Rangs*.—Fr.

Grains placed in six equidistant and distinct rows; lower grains placed nearly at right angles with the rachis, awns in consequence much spread.

In Miller's Gardener's Dictionary, Martyn's edition, this species seems to be confounded with the former, *Hordeum vulgare*. He

says in his specific description, “ *Hordeum hexastichon*, Winter or Square Barley, Bere or Beg. *All the florets hermaphrodite and awned, seeds placed regularly in six rows.*” And again, “ Winter or Square Barley, commonly called Beer, Barley-Bere or Byg, *having six rows of grain, has a much thicker spike than Common or Spring Barley, but is also much shorter ; the number of grains, however, in an ear or spike, is greater in the proportion of at least three to two. The ear is seldom more than two inches in length ; it is square, with two rows of grain on two sides, on the other two a single row of grain runs up the middle, so that the former rows are awned only laterally, and the latter on the sides and along the middle also.*” That portion of the above which applies to the True Six-rowed Barley, is printed in italics ; the other portion can only apply to one or other of the Square Barleys (*Hordeum vulgare*), and certainly the whole can never be applicable to the same species. In *Hordeum hexastichon*, the grains are long, not well filled, and having the awns adhering to them with great tenacity. It is altogether the coarsest in sample of any of the barleys, but hardy and prolific. It is occasionally sown in France, and also in Britain, sometimes as a winter and sometimes as a spring barley, and is found to answer pretty well as either. It is nearly a fortnight longer in arriving at maturity than Common Big (No. 1). There are no varieties of this species in cultivation.

Specimens in straw by the late Rev. William Stark, Dirleton Manse, and by Mr Currer, Myreside.

III. HORDEUM ZEOCRITON.

10. PUTNEY, FAN, SPRAT, OR BATTLEDORE BARLEY.

Ear short, and very broad at the base, tapering towards the extremity ; grain standing out from the rachis as in the last ; awns spreading much to both sides, very much resembling *Hordeum hexastichon* in all its parts, except in the number or rows of grain in the ear, which is only two. This sort is scarcely in cultivation, nor does it seem deserving of more attention.

Specimen in straw by the late Rev. William Stark, Dirleton.

IV. HORDEUM DISTICHON.—TWO-ROWED OR LONG-EARED BARLEY.

In this as in the last species, the lateral florets are male and barren

grains (consequently two-rowed), but the spike is considerably more elongated, and of equal breadth throughout; the male or barren florets are also more minute and indistinct; the grains are more imbricated, or placed so as to overlap one another, instead of standing out from the rachis as in *Hordeum zeocriton*.

11. COMMON TWO-ROWED OR ENGLISH BARLEY.

Ears in general three to four inches long by one-third of an inch broad, containing twenty-eight or thirty grains, which are not very close set on the rachis; awns extending about the length of the spike beyond its point. It may be considered four or six days later than the Common Big (No. 1), is less prolific, but yields a much superior sample, and is held in greater esteem by maltsters. It is, however, not so well suited for inferior soils, and high elevated late places as the other.

Sample in grain by Mr Robert Dale, West Libberton Mains; weight 54 lb. per bushel. In straw by Mr Arnott, Chapel, parish of Kettle, Fife; a plant which he discovered in a field, with three stalks from the same root, two of them having ears of the common form, and the other having a compound spike resembling that of Egyptian Wheat, and containing 63 grains.

12. CHEVALIER BARLEY.

Ears resembling those of the last, but containing on an average two or four grains more in each; grain rounder and more plump; sample every way superior to that of the Common Barley, but not so well adapted for sowing on late soils, being eight or ten days longer in ripening. This sort was introduced from England some years ago, and is now in general cultivation in the best agricultural districts of Scotland.

Crop 1834—Sample in grain and straw by Sir Anthony Maitland, Lauder; weight $56\frac{1}{2}$ lb. per bushel. By Mr A. Gorrie; weight $54\frac{1}{2}$ lb. And in straw by Mr Morris, farm manager, Invermay.

Crop 1835—Sample in grain by Richard Garratt, Esquire, Great Harrondon, Northamptonshire, obtained the prize at Earl Spencer's Show in September; weight per bushel (33 quarts) 58 lb.; produce per acre about 7 qrs. 2 bushels. Communicated by Mr Garratt to the Highland and Agricultural Society of Scotland. Also,

Samples in grain by Messrs Jacob Wrench and Sons, seedsmen, London, weight $56\frac{1}{2}$ lb. per bushel; an average sample of the Edin-

burgh Market, weight $56\frac{1}{2}$ lb. per bushel ; and by Mr J. M'Laren, Castle Hill, Inchtate, Perthshire, a sample of excellent quality, and equal in colour to any of the above English samples.

The English samples present a marked superiority in colour to the generality of Scotch samples of the growth of this season (1835), owing to the continued wet weather which the latter received in harvesting.

13. ANNAT BARLEY.

“ This new and very superior barley is the produce of two ears picked in a field on the farm of Flaweraig, Carse of Gowrie, in 1830, since which period it has been grown by Mr A. Gorrie at Annat Garden (hence its name). Last year it was sown on a ridge in the middle of a field, with Common Barley on the one side and Chevalier on the other. In bulk of straw it seems to have the advantage of both these kinds. It was five days ripe before the former, and about a fortnight before the latter. It was also about $2\frac{1}{2}$ lb. per bushel heavier than the Chevalier,” &c. (See *Quarterly Journal of Agriculture*, March 1835.) The grain is even more round and plump than that of the Chevalier, of a bright yellow transparent colour.

Sample in grain and straw by Mr A. Gorrie, weight per bushel 57 lb., grown beside the samples of Chevalier mentioned above as weighing $54\frac{1}{2}$ lb.

14. DUNLOP BARLEY.

Ear and grains similar in size and shape to those of Common Barley (No. 10), but, together with the straw, a good deal darker in colour, particularly a few days before ripening. This variety, which is but of recent introduction, is now cultivated to a considerable extent in Perth and Forfar shires, as well as some parts towards the southwest of Scotland. It is about a week earlier than Common Barley, and particularly adapted for growing on late situations.

Samples in grain and straw grown on a light soil, 500 feet above the level of the sea, by Mr A. Gorrie ; weight $53\frac{1}{2}$ lb. per bushel.

15. STAIN'S BARLEY.

This variety was sent from London by Lord Lyndoch, to his land-steward, Mr Stain, Dalcruie, Perthshire, and is now known in that neighbourhood under the above name. It is the same sort as that mentioned in Dickson and Turnbull's Museum Report, under the name of Siberian Barley, as being presented by “ Mr Stain, Dalcruie, Lyndoch ; slender ear and fair sample.” It is late in ripening, and

superior in sample to the Common Two-rowed Barley (No. 10). The name Siberian Barley seems to be applied to different varieties, amongst which may be mentioned the Two-rowed Naked Barley, but the true Siberian is undoubtedly the Four or Six rowed Naked Barley (*Hordeum vulgare*, var. *nudum*, No. 7).

Sample in grain by Mr A. Gorrie, Annat Garden.

16. GOLDEN BARLEY, ITALIAN BARLEY.

Sample in straw by Messrs Drummond, Stirling, under the former, and in straw and grain by Mr Imrie, nursery and seedsman, Ayr, under the latter name. Ear short, but remarkably close, broad, and compact; grains larger than in any other variety of *H. distichon*, plump, and of a bright light yellowish colour. Owing to the recent period at which the above mentioned samples were received, an opportunity has not yet been afforded of growing them together for comparison; but from their similarity, and distinct appearance from the other varieties, there is little doubt but they will prove the same.

The Golden Barley is now pretty extensively cultivated about Deanston and other places in the neighbourhood of Stirling; it was first introduced into that district and cultivated by Mr Smith of the Deanston Works. Under the name of Italian Barley, it was introduced into Ayrshire some years ago, from the Alps of Europe, and hence it is sometimes called Alpine Barley. It seems upon the whole a very superior barley, and deserving of cultivation.

17. CHANCELLOR BARLEY.

Ear rather long; grains not very close set; quality of the sample rather inferior, compared with some of the preceding varieties.

18. ROYSTON BARLEY.

Grains large, remote; sample rather inferior, darker in colour than Common Barley when nearly ripe.

19. TWO-ROWED BLACK BARLEY.

Hordeum distichon nigrum.

This sort is at once distinguished from the others by its black or dark blue coloured grains, which are large and coarse shaped. It is prolific, and yields a considerable bulk of straw, but is later by six or eight days in ripening than the Common Two-rowed Barley.

Sample of a variety similar to the above, but having the grains

placed more close in the spike, and the barren florets of a whitish colour, by Mr Patrick M'Kinna, Gowkscroft, near Ayr, who exhibited it at the Highland Society Show there in October, under the name of Cape of Good Hope Barley, from its being originally from that place. A farther trial will, however, be required to ascertain whether or not it be a decided permanent variety.

It is very likely that the Two-rowed Black Barley may prove as hardy as the Four and Six rowed Black Winter sort. The black colour which distinguishes those two sorts, and from which they derive their names, is confined to the paleæ or outer covering of the grain, on the removal of which the grain appears white, and will yield as white flour as any of the other kinds.

20. TWO-ROWED NAKED BARLEY.

Hordeum distichon nudum.

Ears long, containing twenty-eight or thirty very large grains, which separate from the paleæ or chaff in the manner of wheat.

This variety has been introduced to the notice of agriculturists at various times and under different names, but its cultivation has always been abandoned, or at least never carried on to a great extent. Miller mentions "there being cultivated to a considerable extent in Staffordshire, about sixty or seventy years since, under the name of *Triticum speltum*, a sort of naked barley or wheat barley, the ear shaped like barley but the grain like wheat; that it made good bread and good malt, and yielded a good increase; but as no mention is made of it in Page's View of the Agriculture of that country in 1796," he supposes it to be lost or not in cultivation. About seven or eight years since, Mr Loudon introduced it from the north of Europe under the name of *Siberian Barley*, and distributed it amongst several cultivators in various parts of Britain. One portion, consisting of about fifty grains, which he sent to Mr Gorrie, Annat Garden, Perthshire, and which was sown in the garden, yielded a considerable return of grain, and ripened early; but on its cultivation being extended to the field, its straw was found to become very brittle and tender towards the period of ripening, so as to be unfit for supporting the ears, and completely incapable of forming into ropes for binding. Its cultivation was therefore abandoned. The grain, however, on being ground, yielded a good barley-flour, and, had it not been for the above mentioned circumstance, it might have been cultivated with advantage for that purpose.

Sample in grain from Professor Fischer, St Petersburg, 1834, under the name of Himalayan Barley ; and by Vilmorin and Co. Paris.

In France its cultivation is never carried on to any great extent, owing to the above peculiarity of its straw.

On rich lands three and a quarter bushels of barley will be sufficient seed for an imperial acre, when the tilth is fine, which should always be the case ; on poor lands five bushels are sometimes sown, but when sown too thick on any soils, the produce is generally inferior. In England this grain has always been sown early. In this country, about twenty years since, barley seed-time was about the first week in May, but the practice of sowing in April has of late been gaining ground, as the sample produced is found to weigh more than when sown later.

The varieties of *H. distichon*, notwithstanding their inferiority in quality of produce, compared with some of the four and six-rowed Barleys, have received a more extended and careful cultivation not only in Britain but also in France, and other parts of the Continent. This arises no doubt from the superiority of their samples ; but were a little more attention devoted to the improvement of the four and six-rowed sorts by hybridizing or selecting any superior ears which appear possessed of the fine qualities required, in a short time we might expect to see the quantity of barley grown upon a given space, considerably more than at present (in *H. distichon* the number of grains in an ear is from twenty-four to thirty, while in that of *H. vulgare* there are about sixty and often seventy), and the sample at the same time equally good with that of common two-rowed barley. There is certainly much more room for improvement in the case of four and six rowed barleys than in any other of our cereal grains.

AVENA—OAT.

GENERIC CHARACTERS.—Inflorescence panicle, panicle loose, compound ; spikelets solitary, two or more flowered ; glumes longer than the florets, two-valved ; paleæ, lower twice torn, and with the upper terminating in two points, two-keeled, sometimes eroded,

concave ; awn or beard sometimes absent, but when present, placed on the back of the lower paleæ, jointed and twisted ; seed covered with minute hair, and furrowed.

I. AVENA SATIVA.—COMMON CULTIVATED OAT.

SPECIFIC CHARACTERS.—Panicle spreading, nearly equal on all sides. Spikelets often containing two, but occasionally three fertile florets (consequently grains). Paleæ smooth. Awns, one in each spikelet.

* *White Oats, or such as have the paleæ of a whitish or straw colour.*

Of this division cultivators, in every district, have what they term “Common Oat, or Common White Oat ;” but this name is not universally applicable to one variety. Thus the Common Oat of Roxburghshire, is the Blainsley Oat. The Common Oat of some parts of Perth and Angus shires is the late Angus Oat ; and in other parts (chiefly in the north) the Early Angus is termed the Common Oat ; therefore, in the following enumeration of varieties, the term Common Oat is not admitted.

1. POTATO OAT.

This variety, which has received a more extensive cultivation than perhaps any other, was first discovered amongst a field of potatoes (hence its name) in Cumberland, in 1788. Panicle rather compact and regular. Straw rather short. Grain very white, short and well filled, seldom bearded or awned, except when cultivated too long on dry soils without changing the seed. The presence of the awn often arising from the effects of cultivation, climate, soil, or other causes.

Specimens in grain by Mr Robb, Gorgie Mains, 46½ lb. per bushel.

2. POTATO-OAT OF THE FRENCH.

Avoine Patate, Avoine pomme de terre.

Differs most essentially in all its parts from our Potato-oat, being nearly a fortnight longer in ripening. Panicle more spreading. Grain a shade darker in colour, longer, and more pointed ; almost always awned. Straw longer, and rather more slender.

Although the French had this oat originally from England, and although oats deteriorate very much when cultivated in the climate of France, yet the difference between it and our Potato-oat is too

great to leave the least doubt of their being distinct varieties. The French variety is very inferior, and not deserving of cultivation in this country.

3. HOPETOUN OAT.

This variety was raised some years since by Mr Patrick Shirreff, Mungoswells, East-Lothian: it is a few days earlier than the Potato Oat, and not so liable to be shaken out by winds; its straw is longer, and not so apt to bend or lodge; panicle larger, and more spreading; grain rather more awned, and a shade browner in colour, and easily distinguished by a small reddish mark in the centre of the front of the grain.

During the last three or four years, the cultivation of the Hopetoun Oat has extended rapidly throughout every well cultivated district in Scotland. It is now generally believed by farmers to be better adapted for light, than for strong clay soils, and that it is more liable to be attacked by smut or black than the Potato Oat. But altogether its cultivation is still increasing, and for growing on poor late moorish or newly reclaimed lands, no variety is better adapted.

Sample in grain from Edinburgh market, weight 46 lb. per bushel; and in straw by the late Rev. William Stark, Dirleton Manse. Sample also in straw by Mr James Wilson, Sweet Hope; height six and a half feet, grown by Mr Gilbert Wilson in the immediate vicinity of Musselburgh, 1832. This specimen was from about the middle of the field, and not nearly so tall as some which grew on the head-ridges. Previous to being cropped with the Hopetoun Oat, the field had been some years under grass. Quantity of seed sown per Scotch acre, four bushels; produce about fifty-eight bushels.

4. EARLY KENT OAT.

This sort yields a very superior sample, resembling that of the Potato Oat (No. 1), differing, however, from it in being shorter in straw, and about a week earlier, and also very much in the young plant, in which, instead of the leaves being narrow and prostrate (as in the Common Oat), they are of a light-green colour, broad, and upright, not tillering well; in this respect resembling the Georgian Oat.

5. GEORGIAN OAT.

Avoine de Georgie.—Fr.

Grains very large, and thick skinned, seldom awned; panicle

very large, and spreading ; straw tall and strong, not apt to become lodged, about as early as the last ; young plants of a peculiar upright habit of growth, not spreading or tillering much ; leaves very broad and luxuriant, of a light yellowish-green colour.

This variety was introduced about ten years since, by Captain Barclay of Urie. At first it received a rapid and extensive cultivation on account of its earliness, and the great quantity of straw and grain which it produced. But owing to the thickness of skin, it was found to meal very indifferently, and the straw from its coarseness being disliked by cattle, and also, from the crop being supposed of a deteriorating nature for the soil, its cultivation has been almost abandoned. In France the Georgian Oat is of a more recent introduction, and at present held in much esteem.

6. NEW EARLY ESSEX OAT.

In general habit much resembling the last ; panicle, however, more contracted, and altogether of a whiter colour, equally early, grain rather more awned, and thinner skinned.

Specimens in straw and grain by Sir Anthony Maitland, Lauder, by whom it was introduced into this country. Produce 147 bushels, after seven bushels sown.

7. BLUE MAJOR OAT.

This variety also bears a marked resemblance to the Georgian (No. 5). The grains, however, are rather thinner skinned, and darker in colour, being tinged with a very light bluish colour, particularly on the back of the lower palea, and the whole of the upper.

Sample in grain by the Right Hon. the Earl of Lauderdale.

8. STRATHALLAN EARLY OAT.

About two or three days longer in ripening than the Potato Oat ; longer in the straw ; grain more elongated, and not so plump or well filled.

9. EARLY ANGUS OAT.

Nearly as early as the Potato Oat, and less liable to be shaken by high winds when ripe. In other respects this more resembles the last mentioned sort. It is much cultivated in the district of Angus, and northward in some parts of the Highlands ; also in most parts of Scotland, but particularly in the late and more exposed districts.

Sample in straw by the late Rev. William Stark, Dirleton Manse.

10. LATE ANGUS OAT.

Straw longer than in the early variety ; panicle rather larger, and more loose ; grain rather longer, generally a shade darker in colour, and from a week to a fortnight later in ripening.

This is a well known and superior variety, much cultivated, particularly in the central districts of Scotland, in some parts of which it is termed Common Oat, or Common late Oat.

Sample in straw by Mr James Carmichael, Strontian, Argyleshire, grown on a peaty soil.

11. GREY ANGUS OAT.

Differs from the last in the grain being longer, and of a bluish-grey colour. Not so generally cultivated as the Late Angus, but is nevertheless a good sort.

12. CUPAR GRANGE OAT.

So called from being first raised at the farm of Cupar Grange in Angus or Forfarshire. Panicle large, spreading, and loose-like ; grains large, and generally well filled, forming a superior sample ; straw rather longer than that of the Late Angus, than which it is also a few days longer in ripening.

Sample in straw by Mr A. Gorrie, Annat Garden.

13. BLAINSLEY OAT.

The grain is more round and plump in this than in the last sort, which, however, it greatly resembles. It acquires its name from being raised at Blainsley. This is the Common Oat in the south-east districts of Scotland, where it is much cultivated.

Samples in straw by Mr James Carmichael, Strontian, Argyleshire ; grown on a peaty or mossy soil. Good crop.

14. KILDRUMMIE OAT.

Straw long ; panicle erect, rather large, but thinner, and containing fewer grains than that of the last three sorts, which are also lighter, long, and rather small. It is nearly a week earlier than the last. This sort can only be accounted a second rate oat, but is suitable for high districts.

Sample in grain by P. Thomson, Esq. Hangingside, Linlithgow.

15. COMMON IRISH OAT.

This sort is still longer in straw ; more loose and light in the panicle, late, and every way inferior to the last.

Sample in straw by Messrs Drummond and Sons, Stirling.

16. DRUMMOND OAT.

This variety requires about a week longer to ripen than the Potato Oat (No. 1). It bears more resemblance to the Early Angus, but differs from it also in its upper paleæ or adhesive skin, being of a bright light reddish or brown colour. It is grown in some parts of Perthshire, and is found well adapted for very strong clay soils.

Specimens in grain by Mr Alexander Lindsay jun. Myres of Errol, Carse of Gowrie. Soil a strong bluish clay. Good crop.

17. MACBIEHILL OR RED MACBIEHILL OAT.

Acquires the latter name from being of a very clear light brown or reddish colour, so light, however, as to entitle it to a place amongst the white oats ; it differs little in other respects from the preceding.

18. LONDON DON OAT.

This sort seems to be little known in the Lothians ; it is beginning to be cultivated in a few places in Roxburgh and Berwick shires, but more extensively in the south-west of Scotland. It seems to yield a large bulk of straw, is not apt to lodge, and deserving of a more extended cultivation. Panicle long, and pretty close ; grain forming a good sample.

Sample in straw by Mr J. Carmichael, Strontian, Argyleshire. Grown on soil composed chiefly of peat ; yielded a good crop.

19. DANISH OAT.

Panicle large and spreading ; glumes or outer chaff large and broad, of a light yellowish colour ; grains long, light, and awned, forming a very inferior sample ; straw of a medium length.

20. POLAND OAT.

This sort has been in cultivation for a considerable length of time, and it is doubtful whether that which now bears the name be the true original variety ; in general appearance it much resembles an inferior sample of Potato Oats.

The specimen at Meadowbank Nursery was a week later in ripening than that of Potato Oat.

21. FRIESLAND OR DUTCH OAT.

About 1820 this oat was much cultivated in Perthshire, but it degenerated rapidly, ripened unequally, and is now almost out of culture; it is an early oat, rather shorter than the Blainsley or Cupar Grange.

22. THREE-GRAINED WHITE OAT.

Avoine à trois graines.—Fr.

Straw of medium length; panicle rather large and spreading; grains three in each spikelet; good-like sample, but a little thick in the skin. This variety is easily distinguished by the number of grains in the spikelet, and may turn out a valuable acquisition.

The following white varieties of *A. sativa* were received at a period too late for their being sown and satisfactorily compared with the former.

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| 23. EARLY WHITE IRISH OAT. | } Samples by the Messrs Drummond, Stirling. |
| 24. TAM FINLAY OAT. | |
| 25. ARGYLESHIRE OAT. | |

A variety of oat also from the East Indies, by Mr George Drummond, grown in the vicinity of Bengal by Europeans, for feeding their horses.

* * *Red, Dun, or Black-coloured Oats.*

26. RED ESSEX OAT.

Apparently the same as the *Avoine rousse* of the French. Straw rather long; panicle not spreading much; grain long, not well filled; thickish skinned, of a bright reddish colour, approaching to white towards the small end, and blackish towards the other extremity. This, although a prolific variety, yields a very meagre inferior sample, and is scarcely deserving of cultivation.

Specimens in grain by Alexander Thomson, Esq. Banchory.

27. COMMON DUN OAT.

Grains long, but well filled; skin not very thick, of a dark-like colour, lightish towards the point; panicle very large and spreading; straw very long, and not apt to lodge.

This is a very prolific sort, and perhaps more deserving of cultivation than any other of the coloured oats. Although somewhat late, it is well adapted for poor light elevated soils, and is much grown on such in the Lothians and neighbouring districts, as about the Pentland and Lammermuir Hills.

Sample in straw and grain by Mr John Machray, late gardener and overseer at Bush House. The former upwards of six feet in height, containing on each ear from 80 to 100 grains; weight of the latter $44\frac{1}{2}$ lb. per bushel; grown on a lately reclaimed moorish soil; cut 23d September 1834.

28. DUN WINTER OAT.

L'Avoine d'Hiver.—Fr.

Straw shorter, and panicle not so much spreading as in the last variety; grains also rather shorter, and of the same colour.

This oat is by the French considered one of their best, and is one of their most extensively cultivated varieties. It is generally sown in September, and ripens early. It is grown as a winter oat to the greatest extent in the west and south-west of France, as in the department of Brittany, but is there, as well as in other parts, occasionally sown in spring, but in this case the sample is always inferior to that sown in winter. It is very hardy, never being injured by the frosts. In England there is a white variety cultivated as a winter oat, which must be altogether different from the one here mentioned; but as no sample of it has as yet been procured for the Museum, an opportunity has not been afforded for examining and comparing it with the others.

29. BROWN OR BLACK RIGA, OR ARCHANGEL OAT.

Grains small and plump, generally three in each spikelet; colour darker than that of the last, and not so dark as that of the following variety; straw rather long, and not liable to lodge; a very early and prolific sort.

Sample in straw and grain by Mr A. Gorrie, who picked it about four years ago in a sample of oats from Archangel (hence its name).

30. COMMON OR OLD BLACK OAT.

L'Avoine noire de bric.—Fr.

In length of the straw, and form of the panicle, similar to the Potato Oat; grain large, and rather well filled, of a shining black colour, lighter towards the point.

This oat was formerly much cultivated, not only in the Highlands, but also on inferior soils in the Lowlands of Scotland ; its cultivation is now, however, much circumscribed, owing more to its colour than to any real defect in its quality. Farmers in some parts have a peculiar antipathy against black or dun coloured oats. One reason they give for this is, that the coloured grains degenerate and become white, thus giving the sample a mixed like appearance ; but probably this mixture arises more from the slovenly manner in which barns are often kept, and particularly from thrashing black corn in a mill after white sorts, without the machinery being properly cleaned down, than from any real degeneracy.

Samples in grain and straw by Mr Thomas Fair, Lauder, grown by Mr Dods on the farm of Colmslie-hill, Roxburghshire, on a very elevated situation. Mr Dods has grown the same without change of seed on his farm for the space of eight years. The worst crop he has had of this was seven bolls per imperial acre, and the best ten. He considers them the most prolific of any sort he has had on his farm, and about a week earlier than the Potato Oat, and not so easily shaken by wind ; weight 42 lb. per bushel.

II. AVENA ORIENTALIS.—TARTARIAN, HUNGARIAN, OR ONE-SEEDED OAT.

L'Avoine unilaterale ; Avoine de Hongrie.—Fr.

This species differs from the last in having its panicle more contracted, and altogether confined to one side, or secundate.

31. COMMON WHITE TARTARIAN OAT.

Straw very long (about six feet), upright, and not apt to lodge ; panicle long, and slightly bent to the side on which the grains are ; grains of a dull white colour, long awned, and not well filled, forming rather a meagre sample.

This variety is very prolific, but considerably longer in ripening than any of the preceding, and is therefore only fitted for cultivation in early situations, and requires a superior soil. It is not in general cultivation in this country. In France it seems to suit better, and is grown to a greater extent.

Samples in straw by the late Rev. William Stark, Dirleton.

32. BLACK TARTARIAN OAT.

This variety, although resembling the last in the form of its panicle,

is nevertheless very different in other respects ; its straw is of a medium length ; grain black, not so long, more plump, and less awned or bearded than the preceding. It is also one of our earliest oats, and answers best on high and rather inferior light soils ; is very prolific, and meals much better than the Common White Tartarian. In some parts of England, the Black Tartarian Oat has been cultivated, for a considerable length of time, for feeding horses, for which it is said to be well adapted. Into Scotland its introduction has been comparatively recent, but its culture is yearly extending.

By J. H. Colt, Esq. of Gartsherrie, a sample in grain under the name of Black Poland Oat.—By the late Rev. William Stark, Dirleton, a sample in grain grown on very light sandy soil.—By Mr A. Gorrie, Annat Garden, in grain and straw.—By David Millie, Esq. Balhousie, Largo, Fife, where it has been grown very successfully for many years.

33. EARLY WHITE TARTARIAN OAT.

Similar to the last except in colour ; in a field of which, it was discovered, and presented by Mr A. Gorrie.

III. AVENA BREVIS.

34. SHORT OAT.

L'Avoine courte, Avoine pied à Mouche.—Fr.

Panicle mostly confined to one side ; spikelets containing one or two grains, which are always awned ; grains almost as long as the glumes (which are little more than a quarter of an inch), plump, and terminating abruptly at both ends, particularly at the point ; of a dunnish colour when ripe. The kernel is easily rubbed out, and there are generally a few scattered hairs about the insertion of the awn, and towards the point of the paleæ.

There is only one variety of this sort in cultivation. The straw is long and fine, much relished by cattle, either in a green or dry state. Its cultivation does not seem to have been tried in Britain, but is chiefly confined to some of the most mountainous districts of France and Spain, where it is preferred to all others, from its earliness and adaptation to such elevated and inferior soils.

Avena brevis is supposed to have been first introduced into this country from Germany in 1804.

IV. AVENA NUDA—NAKED OAT.

L'Avoine nue.—Fr.

Spikelets containing three to six florets, longer than the glumes ; paleæ not adhering to the seed (as in the other species of oat) ; hence the name.

35. COMMON NAKED OAT.

Fertile florets, three or four in each spikelet, the lower one, and sometimes two of which are bearded ; paleæ large and loose ; grains about the size and similar to the kernel of common oats. The cultivation of this oat has been attempted at different times in various parts of Britain, for the last two or three hundred years. Gerard, who wrote on agriculture, in 1597, says, that at that period “unhulled, or Naked Oats, were cultivated in Norfolk and Suffolk.” Their cultivation, however, in any place has never been carried on extensively, for any length of time, owing chiefly, no doubt, to their liability to shake when nearly ripe. They are very prolific, and grow well on inferior soils, particularly on such as contain a considerable portion of peat.

Specimen in straw by the late Rev. Wm. Stark, Dirleton.

36. SMALL NAKED OAT.

This sort differs from the last in being considerably smaller in all its parts ; panicle more contracted, and one-sided ; florets more compact, and the awns or beards, which are two in each spikelet, longer, and more persistent, than those of the Common Naked Oat ; than which, it is also much later, and its grains not half the size.

This sort is certainly less deserving of cultivation than the preceding, and can only be valued as a curious variety in collections.

V. AVENA STERILIS.

37. ANIMAL OR FLY OAT.

Straw short, and reedy ; panicle one-sided, spreading ; spikelets containing two to five florets, two lowest ones fully more than an inch in length, fertile and awned, the others never awned, but sometimes fertile ; back of the under florets, covered with long bristly hairs, as far up as the insertion of the awn.

This oat is never cultivated, except as an article of curiosity. The awns and bristly hairs, when acted upon alternately by heat and mois-

ture, twist about, so as to give the grain a creeping motion, resembling that of a large fly; hence its name of Fly or Animated Oat, and sometimes that of the Hygrometric Oat. It is of a black or dark brown colour, and, from its resemblance to some winged insect, is occasionally used as a bait for salmon hooks.

Specimen of seeds, by A. Thomson, Esq. of Banchory.

VI. AVENA FATUA.

38. WILD OAT.

Straw long, rather slender and upright; panicle spreading equally on all sides, large, open, and loose-like; spikelets generally containing three florets, which are all bearded and hairy at the base; colour similar to the last.

This is supposed by some, to be the original from which all the varieties of *A. sativa* are derived; although there is no proper reason given for such a supposition, and from the marked difference between them, the probability of such may well be questioned. The seeds of the Wild Oat have been known to retain their vegetative powers for an extraordinary length of time, when buried in the earth, at a depth sufficient to prevent their springing. When nearly ripe, the seeds are very liable to be shaken out, and thus to become in some places a most troublesome weed. It is never cultivated for any special purpose, but the awns possess similar hygrometric qualities as those of the last, and are also used for baiting hooks. It is often mistaken for the next, both being indiscriminately termed Wild Oats.

DANTHONIA.

This is a genus separated by modern botanists from that of *Avena*, chiefly on account of the lower palea being much prolonged, two-toothed, and so deeply divided that the awn appears as if inserted between the teeth.

DANTHONIA STRIGOSA.

1. COMMON DANTHONIA OR BRISTLE-POINTED OAT.

Panicle inclined to one side, nearly simple; spikelets containing two or three florets all bearded, about as long as the glumes; grain rather small, and thick skinned.

This oat is cultivated in several countries, particularly in France, for the purpose of feeding cattle, being either cut and given them in a green state, or allowed to ripen and given them in the straw. It is often to be met with in oat fields, particularly amongst the later sorts, and is termed Wild Oat by farmers, they making no distinction between it and the former. The difference may, however, be at once detected, by the Bristle-pointed Oat having rather shorter straw, and its panicle nodding or bending to one side, while that of the former is spreading and almost upright; also by the lower end of the grain being smooth, while that of the *A. fatua* is hairy.

Sample in grain by R. Scarth, Esq., Kirkwall, the produce of some of the northern islands of Orkney; and in straw by Mr A. Gorrie, received by him from England, where it is cultivated as food for hunters or riding horses. This is believed by some, to have been the original cultivated oat of Scotland. It is still, or was very lately, cultivated in some parts of the north of Scotland, and in the Orkney and Shetland Isles, as a bread corn.

2. ARGYLESHIRE SMALL OAT.

This appears to be an improved variety of the former, and only differs from it, in having a more compound panicle, producing more seed, and being a shade lighter in colour.

Sample in straw by Mr J. Carmichael, Strontian, Argyleshire, where it is cultivated for cattle, and given to them in winter on the straw.

In sowing Oats, the quantity must be regulated by the shape and size of the grain, as well as by the nature and condition of the soil. There are, for instance, fewer grains in a bushel of Blainsley, Cupar Grange, or Tartarian Oats, than in the same measure of Potato or Hopetoun Oats. Some varieties, too, are more leafy than others, and require to stand farther apart; in general, however, four bushels will be necessary for medium soils, per imperial acre, and in poor upland soils more than six bushels may be proper.

The soil and climate of Scotland, seem peculiarly suited to the production of oats in perfection; and the success with which the introduction and culture of improved varieties of Barley have been attended, may stimulate to exertion, in selecting new and improved varieties of Oats, suitable to the various soils and situations in this country.

PHALARIS—CANARY GRASS.

GENERIC CHARACTERS.—Inflorescence forming a crowded or spike-like panicle ; spikelets solitary, one-flowered ; glumes two-valved, equal, keeled and boat-shaped, smooth and beardless, acute ; valves inclosing the boat-shaped paleæ, which are also beardless and smooth, supported at the base by two small hair-like appendages or accessory glumes.

I. PHALARIS CANARIENSIS—COMMON CANARY-GRASS.

Panicle contracted so as to resemble an oval spike ; glumes entire at the point, having a large keel, and two green stripes on each side, the length of the whole glume, which is thin and chaffy ; straw from one and a half to two feet in height ; grain smooth and shining, of a whitish colour, difficult to thrash or separate from the glumes.

Although the Canary-grass be cultivated, to a considerable extent, in some parts of England, chiefly as food for birds, its growth has not been attempted, to any considerable extent, in Scotland ; and it is questionable, whether it would be attended with any beneficial results, as it requires a longer time to arrive at maturity, than either oats or barley. In England it is generally sown in February, in drills about a foot apart, and the quantity of seed per acre is about five gallons. It requires a superior soil, well pulverized and manured ; and is, even in the south of England, considered a precarious crop. In Scotland it does not ripen until the end of September or beginning of October. In the Canary Islands it is ground into flour, and made into a nutritious bread, by the inhabitants.

II. PHALARIS CAPENSIS—CAPE CANARY-GRASS.

Introduced from the Cape of Good Hope in 1804. Differs from the former, in having larger and more slender straw ; a smaller and more tapering panicle ; considerably smaller and darker coloured grains, and is every way inferior, except in being rather earlier.

III. PHALARIS PARADOXA—BRISTLE-SPIKED CANARY-GRASS.

About one foot in height ; spike-like panicle, cylindrical ; intermediate floret hermaphrodite ; the rest imperfect, rigid, and terminating as if bitten off ; glumes of the perfect floret having each one tooth on their keel ; seed small, and in shape similar to the last ; ripens in August, but is so unproductive, as to be of little or no value as a cereal grass.

ZEA—MAYS OR INDIAN CORN.

GENERIC CHARACTERS.—Male and female organs in distinct flowers, but on the same plant ; male in branching terminal spikes ; female in a concealed spike or elongated receptacle, proceeding from the joints of the culm or stalk ; calyx a two-valved blunt glume ; corolla a two-valved glume ; style one, long and pendulous, protruding considerably beyond the leafy envelope of the seed spike ; seeds solitary, immersed in an oblong common receptacle.

ZEA MAYS.

This is the only species of which there are any varieties in the Museum. It differs from the others, principally in having entire leaves ; the varieties are :—

1. COBBETT'S INDIAN CORN.

Height about two feet ; average length of the seed, spike, or receptacle, about four inches ; colour of the grains yellow ; size small, compared with most other varieties.

By Mr J. Reddie, Milnathort, September 9. 1834, several plants with the grains well formed, but not arrived at sufficient maturity to enable them to vegetate. Sown 8th May ; elevation above the level of the sea 400 feet. September 9, an ear almost ripe by Dr Drummond, West Newington, Edinburgh, grown in the open air.—By Mr Park, Dalkeith, two ears fully ripe, October 20, also grown in the open air.—1835, Several specimens grown in the Nursery at Meadowbank, fully ripe. Sown April 27, and pulled October 6, from seeds procured from Paris under the name of *Mais Quarantain* (or *Quarantine Mais*). In France this sort requires about three months to ripen.

2. EGYPTIAN, OR CHICKEN CORN.

“ *Zea Mais à Poulet, le plus petit et le plus precoc* ” of M. Vilmoren's Catalogue, from whom it was received. This is the smallest and earliest of the Indian Corns ; colour of the seed yellow, as in the last. Grown along with the former, at Meadowbank Nursery last season (summer 1835). This variety ripens nearly a fortnight sooner. Its quantity of produce, however, compared with that of the others, is very small.

Also, presented by Mr Grant Thorburn, seedsman, New York.

an interesting collection of the different varieties of Indian Corn cultivated in North America.

PANICUM—MILLET.

GENERIC DESCRIPTION. — Glume three-valved, containing two florets, one of which is generally barren, valves unequal, the outer being very small ; paleæ two, concave, equal, beardless, seed coated with the hardened paleæ ; panicle scattered and loose.

PANICUM MILIACEUM—COMMON MILLET.

Panicle loose, nodding ; leaves long, broad, slightly hairy ; sheaths hairy ; valves or loose chaff sharp-pointed ; seed when ripe, about one-eighth of an inch in length, ovate, and slightly pointed at both ends, smooth, shining ; height about three and a half or four feet.

The following varieties are arranged according to their time of ripening, the difference between the earliest and the latest being only about a week. They are all from Messrs J. G. Booth and Company, Hamburgh :—

1. COMMON MILLET.

Panicle rather bundled like, and nodding a good deal to one side ; colour light green ; colour of the seed yellow.

2. GREY-SEEDED MILLET.

Panicle more loose and spreading than that of the last variety ; seed greyish coloured ; panicle darker green than the last.

3. WHITE-SEEDED MILLET.

Panicle light green, more contracted or bundled and nodding than in any of the others ; seeds white.

4. BLACK-SEEDED MILLET.

Panicle of a mixed blackish-green colour, very loose ; seeds almost black.

SETARIA.

This is a genus, separated from that of *Panicum* on account of its

panicles being contracted so as to resemble a spike, its other characteristics are the same, except in having a bristle-like appendage proceeding from under the glumes, considerably longer than the spikelet termed the involucre.

1. SETARIA ITALICA—ITALIAN MILLET.

Spike-like panicle, compound, nodding to one side; spikelets crowded or heaped like, but more distinct towards the base: involucre or bristle much longer than the florets; rachis downy; seeds about half as long as those of the Common Millet, not so small, and of a lighter colour, slightly tinged with green; height three to four feet. Seeds did not ripen in the nursery this season (1835).

2. SETARIA GERMANICA—GERMAN MILLET.

Differs from the last in being much dwarfer; spike more short, compact, and upright; seeds about the same size, and of a dark greyish colour; equally late in ripening.

In Hungary this sort is cultivated as green food for horses, and is said to be preferred by them to all other grasses. The seeds are also occasionally used as those of other millets.

3. RED-SEEDED MILLET.

This variety seems to resemble the Italian Millet, but is much earlier; seed longer, more smooth, and of a reddish colour; spike not so pendulous; height about four feet. This, together with the following, ripens about the same time as the Common Millet (*Panicum miliaceum*).

4. SMALL WHITISH-SEEDED MILLET.

Spike larger than in any of the preceding; bristles much shorter; height about four feet.

From the lateness of the period at which the millets ripen, it is questionable how far they are at all fitted for our climate. In the south of England their culture has been attempted, but is now abandoned, owing to the facility with which they are imported from Germany and the south of Europe.

The quantity of seed required per imperial acre, when sown broadcast, is about a peck, but when in drills from ten to twelve quarts will suffice. Owing to the large size of the plants, they require to

stand at least from six inches to one foot distant. In America the Common Millet is often known to yield twenty bushels per acre after one quarter of a bushel sown ; and the hay is so much relished by cattle, and horses in particular, notwithstanding its seeming coarseness, that they prefer it to that of Common Timothy-grass. The young plants are very impatient of cold, and should not be sown until every chance of frosty nights is over, or about the first week of May, in Britain, north of France, and Canada, &c. ; in more southern and less variable climates, such as Italy, Spain, &c., it requires to be sown earlier, in order to take advantage of the winter sap. The Millets should all be harvested shortly after they begin to change their colour, not waiting until the whole be ripe, else the earliest and best of the grain will be shaken and lost, no grain being easier thrashed and separated from its glumes by the mill. In Germany, and the southern countries of Europe, also in America, some parts of Asia, and in most countries lying under the warmer latitudes of the temperate zone, the millets form a very essential article in the domestic economy of the inhabitants, being deprived of the husk, and used whole as rice, or ground into meal or flour, and made into bread, &c. In this country they are chiefly used for feeding small birds.

SORGHUM—INDIAN MILLET.

GENERIC CHARACTERS.—Flowers, male, female, and hermaphrodite, on the same plant ; panicle glume thick and gristly, two-flowered, close ; paleæ of the hermaphrodite bearded, of the male single beardless ; male glume one-flowered, stalked ; paleæ two, beardless.

SORGHUM VULGARE—COMMON INDIAN MILLET.

In Arabia it is called Dara or Durra, and in the West Indies Negro or Guinea Corn. Panicle contracted, oblong ; flowers obovate or inversely egg-shaped ; seed when ripe about as large as that of hemp, irregularly shaped, smooth, shining, of a brown-reddish colour, hard and flinty. From the hardness and rigidity of the small peduncles or seed stalks, they are used as brooms, and often imported as such to this country ; hence it is also termed Broom Corn. It grows to the height of four to six feet, with long leaves, one to two inches in breadth. It requires a warmer climate than the Common Millet to bring it to perfection, but yields a much greater quantity of grain. Indeed, so much so, that it has been said to yield a greater

bulk of seed per acre than any other grain whatever, Indian Corn not excepted. It is cultivated in most tropical countries ; and in others where the summer is very warm, as the south of Europe, some parts of North America, and as far north as Germany. In this country it sometimes flowers, but never ripens seed.

Sample in grain from Professor Fischer, St Petersburg, under the name of Nagara, by which it is known in the north of China. In flower from Meadowbank Nursery ; cut October 6. 1835.

SORGHUM BICOLOR—WHITISH INDIAN MILLET.

Glumes smaller, softer, and less adhesive than those of the common sort ; seeds larger and more round, of a whitish colour, tinged with a light brown or pink, and less flinty than those of the last ; than which it requires a still warmer climate, being considerably later in ripening.

Sample in grain by Vilmorin and Co., Paris. By J. G. Booth and Co., Hamburgh. Plants grown at Meadowbank Nursery, 1835, with the panicles scarcely so much as beginning to appear.

ORYZA—RICE.

DESCRIPTION—Stamina six ; styles two ; glumes two, one-flowered ; paleæ two, equal, adhering to the seed.

I. ORYZA SATIVA—COMMON RICE, EAST INDIA RICE OR PADDY.

Sample in grain imported from the East Indies.

II. ORYZA MUTICA—MOUNTAIN RICE.

Grains much shorter and more rounded than those of the last, it also differs from it in growing in dry ground, while the Common only grows in water and marshes. This is the hardiest kind of rice which has been as yet introduced to Europe, and is that sort which is cultivated in some parts of Hungary, but will not ripen in our climate.

Specimen in seeds by Vilmorin and Co., Paris.

There is said to be a hardy rice cultivated on the Hinmalayan Mountains, almost as high as the verge of perpetual snow, which might be found suitable for the climate of this country ; this variety has not as yet, however, been introduced.

II. LEGUMINOUS PLANTS.

(*Leguminosæ.*)

FABA—BEAN.*

* *FABA VULGARIS ARVENSIS*, *Field Beans*, or such as are only adapted for field culture, having smaller and more compact seeds than the other sorts.

I. COMMON SCOTCH OR HORSE BEAN.

This is almost the only sort cultivated in Scotland, and so well known as to require little or no description, were it not for the purpose of comparing and describing the rest with more facility. In length the seed is from one-half to five-eighths of an inch, by three-eighths in breadth, generally slightly or rather irregularly compressed and wrinkled on the sides, and frequently a little hollowed or flattened at the end; of a whitish or light brownish colour, occasionally interspersed with darker blotches, particularly towards the extremities; colour of the eye black; straw three to five feet in length; middling prolific; average weight per bushel 62 lb.

There is perhaps no other grain over the shape and colour of which the climate, soil, and culture, has so much influence as in the case of the bean. Thus, in a warm dry summer, the sample is always more plump, and white in colour, particularly if followed by a dry harvest, and more so when cultivated on a strong rich clay, than on a light soil, and when drilled than when sown broadcast. But the great diversity of appearance in some samples of Common Beans, is owing more to a mixture of varieties than to any other cause. That such a mixture exists, any person may perceive by examining a field of beans in full flower, when they will be seen to present an infinite diversity in the colour of their flowers; and although this may not, and does not always precede a different colour or form in the seed, yet it doubtless constitutes a variety, and therefore the seeds are more likely to vary than if the flowers were all the same.

* The generic characters of the Bean and Pea, and some others, are so well known, that any description has in the present instance been considered unnecessary.

2. NEW LARGE RED OR SCARLET FIELD BEAN.

This is a remarkably distinct variety, having large reddish coloured beans, and being very prolific.

Sample by Mr A. Gorrie, who discovered it in the Carse of Gowrie, 1834, amongst a field of common Field Beans (No. 1). Seems deserving of cultivation.

3. COMMON TICK BEAN.

La Féverolle proprement dite.—Fr.

This sort is seldom cultivated in Scotland. In England and France, it is the kind of field bean held in highest estimation, and there often termed Common Horse Bean, or Common Field Bean, from its being more commonly cultivated than any other sort. It differs from the Common Scotch Bean, in having shorter straw; being more prolific; seeds rather smaller, more cylindrical, and rounded at the ends. It is also better suited for growing on light soils.

Sample by Mr David Hogg, Leith, weight 67 lbs.

4. HARROW TICK BEAN.

This variety is still smaller in all its parts than the last, it is also better suited for light soils. Its seeds are remarkably plump and hardy. There are, besides the preceding, many varieties known by the name of Tick Beans, as the Flat Ticks, Essex Ticks, French Ticks, &c. which differ only from the Common by being cultivated on different soils, or under different circumstances.

5. WINTER BEAN.

La Féverolle d'hiver.—Fr.

Height three to four feet; remarkably hardy and prolific; seed small, very plump and heavy, seldom having the least depression in the sides; same colour as the Common Bean, but with the addition of a dark greenish spot on the short side, a little below the termination of the small very black eye.

This sort has not been as yet fairly tried in Scotland. In France and England, it is found to stand the winters well, although often more severe than ours. It was introduced into England about the year 1825.

This and the Heligoland Bean are said by some to be the same variety. But from not having a sample (to be relied on as perfectly genuine) of the latter in the Museum, an opportunity has not been

afforded of comparing them satisfactorily; which may, however, be done in another season.

6. PIGEON BEAN.

This sort is the smallest seeded of all the beans; it is also of dwarf growth, but rather early and prolific; and in colour considerably darker than any of the preceding. It derives its name from being used instead of pease for feeding pigeons.

It has not hitherto been extensively cultivated in Britain, but to a considerable extent on the lighter bean soils of Germany, where it originated.

7. PURPLE FIELD-BEAN.

This sort resembles the Winter Bean very much, except in the colour of its flower and seeds; the former a darker and of a reddish or pink-like tinge, and the latter a reddish-brown or purple. It is scarcely so prolific as the last mentioned, which may be owing in a great measure to the lateness of the period at which it ripens. It might probably succeed as a winter-bean, but has not hitherto been tried as such in this country.

8. ALEXANDRIAN FIELD-BEAN.

This sort grows about the same height as the Common Bean (No. 1.), but is later in ripening; in consequence of which the seeds are seldom so plump or well filled. In size and shape they much resemble the Common Bean, but differ in colour, being of a dull reddish-brown.

Seems not at all suitable for general culture in this country.

*** FABA VULGARIS ARVENSIS vel HORTENSIS, FIELD OR GARDEN BEANS, or such as are generally cultivated in the gardens in Scotland; but may be grown in the field under favourable circumstances. Seeds larger than those in the preceding, and smaller than most of those in the following division.*

9. EARLY MAZAGAN.

La Fève de Mazagan.

This sort is supposed to have been originally brought from a Portuguese settlement on the coast of Africa. When grown in that place, the seeds are said to be smaller even than our horse-beans, but they grow to a larger size when cultivated in Portugal or England.

Stem about four feet high, and rather slender; pods four to five inches long, rather narrow, and containing four or five seeds; flowers, as in most of the white and green varieties, white, with dark brownish stripes on the vexillum or standard, and two dark brown spots on the alæ or wings; seeds, when ripe, of a whitish colour, rather larger, and more flattened, than those of the Common Horse-bean (No. 1).

In Scotland, the cultivation of this sort as a field bean has seldom been attempted; from its early and prolific habits, it might no doubt succeed in favourable situations. It grows best on a stiff or medium soil, avoiding alike the strong clays and very light soils, particularly if of an inferior quality.

Sown at Meadowbank Nursery (soil rather light, black loam) 27th April 1835; in flower 28th June; height at that period two and a quarter feet. Ripe 24th August; height at that period four feet.

10. LONG-PODDED BEAN, HANGDOWN LONG-POD, EARLY LONG-POD, LARGE LONG-POD, LISBON, EARLY LISBON, SANDWICH, EARLY MOM, &c.

La Fève à longues cosses.—Fr.

Stalks four to five feet in height; pods six to seven inches long by about one and one-fourth broad, rather pendulous, containing four or five beans; seed, when ripe, whitish, about an inch long, and five-eighths of an inch in breadth, flat, and generally rounded at the point. This sort is about a week later than the last, but rather more prolific.

There are several varieties of long-pod beans, under different names; but a season or two's culture, under similar circumstances, is found to produce so great a similarity in their habits, that it is very probable their temporary dissimilarity arises only from the effects of soil and previous culture. One variety, however, may be mentioned as possessing more distinct and seemingly permanent characteristics than the others, viz.:—

11. CHILD'S NEW EARLY LONG-POD.

This variety is only of recent introduction by Mr Child, an eminent seedsman in London: it is fully as prolific as the Common Long-pod; considerably earlier; its seeds are more irregularly shaped, and much thicker, especially towards the eye.

Sample in grain by Messrs Field and Child, London.

These three sorts are the most likely to succeed in field culture of those generally cultivated in the garden. Some of the following might likewise be tried, although with less chance of success ; they are, therefore, classed under the third division as follows :—

*** *FABA VULGARIS HORTENSIS*, *Garden Beans*.

12. DWARF FAN OR CLUSTER.

Height two to two and a half feet ; very prolific, and the earliest and dwarfest of all the garden beans ; pods short, and nearly cylindrical, containing three or four beans, which are larger and rather more flattened than the Early Mazagan.

This is an old and esteemed garden bean, but from its dwarf habit of growth wholly unfit for field culture.

13. WINDSOR, WHITE WINDSOR, BROAD WINDSOR, BROAD SPANISH, MUMFORD, TURKEY, TAYLOR'S WINDSOR, &c.

Height about four feet ; pods short, broad, containing two or three seeds, which are of a flat circular form, about an inch in diameter, but varying in size according to season, soil, and culture, and of a whitish colour.

This sort is much esteemed, and extensively cultivated. It is considered the earliest of late garden beans ; a sure bearer, and from its not ripening regularly may be gathered day after day for some time.

Specimen in straw by Mr J. Machray, late gardener at Bush House.

14. DUTCH LONG-POD.

Height four to five feet ; pods long, broad, and slightly pendulous, containing five and often six seeds, which are about the size of the last, but more elongated.

This is rather a superior sort, but not so well known as some of the others ; it is an excellent bearer, and rather late.

15. TOKER, LARGE TOKER BEAN, &c.

Height about five feet ; pods rather long and very broad, containing three or four beans of a whitish colour ; differing from the Windsor, in being of an elongated oval shape.

This is a medium late sort, and an excellent bearer, but considered rather coarse, and, therefore, not so much esteemed as the Windsor (No. 13).

16. JOHNSON'S WONDERFUL BEAN.

This is a newly introduced, and apparently a superior variety ; its pods are long, and contain six or eight beans, resembling in size and shape those of the Windsor.

Specimen in grain by Messrs Field and Child, London.

17. GREEN LONG-POD, GREEN NONPAREIL, GREEN GENOA.

This sort differs from the Common White Long-pod (No. 10), principally in the colour of its seed, which is always green even when ripe, and in being considerably later in arriving at maturity. It is an excellent bearer, and of good quality.

18. GREEN WINDSOR.

This sort bears the same relation to the White or Common Windsor that the Green does to the Common White Long-pod, except in its ripening about the same time, or only a few days later. It has the same advantages as the former, of retaining its green colour when ripe, and may on that account be used at table in a more advanced state than the white sort.

19. VIOLETTE.

Height about four and a half feet ; pods long and broad, containing three or four beans, which are of a size and shape intermediate between the Long-pod and Windsor ; of a very light purple colour when young, and dark red when fully ripe.

This is rather an early sort, coming in use about the same time as the Common Long-pod.

20. RED WINDSOR, SCARLET WINDSOR, DARK RED.

Height about four feet ; pods rather narrower than those of the Common Windsor, containing about the same number of beans ; similar in shape and size, but of a darker colour than those of the preceding when young, changing to a bright scarlet when full grown, and to a deep red when fully ripe.

This is a late sort, prolific, and of good quality, but neither it nor the last are liked by cooks, on account of their colour.

21. WHITE-BLOSSOMED OR WHITE-BLOSSOMED LONG-POD.

The flowers of this sort differ from all the others in being pure white, having no dark spots on the vexillum nor alæ ; it is very apt

to degenerate, but may easily be distinguished when in flower from the above circumstance; height nearly four feet; pods long, nearly cylindrical, and slightly pendulous, containing generally four but sometimes five beans, about six-eighths of an inch in length by half an inch in breadth, and rather thick or plump, of a black colour, or mixed with dark brown when ripe. It is a moderate bearer, of excellent quality, having little of the harsh beany flavour, but not liked when in an advanced state, on account of the darkness of its colour.

With regard to the period of ripening, both this and the following may be said to occupy a medium place, being neither very early nor very late. This variety possesses the curious anomaly of having the whitest flowers and blackest seeds of any in the collection.

22. RED, OR SCARLET-BLOSSOMED BEAN.

Height about four feet; colour of the flower generally a bright red approaching to scarlet, but varying from a pale red to a dark or almost black colour. Pods medium size, containing generally four or five beans, similar in shape but rather longer than those of the long-podded sort, and differing from all the rest in colour, which is a darkish rusty-brown. An excellent bearer, but not held in esteem on account of its colour; when in bloom, however, it is very ornamental.

Miller mentions a Black-blossomed Bean, which is very likely a variety of the red or scarlet, as it often approaches almost to a black colour; it seems to be now either extinct or mixed with the last.

In the early districts of Scotland beans enter into the rotation of cropping, and are successfully cultivated on all strong soils; they form an excellent preparative for wheat, and by attention early varieties might be found which would extend their culture to higher elevations and lighter soils; and, with this view, the habits of the Pigeon and Tick beans should be attended to. When sown broadcast, with a mixture of about one-fifth of late grey field-pease, the seed required will be from five to six bushels; and when sown in drills, from four to five bushels per imperial acre, the quantity of the seed being proportioned to the condition and quality of the soil. The produce in grain varies from twenty-eight to forty-eight bushels per imperial acre. Bean haulm forms nutritious food for horses in the winter and spring months.

PISUM—PEA.

The cultivated pease are generally divided into two distinct species ; such as have white flowers, with white or bluish coloured seeds (commonly termed Garden Pease), being included under the name of *Pisum sativum* ; and such as have coloured flowers, and in general grey, dun, red, or speckled seed (Field Pease), under that of *P. arvense*. Their botanical characters are, however, not sufficiently distinct, nor permanent in their duration to admit of their forming two distinct species ; but as the varieties in cultivation are so numerous, some mode of classification is necessary in order to admit of more easy reference ; and for this purpose they are in the present instance divided into four classes, as follows :—

* *PISUM SATIVUM ARVENSE, FIELD PEASE.*

** *PISUM SATIVUM ARVENSE vel HORTENSE, PEASE suited either for FIELD or GARDEN culture.*

*** *PISUM SATIVUM HORTENSE, GARDEN PEASE.*

**** *PISUM SATIVUM SACCHARATUM, varieties wanting the endocarp, termed SUGAR, or EATABLE PODDED PEASE.*

On the 29th of March 1834, most of the varieties enumerated in the following collection were sown at Meadowbank Nursery, with the view of comparing them with one another, and also of ascertaining in some measure their several properties or qualities ; therefore in any of the following descriptions, where the periods of flowering and ripening are mentioned without any reference to the time of sowing, the above date is always to be understood. In the case of the Garden Pease, and those generally used in a green state, where their period of ripening is mentioned, it is not understood as applying to the period when they were fit for use, but to that at which their seed was perfectly ripe.

* *PISUM SATIVUM ARVENSE, FIELD PEASE, or such as are more particularly adapted for Field culture.*

1. COMMON GREY FIELD PEA.

This is a late sort, generally sown alone in the early districts, or in mixture with Common Beans on strong lands, for which it is pe-

cularly adapted, from its requiring about the same time to mature its seeds. The pod is semi-cylindrical, long, and well filled, often containing from six to eight peas. In summer and autumn little difference is observable in the straw, but when thrashed, three distinctly marked varieties appear,—one spotted with a bluish green ground, one light blue, and one bluish coloured green without spots. When these pease are separated from the beans by a properly sized riddle, they are in some districts called *reeings*.

This pea is very prolific; and its haulm forms excellent fodder for horses, superior to that of the more early field varieties.

Sample by Mr Alex. Lindsay, Myres of Errol, Carse of Gowrie.

2. EARLY GREY WARWICK, OR EARLY NIMBLE HOG PEA.

Pods very often in pairs, small, straight, and nearly cylindrical, containing each from three to five peas, which are small, round, or slightly compressed, with small purple speckles; height two to three feet; in flower 31st May, ripe 20th July; middling prolific.

This is remarkable as being considerably earlier than any other field pea at present in cultivation. It seems well adapted for growing in late situations, and where it may not be likely to suffer from drought in the month of May or beginning of June. In dry warm soils its produce of straw is very inconsiderable.

Sample in grain by Messrs Nash, Adams, and Nash, London.

3. GREY HASTINGS.

This variety much resembles the last in its seeds, but it differs in its pods being longer, and containing more pease; straw also much longer and more slender; its leaves are small, and placed rather remotely. It is also at least three weeks later in ripening than the Grey Warwick.

The Grey Hastings is adapted for light soils, and situations which are too late for the common sort (No. 1), and was formerly grown to a considerable extent in some parts of Scotland; but its cultivation is now rapidly giving place to that of the Partridge Pea.

Sample in grain by Mr William White, Over-Fingask, Carse of Gowrie; and by Mr A. Gorrie, Annat Garden.

4. PARTRIDGE, GREY MAPLE, OR MARLBOROUGH PEA.

Pods broad, and occasionally in pairs, containing five to seven seeds, which are of medium size, roundish, of a yellowish-brown

speckled colour, with light coloured eyes ; straw thick and soft-like ; leaves large and broad ; average height four feet. About a fortnight earlier than the last sort.

This is generally reckoned the most suitable variety for growing in late situations, from its combining the properties of being very early, prolific, and of excellent quality.

5. GREY ROUNCEVAL, GIANT, OR DUTCH PEA.

This is at once the tallest growing, the latest, and largest of our field pease ; pods often in pairs, broad, and rather flattened, containing five or six seeds, which are a good deal flattened and wrinkled, of a dunnish-brown colour, with black eyes ; height six to eight feet.

This variety is only adapted for the earlier districts of Scotland, but is extensively cultivated in some of the southern counties of England, and some parts of the Continent.

Sample in grain by Mr J. Carmichael.

6. PURPLE-PODDED, AUSTRALIAN, OR BOTANY BAY PEA.

Pods generally in pairs and flattened, with thick fleshy skins, generally of a dark purple colour ; but this characteristic is not permanent, as they are sometimes found with green pods, in which case they are, however, easily distinguished from those of other pease by their thick and fleshy nature. Pease of an average size, slightly and irregularly compressed, of a light dunnish colour ; sample very superior in quality ; height five feet, remarkably prolific, and earlier than the Partridge Pea.

As yet this variety is little known amongst cultivators, but it seems possessed of properties which entitle it to an extensive share of cultivation, particularly in late situations.

Sample in straw by Mr A. Gorrie, Annat Garden, who has cultivated it successfully for several seasons, and has found it more productive in grain and straw than the Partridge Pea.

7. RED OR PURPLE AMERICAN FIELD PEA.

Pods generally in pairs, nearly straight, and semi-cylindrical ; pease medium size, and of a darkish red purple colour, indistinctly interspersed with darker speckles ; height four to five feet ; medium early, and remarkably prolific.

Sample in grain by Alexander Thomson, Esq. of Banchory, under the name of Roman Pease.

8. PAINTED LADY CROWN PEA.

Has beautiful dark red and whitish coloured blossoms, which, together with the pods, are produced in abundance towards the termination of the shoots ; its seeds resemble those of the Partridge Pea.

In this country the cultivation of this pea is almost exclusively confined to the flower border, but on some parts of the Continent, and also in America, it is subjected to field culture.

9. WINTER FIELD PEA.

Le Pois gris d'hiver.—Fr.

Pods almost always in pairs, small, cylindrical, and straight, containing about six peas, which are smaller than any other of the field pease whatever, and of a dark colour ; straw about four feet in length, small and hard-like.

In France and Germany this variety is generally sown in October, and ripens before any of the spring-sown field pease. If the sowing be, however, deferred until March, it is later in ripening than most of the other varieties sown at the same time. It is extremely hardy, and found to endure the severest winters, without suffering the least injury.

Sample of seeds by Messrs Booth and Co., Hamburgh.

** *PISUM SATIVUM ARVENSE vel HORTENSE, Pease suitable for cultivation either in the field or garden.*

In this class is included such white-flowered pease, with white, green, or blue seeds, as may be grown in this country, either for their green or ripened seeds.

† *Varieties having whitish-coloured seeds.*

10. SMALL WHITE OR YELLOW FRENCH FIELD PEA.

Pods in pairs, small, well filled, and slightly bent, having long foot-stalks, and containing five to eight very small round white or yellowish coloured pease ; straw of medium length, hard, slender, and rather sparingly clothed with foliage ; seems rather late, not very prolific, and scarcely deserving of cultivation in this country.

11. EARLY CHARLTON.

Pods generally, but not always, in pairs, two and a half to three inches long by one-half inch broad, well filled, and slightly bent ; pea rather longer, but in other respects similar to the Double-blossomed

Early Frame (No. 29); in flower June 3, ripe July 29; height four feet; prolific.

This is the oldest, most extensively cultivated, and best known variety of White Pea, and is said by some to be the origin from which the most esteemed early garden varieties have arisen, and that they are nothing else than Charlton Pease, considerably modified in character, from the effects of cultivation, selection, &c. Although this idea may seem far-fetched, yet it does not at all seem improbable, especially when we take into consideration the susceptibility of change from cultivation, and other causes, which the pea is ascertained to possess. Thus the Early Charlton, or any other variety whatever, if sown for several years, and only the very earliest and very latest flowering plants selected for seed each season, the difference in the time of ripening between the two will ultimately become so great as to give them the appearance of two distinct varieties; and by sowing the earlier portion on light early soils, and the later on strong black or carse soils, the difference will become materially increased. It is therefore probable, that the Early Frame Pease may have originated in the Charlton, although they differ essentially in their habit of growth.

12. CAROLINA PEA.

Pods generally in pairs, two and a half to three inches long, by fully five-eighths of an inch broad, very slightly bent, well filled; pea from one-fourth to three-eighths of an inch in diameter, cream coloured, and perfectly round; in flower 10th June, ripe 8th August; height four feet; prolific.

13. WHITE PRUSSIAN PEA.

Pods generally in pairs, two and a half inches long, from one-half to five-eighths of an inch broad; straight, and well filled; pease fully one-fourth of an inch in diameter, cream-coloured, round, and white, not wrinkled, but slightly compressed, from being closely set in the pod; in flower 15th June; ripe 15th August; height three to four feet; very prolific.

14. WHITE SICKLE PEA.

Pods rather shorter and more bent than those of the Scimitar Pea (No. 20), rather larger than, and similar in colour to, that of the White Prussian; in flower June 18, ripe August 20; height three to four feet; prolific.

15. DANTZIC PEA.

Pods in pairs, two and one-half inches long, by one-half of an inch broad, compact, and slightly bent ; smallest of all the White Pease, quite round, of a bright yellow colour, beautifully transparent, with whitish eyes ; in flower June 20, ripe August 29 ; straw branching six to seven feet high ; medium prolific.

It is to be regretted that this pretty pea is not more prolific ; it is seldom cultivated in this country, but is grown extensively on the shores of the Baltic, and imported for splitting, or boiling whole.

† † *Varieties having white-coloured flowers, and whitish seeds, with black eyes.*

16. PEARL PEA.

Pods in pairs, two and a half to three inches long, by one-half to five-eighths of an inch broad, slightly bent back, and well filled ; pea scarcely one-fourth of an inch in diameter, of a dull whitish colour, quite round and compact ; in flower 20th June, ripe 21st August ; height six feet ; very prolific.

17. SPANISH MORATTO.

Pods in pairs, fully three inches long by five-eighths of an inch broad, slightly curved backwards, compact and firm ; pea rather larger than the last, and of a dull white colour ; in flower 26th June, ripe 29th August ; height five to six feet ; medium prolific.

18. LARGE EGG OR BEAN PEA.

Pods in pairs, similar to those of the Spanish Moratto ; pea much larger, more oblong or bean-shaped, and darker coloured ; in flower 22d June, ripe 30th August ; from seven to eight feet high ; medium crop.

† † † *Varieties having blue or greenish coloured seed.*

19. BLUE PRUSSIAN.

Pods almost always in pairs, similar in size and shape to those of the White Prussian (No. 13), rather larger, and more compressed, colour bluish-green ; in flower 16th June, ripe 18th August ; height three to four feet ; very prolific.

The green straw, pods, &c. is in this, and all the other blue pease, of a darker colour than in the white ones ; the colour of the straw

varying (although not to the same extent) according to the colour of the ripe seed.

20. BLUE SCIMITAR.

Pods generally in pairs, length about three inches, breadth in the middle five-eighths of an inch, forming a gradual curve from the calyx to the point, slightly bent back at both ends, or of a scimitar-like shape (hence the name); pea compressed and very little, wrinkled, or of a bean-like shape, greatest diameter more than one-third of an inch, colour light blue; in flower 16th June, ripe 18th August; height three feet; prolific.

21. DWARF BLUE OR GREEN IMPERIAL.

Pods generally in pairs, tapering very abruptly at the point, slightly curved, two and a half to three inches long, by five-eighths of an inch broad, rather compact and well filled than otherwise; pea nearly one-third of an inch in diameter, slightly compressed and wrinkled, colour light bluish-green; in flower 16th June, ripe 18th August; height two to three feet; prolific.

22. TALL BLUE OR GREEN IMPERIAL.

Pods about the same length as those of the last, rather broader, more flattened, and generally straight; pea larger, more compressed, and irregularly shaped, but less wrinkled, same colour; in flower 19th June, ripe 24th August; height six feet; prolific.

The preceding list is not intended to comprehend all the White or Green Pease which may be found suitable for field culture in this country, but only a few of those, the merits and habits of which are sufficiently well known to recommend them as such.

* * * *Pisum sativum hortense*, GARDEN PEASE, or such as are more particularly adapted for garden culture, although not unsuitable for field cultivation, should such be accounted expedient, as in the case of growing them for seed.

† *Very dwarf, upright growing, varieties not requiring the aid of stakes or other support, under any circumstances.*

23. BISHOP'S EARLY DWARF.

Pods single or in pairs, two inches long, bent back at both ends,

increasing in size towards the middle, which is generally about half an inch broad ; pea rather irregularly shaped, from one fifth to one fourth of an inch in diameter ; cream coloured, irregularly blotched with white, particularly about the eye and the junction of the cotyledons ; in flower 31st May, ripe 26th July ; height one foot ; medium prolific. Found accidentally by Mr Hamilton Bishop, market-gardener at New Seone, Perthshire, amongst a quantity of Early Pease.

24. EARLY DWARF BREST.

Pods single or in pairs, from one and a half to two inches long ; by one half inch broad, tapering from the middle to both ends, slightly bent ; pea one-fourth of an inch in diameter, more round and regularly shaped than Bishop's Early Dwarf ; in flower 6th June, ripe 30th July ; height from one half to one foot ; unprolific.

25. EARLY SPANISH DWARF.

Pods single and in pairs, from two to two and a half inches long by fully half an inch broad, broadest within half an inch of, and tapering abruptly towards the point, and with a gradual curve to the calyx ; pease rather larger, and more wrinkled than those of Bishop's Dwarf ; colour similar ; in flower 10th June, ripe 30th July ; height one foot ; medium prolific.

26. LATE SPANISH DWARF.

Differs little in general appearance from the former, but is considerably later in ripening ; in flower 16th June, ripe 14th August ; height one foot ; medium prolific.

27. BLUE SPANISH DWARF.

Pods generally in pairs, about two inches long, by half an inch broad, a good deal bent back or sabre-shaped ; pea about five-eighths of an inch in diameter, colour dark bluish-green, light towards the eye, pretty regularly shaped ; in flower 13th June, ripe 18th August ; height one to two feet ; prolific.

28. GROOM'S NEW SUPERB, OR BLUE DWARF PEA.

Pods single and in pairs, two and a half inches long, compact, and terminating abruptly at both ends ; pease a good deal larger than those of the last, of a white and light green, or mixed-like appearance ; in flower 16th June, ripe 16th August ; height one and a half to two feet ; medium prolific.

† † *Such varieties as require the aid of rods, or stakes, to support them, to prevent their lying on the ground.*

29. DOUBLE-BLOSSOMED EARLY FRAME.

Pods almost always in pairs, slightly bent backwards, well filled, terminating rather abruptly at both ends, about two and a half inches long, by from three-eighths to half an inch in breadth; pea, when fully ripe, round and plump, cream-coloured, approaching to white towards the eye and at the junction of the cotyledons, almost one-fourth of an inch in diameter; in flower 31st May, ripe 25th July; height three to four feet; prolific.

30. SINGLE BLOSSOM EARLY FRAME.

This variety differs very little from the former, except in having its pods more generally single, and longer; (when two pods grow on the same foot-stalk, they are generally less than when one only is produced).

The stock from which the above two specimens were grown was obtained from Messrs Jacob Wrench and Sons, London, and they were found to be from five to ten days earlier than several specimens under the same name. This difference must arise from attention on the part of the growers in choosing the most suitable soils and situations for growing their previously selected seed-stock of early pease to the greatest advantage.

31. EARLY WARWICK.

Pods sometimes in pairs and sometimes single, about the same breadth, rather shorter and more straight than those of the Double-Blossomed Early Frame; in flower 31st May, ripe 25th July; height three feet; medium prolific.

This variety has acquired the character of being the earliest of all the varieties of garden pease, and on this account has lately been much sought after by cultivators. But from a series of experiments made since its introduction, it cannot be said to be any earlier than either of the varieties of early frame above mentioned (and is certainly less productive than either).

32. NIMBLE.

This is another name for a variety of Double-blossomed Early Frame; it is, however, questionable if any such difference does really

exist ; at all events, it is not so distinct even as the Warwick, and, at the farthest, can only be attributed to previous cultivation.

33. EARLY GOLDEN HOTSPUR.

Pods generally in pairs, two and a half to three inches long, by fully half an inch broad, nearly straight, well filled ; pea similar to that of the Double-blossomed Early Frame, but rather larger ; in flower 2d June, ripe 27th July ; height three to four feet ; prolific.

This variety is known also by the following names, which are derived from the places in which the seed stock has been previously cultivated, or other causes :—Reading Hotspur, Essex Hotspur, Master's Hotspur, and Superfine Early ; any variation in all of which can only be attributed to causes attending their previous culture.

34. ROYAL DWARF.

Pods generally in pairs, straight, three inches long, by five-eighths of an inch broad ; pea light cream-coloured, fully one-fourth inch in diameter, occasionally slightly compressed in the sides, arising from their growing very close in the pods ; in flower 13th June, ripe 10th August ; height two to three feet ; prolific.

35. DWARF PROLIFIC.

Pods rather smaller than those of the Royal Dwarf ; pease also smaller and whiter ; in flower 16th June, ripe 14th August ; height two to three feet ; very prolific.

36. DWARF MARROWFAT.

Pods rather flattened and inflated, sometimes in pairs, and sometimes single, about three inches long, by six-eighths of an inch broad at the middle, tapering from thence to both ends with a gradual curve, slightly bent backwards ; pea cream-coloured and white, from one-fourth to three-eighths of an inch in diameter, slightly compressed and wrinkled ; in flower 18th June, ripe 16th August ; height three to four feet ; prolific.

37. TALL MARROWFAT.

Pods not so often in pairs as those of the Dwarf, straight, and terminating more abruptly, three to three and a half inches in length, by six-eighths of an inch in breadth ; pea same colour, and rather longer

than the Dwarf Marrowfat ; in flower 16th June ; ripe 15th August ; height six to seven feet ; prolific.

38. MATCHLESS MARROWFAT.

Pods single and in pairs, about three inches long, by five-eighths of an inch broad, nearly straight and well filled ; pea fully one-third of an inch in diameter, compressed, and slightly wrinkled ; sample, when not very well ripened, possessing a greenish tinge ; in flower 16th June, ripe 18th August ; height three to four feet ; very prolific, and of superior quality.

This sort is of recent introduction ; and was obtained from Messrs Warner, Seaman, and Warner, seedsmen, London.

39. EARLY GREEN MARROWFAT.

Pods generally in pairs, well filled, slightly bent back at both ends, from two and a half to three inches long, by fully half an inch broad ; pease slightly compressed, not much wrinkled, approaching to a cream colour when very ripe ; those in the pods, nearest the top of the straw, which are latest in ripening, are of a light green colour, which gives to the sample a mixed-like appearance, similar to those of the Matchless Marrowfat ; in flower 10th June, ripe 30th July ; height four feet ; prolific.

40. LATE GREEN MARROW.

Pods rather shorter, broader, and not so well filled as the last ; pease larger and more wrinkled, similar in other respects ; in flower 16th June, ripe 15th August ; height four to five feet ; medium prolific.

41. FRENCH MARROWFAT.

Pods generally single, three to three and a half inches long, by six-eighths of an inch broad, much inflated, nearly straight ; pease white, but greenish when not fully ripe, about one-third of an inch in diameter, slightly wrinkled, sample mixed-like ; in flower 16th June, ripe 14th August ; height three to four feet ; prolific.

42. WOODFORD'S GREEN MARROW, sometimes termed NONPAREIL.

Pods generally in pairs, three to three and a half inches long, by half an inch broad, almost straight ; pease fully one-fourth of an inch in diameter, almost round, or very slightly compressed on the sides ; colour darker green than any other variety whatever ; in flower 16th

June, ripe 17th August; height two to three feet; very prolific, but rather a coarse pea.

43. KNIGHT'S DWARF WHITE WRINKLED MARROW, OR KNIGHT'S DWARF MARROW.

Pods in pairs, from two and a half to three inches long, by six-eighths of an inch broad, straight, or almost so, well filled, and terminating abruptly at both ends; pea, on an average, about three-eighths of an inch in diameter, flattened, and very much wrinkled; colour white, and sometimes of a greenish tinge; in flower 26th June, ripe 15th August; height three feet; prolific.

44. KNIGHT'S TALL WHITE WRINKLED MARROWFAT.

Pods in pairs, large, and rather more bent than those of the last; pease exactly similar; in flower 24th June, ripe 18th August; height seven feet; prolific.

45. KNIGHT'S IMPROVED WHITE WRINKLED MARROWFAT.

Pods always in pairs, similar to those of the last mentioned variety; pease similar to those of the Tall and Dwarf varieties of Knight's White Marrow, than which it is also rather sweeter and more prolific; in flower 20th June, ripe 15th August; height six feet; very prolific.

46. KNIGHT'S DWARF GREEN WRINKLED MARROWFAT.

Pods in pairs, three inches long, by six-eighths of an inch broad, flattish, and very slightly bent; pea, which is a light bluish-green, differing only from the White Marrow in colour; in flower 26th June, ripe 29th August; height three feet; medium prolific.

47. KNIGHT'S TALL GREEN MARROWFAT.

Pods rather less, but more compressed, than those of the last variety; pea similar in shape and colour; in flower 16th June, ripe 14th August; height six or seven feet; prolific.

For the existence of the last five varieties, the country is indebted to T. A. Knight, Esq. of Downton, President of the London Horticultural Society, who obtained them by crossing or hybridizing some of the most esteemed older varieties. From their remarkably wrinkled appearance, together with the peculiar sweetness which they all possess, Knight's Marrows may be said to form a distinct class of garden

pease, possessing qualities which, together with their general productiveness, render them a valuable acquisition, both to cultivators and consumers.

48. MAGNUM BONUM.

Pods in pairs, about three inches long, by five-eighths of an inch broad, straight, compact, terminating abruptly at the point, and gradually at the calyx ; pea fully three-eighths of an inch in diameter, irregularly shaped, but not wrinkled, of a deep cream colour, occasionally very slightly tinged with green ; in flower 16th June, ripe 14th August ; height six to seven feet ; prolific.

49. WHITE CROWN, AMERICAN CROWN, ROSE OR CROWN PEA.

The name of Crown is applied to this sort from its producing all its flowers and pods in tufts or crowns on the extremity of the shoots ; pods in pairs, small, cylindrical, and nearly straight, containing five or six medium-sized pease of good quality ; ripe about the same time as the last ; height about five feet ; very prolific.

50. NEW TREE PEA.

This is a large and luxuriant growing variety of the White Crown, communicated to the Museum by Robert Downie, Esq. of Appin.

From the specimen grown this season at Meadowbank Nursery, it seems altogether superior to, and likely to supersede the last.

51. WHITE ROUNCIVELLE.

Pods generally in pairs ; large, broad, a little flattened, and nearly straight, containing seven or eight peas, which are large, irregularly shaped, and white coloured ; in flower 20th June, ripe 18th August ; height six feet.

52. MARQUIS OF HASTINGS.

Pods generally in pairs, three inches long by fully five-eighths of an inch broad, slightly flattened ; pease more than three-eighths of an inch in diameter, irregularly white and cream coloured ; in flower 26th June, ripe 16th August ; four to five feet high ; very prolific.

53. WELLINGTON PEA.

Pods in pairs, three and a half inches long by six-eighths of an inch broad, well filled, very slightly bent back ; pea rather oblong or bean-shaped, not wrinkled ; cream-coloured ; largest of all the White

Pease ; in flower 18th June, ripe 20th August ; height four to five feet ; very prolific.

54. WATERLOO PEA.

Pods in pairs, from two and a half to three inches long by fully one-half inch broad ; pea one-third of an inch in diameter, round, or very slightly compressed, and wrinkled ; whitish towards the eye, the rest cream-coloured or greenish, according to their respective degrees of ripeness. Sample on this account mixed like. In flower 16th June, ripe 15th August ; height four to five feet ; very prolific.

55. GROTTO OR MOSSY-PODDED.

This is easily distinguished at first sight from all other pease whatever, by its pods, which are generally in pairs, straight and above the middle size, having a rough, mossy, or warted-like appearance, which turns to a darker colour than the rest of the pod as it becomes ripe (especially if exposed to rain or damp weather), it is then easily partially rubbed off ; pea one-third of an inch in diameter, roundish, very slightly wrinkled, of a dirty-greenish colour, approaching to white at the eye when pulled ripe, which gives the sample rather a mixed-like appearance ; in flower 28th June, ripe 27th August ; five to six feet in height ; very prolific.

**** PISUM SATIVUM SACCHARATUM, *Sugar, Eatable Podded, or Skinless Pease.*

Such as want the tough inner film or endocarp, and on that account used with the green pods entire, in the same manner as kidney-beans, but they may also be used as other pease either green or ripe. When not ripe, the pods of some of the varieties have the appearance of being much swollen or distended with air, but on ripening they become shrunk and collapse closely on the seeds.

† *White Flowered Eatable Podded Pease.*

56. COMMON DWARF CROOKED SUGAR.

Pods three inches long by five-eighths of an inch broad, crooked or jointed-like, with the seeds, as in all the Sugar Pease, very prominent, especially on becoming ripe and dry ; pease fully one-fourth of an inch in diameter, white, and slightly wrinkled ; in flower 19th June, ripe 13th August ; height two feet ; prolific.

57. LATE DWARF SUGAR OR TAMARIND PEA.

Differs from the last in being from a week to a fortnight longer in ripening; is also of a more broad-leaved luxuriant-like habit of growth, and produces larger pods.

58. DUTCH DWARF SUGAR.

Pods small, cylindrical, and nearly straight, containing five or six pease, of good quality, and not very prolific. About the same height and as early as the Early Frame (No. 29), but less patient than it of the spring frosts.

59. COMMON TALL CROOKED SUGAR.

Pods rather longer than those of the Common Dwarf; pease longer, darker coloured, and more irregularly shaped; in flower 16th June, ripe 17th August; height four to five feet; prolific.

60. VILMORIN'S SUGAR.

Pods small, well filled, and straight, containing seven or eight pease, which appear very prominent even in the young pods; height five to six feet; rather late; said to be of excellent quality, and the most abundant bearer amongst all the white eatable podded pease.

Specimen by Vilmorin and Co. Paris, under the title of *Espèce de Pois très excellent*.

61. LATE WYKER SUGAR.

This variety bears a considerable resemblance to the last, but is taller, and later in ripening.

†† *Red or Purple-flowered Eatable Podded Pease.*

62. TALL, OR FRENCH IMPERIAL.

Pods single, about seven inches long by one inch broad, very much inflated and slightly bent, afterwards becoming very much shrunk and crooked; blossoms reddish, like those of the Common Field Pea; pease fully one-third of an inch in diameter, compressed or slightly wrinkled, of a dun-greyish colour; sown 27th March, in flower 26th June, ripe 6th September; height five to six feet.

63. RED OR PURPLE AMERICAN EATABLE PODDED OR SUGAR PEA.

This differs from the Common Red American (No. 7), in its pods

wanting the endocarp, and the pease appearing more prominently through the skin.

Sample in grain by Mr Murray, Montague Street, Edinburgh.

64. FISHAMEND'S SUGAR.

This variety is a good deal like the French Imperial (No. 62), but its seeds are much smaller and more compact; a good bearer, and in France much esteemed for its pods when young.

By Vallentin Schertzer and Sons, Haarlem, on the 26th December 1835, specimen of dried young Sugar Pease in the pods; and also a sample of young unripe pease, in an excellent state of preservation.

Sorts lately added, the characters of which have not yet been ascertained by experiment in this country.

By M. Vilmorin and Co., Paris.

The earliest Early French Pea.

By Messrs Field and Child, London.

The earliest Early English Pea, under the name of Race Horse.

By Mr Siwwright, Abercrombie Place.

New branching White Pea; to be sown at the distance of ten inches in the rows.

By Mr Airth, Lisburn, Ireland.

A new and very prolific garden pea.

By Mr Miller, Dalswinton.

A new early and full-podded pea, found amongst a quantity of French lentils.

The superior attention devoted by horticulturists, compared with that of agriculturists, in procuring and improving the varieties of different plants under their care, is perhaps more clearly exemplified in the case of pease than in that of any other tribe of plants whatever, as may be seen by comparing the number of white-blossomed or garden pease in cultivation, with that of the purple-flowered, grey, or field sorts; and the beneficial results arising therefrom serve as a stimulus for cultivators to persevere in the improvement of such sorts as are found to be best suited for field culture. In this country, that class generally termed eatable podded, or sugar pease, has been hitherto comparatively neglected; and it is to the French, who cultivate and use them to a much greater extent, that we are indebted for most of the varieties which we possess.

Almost every kind of soil will answer for one or other of the varieties of pea, provided it is possessed of a medium degree of fertility, and not too wet. The quantity of seed required per imperial acre, when sown broadcast, is from two and a half to three and a half bushels; when drilled, two to two and a half bushels will suffice; the quantity in either case increased or lessened according to circumstances.

In the case of the pea, the drill system is considered better than sowing broadcast, not only as it affords a better opportunity of cleaning the soil, but the produce is generally found superior, both in quantity and quality. The average produce of ripe seed varies from twenty to thirty bushels per acre.

The uses both of the grain and haulm of the pea are well known, but one circumstance of material importance to consumers is, that some samples fall in boiling, while others do not. This arises not from any difference in the kind, but from being cultivated on different kinds of soils; those which fall in boiling are termed boilers; and the hard ones owe their property to being cultivated on strong aluminous or calcareous soils. To counteract this fault, it is only necessary to throw into the water a little of the subcarbonate of soda.

PHASEOLUS—KIDNEY-BEAN.

Haricot of the French.

The varieties of Kidney-bean, generally cultivated, are considered as belonging to two distinct species, viz. *Phaseolus vulgaris* and *Phaseolus multiflorus*, the dwarf sorts being referred to the former, and the runners or pole-beans to the latter species. The dwarf sorts are in general the earliest, but the others are much more productive; although less adapted for cultivating for their ripe seeds, were such accounted a desirable object in this country.

As a farinaceous seed for the food of man, the Kidney-bean is considered by the French as being far superior to any other legume, and next, if not of equal importance, with wheat. In this country, however, notwithstanding that many of the earlier varieties might be grown to advantage on light early soils, their culture has hitherto been scarcely extended beyond the gardens of the opulent; and even there, kidney-beans occupy but a small breadth, and are only cultivated for their pods, which are used in a green state, or

when about half grown. In France, and other countries of Europe, as also in the Canadas and United States of America, and elsewhere, kidney-beans are not only used, in a green state, to a much greater extent than in this country, but are cultivated in the fields, and by every cottager who possesses a piece of garden-ground, for their ripe seeds, of which they make various kinds of dishes, and consider them of as much importance in their domestic economy as the cottagers in this country do potatoes. Unlike the common bean, the kidney-bean does best in a light, sharp, dry soil of medium fertility, and the produce, per acre, even of some of the dwarf varieties, is often more than double that of any other cultivated legume.

I. PHASEOLUS VULGARIS—DWARF KIDNEY-BEANS.

Les Haricots nains.—Fr.

* *White-seeded Dwarf Kidney-beans.*

1. COMMON ROUND WHITE KIDNEY-BEAN.

Le Haricot rond blanc commun.—Fr.

In France this sort is much esteemed for field culture, particularly in the western districts, where it is often distinguished by the name of *favette* or little bean. Pods long, nearly cylindrical, and well filled with seeds, which, when ripe, are about three-eighths of an inch in diameter, nearly round, and rather swollen than sunk at the eye; medium early, but not well adapted for using in a green state, by reason of the inner skin of the pods being more tough than in most of the others. It is, therefore, only cultivated in France for its ripe seed, and on that account little known in Britain.

A sample in the Museum from Mr G. Thorburn, seedsman, New York, under the name of American Soup-bean, very much resembles this in grain, but an opportunity has not yet been afforded of growing them together for comparison.

2. DWARF SOISSONS KIDNEY-BEAN.

Le Haricot de Soissons.—Fr.

This is a very early sort, medium prolific, but not much cultivated; pods medium long, and a little flattened; seeds about six-eighths of an inch in length by nearly three-eighths of an inch in breadth, a good deal flattened and bent or kidney-shaped, very much hollowed at the eye. It is equally well adapted for using in a green and ripe state. Scarcely known in Britain.

3. DWARF CANTERBURY.

Pods three to four inches in length, nearly straight, narrow and well filled; seeds about half an inch in length by one-fourth in breadth, slightly flattened, and nearly straight.

This is a well-known, very dwarf, and early sort, but rather unproductive. It is nevertheless an esteemed sort for an early crop, the young pods being very tender.

4. DWARF SABRE KIDNEY-BEAN.

Pods six to seven inches long, bent or curved; seeds slightly flattened, full five-eighths of an inch in length by about three-eighths in breadth, very slightly kidney-shaped; the seeds straight, and the eye a little sunk.

In Britain this sort has received only a medium share of cultivation, but in Holland it is reckoned a very superior sort; is extensively cultivated, and found to be well adapted for using either in a green or ripe state. Medium early and dwarf.

5. DUTCH DWARF.

Pods longer, more straight, and flattened, than those of the last mentioned sort; seeds larger, and of the same shape, but ripens fully earlier.

Is also much cultivated in Holland, as well as in this country, and reckoned one of the best for using in a green state. Its long pods are liable to lie upon the ground, and apt to become damaged in wet or damp weather; and it is, therefore, not so well suited for growing extensively for its ripe seed.

6. BATTERSEA KIDNEY-BEAN.

This differs from the last in having longer seeds; rather shorter and broader pods; and in being later in arriving at maturity.

7. FLAGELET-SHAPED KIDNEY-BEAN.

Seeds not so broad, and more compressed than any of the preceding, kidney-shaped; pods short and narrow; habit of the plant very dwarf, rather late, and not very productive. It is, however, of superior quality, and by some an esteemed sort.

8. WHITE SWISS KIDNEY-BEAN.

Rather larger, and more cylindrical than the last ; pods long, and rather narrow ; late and productive ; little known in this country.

In France chiefly cultivated for using in a green state.

*** Dun and Yellowish-coloured Dwarf Kidney-beans.*

9. ROUND LIGHT DUN CHINESE KIDNEY-BEAN.

Habit of growth very dwarf and close ; pods short (from two to three inches) and having a tough skin ; beans small, nearly round, and of a very light dun or almost white colour, with a darker coloured ring round the eye. A very inferior variety.

10. CANADIAN OR ROUND AMERICAN KIDNEY-BEAN.

Pods long (five to six inches), slightly curved, almost cylindrical when ripe ; seeds of a light copper colour, nearly round (about one-half by three-eighths of an inch), not sunk at the eye, which is surrounded by a dark red ring ; medium early, but not well adapted for use in a green state, the pods being rather tough ; it is, however, very prolific, and well adapted for growing, when ripe seed is the object in view.

11. SMALL YELLOW, ROUND YELLOW, SMALL ROUND YELLOW,
DWARF YELLOW.

Rather smaller in all the parts than the preceding ; of a dark copper colour, with a very small dark ring round the eye, also rather tough skinned, but cultivated occasionally in this country for its green pods. It is very prolific, and might be grown to advantage for its ripe seeds.

12. LIGHT DUN, CREAM, OR STRAW-COLOURED KIDNEY-BEAN.

Pods long, and nearly straight, almost cylindrical when ripe, and containing about six seeds of a light dun colour, slightly kidney-shaped, about five-eighths of an inch in length, and a little flattened ; habit of growth rather tall, and a little straggling.

13. DARK DUN, OR LIVER-COLOURED KIDNEY-BEAN.

Differs from the last in being of a more dwarf and compact habit of growth, and in its seeds being considerably darker in colour. This and the last are well known amongst cultivators in this country, they

are early, very hardy and productive. On the Continent they are esteemed alike for using in a green and ripe state.

* * * *Dwarf Speckled Kidney-beans.*

14. JERSEY DWARF KIDNEY-BEAN.

Pods short, and nearly cylindrical; seeds small, and roundish, thickly interspersed with dark speckles; and in appearance resembling the seeds of the common yellow lupine, but scarcely so much flattened; medium early, and prolific, suitable either for using in a green or ripe state.

15. FLESH-COLOURED KIDNEY-BEAN.

Pods generally five inches long, curved, slightly speckled with brown, narrow, and nearly cylindrical when ripe, containing about five seeds, which are rather large, long, and slightly kidney-shaped; flesh coloured, thinly and irregularly interspersed with reddish speckles; habit of growth dwarf, and compact; early, and prolific.

16. ZEBRA SPECKLED KIDNEY-BEAN.

Pods about the same size and shape as those of the last, much speckled, with a dark purple or almost black colour; seeds same shape, and rather less than those of the Flesh-coloured; colour nearly white, rather sparingly interspersed with black or very dark purple speckles; habit of growth much stronger than the last, it is also about a week later, and a still better bearer.

17. MAGPIE KIDNEY-BEAN.

Differs from the last in having larger and darker pods, being much later, and not nearly so productive, and also in the ground colour of the bean, which is rather more inclined to a French white.

18. RED SPECKLED KIDNEY-BEAN.

Pods long, nearly straight, and well-filled, slightly speckled into light brown; colour of the seeds dull red, thinly interspersed with light brown speckles, size and shape similar to the preceding; habit of growth robust, and not very close; medium early, and a medium bearer.

19. FULMER SPOTTED KIDNEY-BEAN.

Very dwarf, medium early, and prolific, ground colour of the seed dark purple, speckled light brown.

This sort and the preceding four are better adapted for using in a green than in a ripe state.

* * * * *Various other sorts not included in the foregoing divisions.*

20. ROUND-SEEDED CHINESE KIDNEY-BEAN.

Pods about four inches long, slightly bent, and almost cylindrical, when ripe containing four or five small seeds, which are almost round, of a reddish colour next the eye, and white on the opposite side ; dwarf, and rather late, only a medium bearer.

21. COMMON DWARF CHINESE KIDNEY-BEAN.

Seeds same colour as the preceding, but much more elongated ; ripens earlier, grows stronger, and is very superior to the last.

22. DWARF NEGRO OR BLACK KIDNEY-BEAN.

Seed small, elongated, and black ; pods long and cylindrical, slightly curved and abundant, a free grower, much esteemed both in this country and on the Continent for its green pods, and also occasionally cultivated for its ripe seeds. This sort is used very much for the food of the black population in the Brazils.

* * * * * *Varieties which, although referred to the tribe of Dwarf Kidney-beans (P. VULGARIS), have nevertheless short runners, particularly when sown late or in wet seasons, and which seem to occupy an intermediate place between the true Dwarfs and Runners or Pole Beans (P. MULTIFLORUS).*

23. COMMON WHITE RUNNERS.

Le Haricot blanc commun.—Fr.

Pods long, broad, and crooked, containing seven or eight seeds, which are white, about an inch long, by half an inch in breadth, a good deal flattened, and kidney-shaped ; grows to the height of three feet, but bears chiefly at about one foot from the ground.

24. TALL SOISSONS KIDNEY-BEAN.

Le Haricot de Soissons.

This is only considered an improved variety of the last ; its pods are generally longer, and its seeds of a more brilliant transparent white, but is said to degenerate when cultivated elsewhere than at

Soissons. The seeds of this sort are more esteemed in Paris market for using in a ripe state than any other whatever; neither it nor the preceding are used in a green state, owing to the toughness of their skins.

25. IMPROVED FRENCH POLE BEAN.

This is a variety differing from the last two in having large pods about one foot long, by from one to one and a half inch in breadth, a good deal compressed, and containing generally from ten to twelve or more seeds; the skin of the pods is also more tender and better adapted for using in a green state than any of the two former.

Specimen from Mr Spindler, 24. Greenside Street, Edinburgh, who received it from Hanover under the name of *Schwer bohner*.

26. FRENCH TALL PEARL BEANS, OR TURKEY PEASE.

Le Haricot Predôme.—Fr.

Seeds small, round, white, and transparent; pods three to four inches long, well filled, and clasping the beans firm when ripe, so as to have a wrinkled-like appearance; pods remarkably tender and well adapted for using in a green state; earlier than any of the last three sorts, but too late to depend on for a crop of ripe seed in this climate.

27. NEW IMPERIAL FRENCH PEARL BEANS, OR TURKEY PEASE.

This is an improved variety of the former, being finer, and still more tender podded; they are both very superior sorts, and well worth the attention of cultivators. Much cultivated in Normandy.

Specimen from J. G. Booth and Company, Hamburg.

28. SABRE RUNNER, OR GERMAN SABRE.

Resembles No. 23 and 24, except in being of dwarf growth, having smaller seeds, and being equally well adapted for using either in a green or ripe state. Much cultivated in Germany, but scarcely ripens in this country, except under favourable circumstances.

29. PURPLE SPECKLED KIDNEY BEAN.

Pods about four inches long, slightly flattened, straight, narrow, and speckled, with purple seeds, small, nearly straight on the sides, slightly compressed; ground colour dark purple, interspersed with light brown or straw coloured speckles; rather late, and but a medium bearer, chiefly cultivated for its green pods.

30. BLACK SPECKLED.

Compared with the last this sort has longer pods, darker coloured seeds, is a better bearer, and a little earlier, also cultivated for using in a green state.

31. RED PRAGUE.

Resembles the Pearl Beans in shape and habit of growth, also in being very good either green or ripe, but differs in the colour, which is reddish, and in being very late, and on that account not so well suited to our climate.

II. PHASEOLUS MULTIFLORUS—LARGE RUNNER OR POLE KIDNEY-BEAN.

Besides being larger in seed, and of much stronger growth than the varieties of *P. vulgaris*, those of this species are distinguished by the seedling plants having their cotyledons under ground, and in being of a perennial nature if protected from cold, and by the racemes of flowers being as long or longer than the leaves, while those of the other are generally much shorter.

32. SCARLET RUNNER KIDNEY-BEAN.

This variety is too well known to require any description ; besides being cultivated for its pods and seeds, it is often grown for its beautiful scarlet flowers.

33. PAINTED LADY RUNNER.

This differs from the last in having the keel or centre of the flower almost white ; its seeds are also much lighter coloured, and it is considered a better bearer.

34. WHITE DUTCH RUNNERS, NEW LARGE WHITE RUNNERS.

This sort has white flowers, and white seeds, it is also an abundant bearer, and by some considered superior to either of the last two varieties in quality.

III. PHASEOLUS LUNATUS—LIMA KIDNEY-BEAN.

35. COMMON LIMA, OR SCIMITAR-PODDER KIDNEY-BEAN.

Pods long, curved, and more smooth than those of the last species ; seed larger, and much thicker at one end than at the other,

of a dull white colour. Like the Large Runners, this is remarkable for the largeness and great produce of its seeds, but so tender that even in the latitude of Paris it requires to be forced before being planted out in spring, in order to insure a supply of ripe seed.

Although Kidney Beans in a ripe state are not likely soon to form any considerable portion of the food of man in this country, yet many of the early and prolific sorts offer an opportunity of adding to the very few dishes, at a cheap rate, which appear on the cottager's table.

DOLICHOS.

This genus is very nearly allied to the preceding, only differing slightly in the form of the flower. The seeds and pods of several of the species are used in the same manner as those of the *Phaseolus*, in the countries from which they are originally procured. Their culture has been attempted in various parts of Europe, but although generally suited for the warmer countries, such as the south of France, Spain, Italy, &c., they are, for the most part, so inferior in quality to the kidney beans, as only to merit the attention of cultivators for the sake of variety. They are all too tender to be cultivated in our climate without the aid of artificial heat at some period of their existence.

The names of the only species cultivated for food are as follows :

I. DOLICHOS UNGUICULATUS—BIRD'S-FOOT DOLICHOS.

Le Dolique à onglet mongette ou banette.—Fr.

II. D. SESQUIPEDALIS—LONG-PODDED DOLICHOS.

Le Dolique à longues gousses.—Fr.

III. D. LABLAB—BLACK-SEEDED OR EGYPTIAN DOLICHOS.

Le Dolique lablab.—Fr.

IV. D. SOJA—SOJA BEANS.

Le Dolique soja.—Fr.

V. D. CATIANG—SMALL-FRUITED DOLICHOS.

ERVUM—TARE OR LENTIL.

There is only one species of this genus deserving of much cultivation, viz., *E. lens* or *lentil*, but of it there are several varieties.

The Lentil is a legume of the greatest antiquity, being in esteem in the days of the Patriarchs, and much prized in eastern countries ever since. In Egypt and Syria the seeds are parched in frying-pans, and sold in shops, being considered by the natives as the best food for those who undertake long journeys.

The Lentil is said to have been first introduced into Britain about the year 1545, but although well adapted to our climate, its cultivation has never been attended to. In France, Germany, Holland, and other countries of the Continent, it is grown to a considerable extent, for its seeds and haulm. The former are round and flat, produced in great abundance in small, flat, square-like pods, generally two on each foot-stalk, and one or two seeds in each pod; they are used in various ways, but principally when ripe in soups, as split pease; and the haulm is considered, both in a green and dry state, so nutritious as to compensate for its small bulk of produce, and particularly well adapted for feeding calves, and other young stock. When given as green food for cattle, it should be cut when the first pods are nearly full grown; and in this case it is generally sown broadcast, but drilled when grown for ripe seeds. The soil best adapted for the Lentil is that of a dry, light, calcareous, sandy nature, being very impatient of wet.

I. ERVUM LENS.—COMMON LENTIL.

1. LARGE LENTIL.

Flowers very small and whitish, generally two, but sometimes three on each peduncle or foot-stalk; pods when ripe about three-fourths of an inch in length, by one-half in breadth, flattened, and containing generally only one seed, which is round and compressed, about three-eighths of an inch in diameter, and about one-eighth in thickness, of a whitish or cream colour. Sown at Meadowbank Nursery on the 7th April 1835; in flower 6th July; ripe in the second week of August; height one foot to fifteen inches.

This is certainly the most productive variety, but on the Continent it is considered inferior in quality to the next sort.

2. COMMON LENTIL, YELLOW LENTIL.

This differs from the preceding variety in having smaller seeds,

and being considered of a superior quality. It is the sort most esteemed in the Paris market ; about as early as the last.

3. RED LENTIL.

Seeds about the same size as those of the last, of a reddish-brown colour ; flowers also light red, about as early as the preceding.

4. SMALL LENTIL.

Seeds not much more than one-eighth of an inch in diameter ; flowers also reddish, and pods often containing two seeds.

This is the variety mostly sown for green food in France, although its ripe seeds are also used. It is rather later, and grows taller, than any of the preceding. When sown in drills they should be ten to fifteen inches apart, and the plants at about four or five inches distant in the rows. The Lentils are of a close branching habit of growth, and one plant will produce 100 to 150, and often a considerably greater number of pods.

II. ERVUM MONANTHOS—ONE-FLOWERED LENTIL.

La Lentille unifleur.—Fr.

This differs essentially from the other Lentils ; its seeds are from one-eighth to two-eighths of an inch in diameter, globular, but often slightly wrinkled, of a dunnish-brown colour, and generally three or four in each pod. It is much less esteemed than the varieties of *E. lens*, but is, notwithstanding, cultivated in some parts of France, and elsewhere, both for its seeds and herbage or haulm.

CICER ARIETINUM—CHICK PEA.

The Chick Pea is a native of the south of Europe, as also of the north of Africa and some parts of Asia. In countries where the winters are not very severe, the Chick Pea is sown in autumn, but it is alike too tender to endure the rigour of our winters, and scarcely arrives at maturity during our summer, consequently it is quite unsuitable for field culture in this country.

The Chick Pea is of a stiff, branching, upright habit of growth, one and a half to two feet high, producing small red or white inconspicuous flowers, which are followed by swollen or bladder-like pods, about an inch in length, by three-fourths of an inch in diameter, con-

taining three or four seeds of a whitish colour, about the size of common pease, globular, and irregularly indented or wrinkled on the surface.

LATHYRUS—CHICKLING VETCH.

LATHYRUS SATIVUS—CULTIVATED LATHYRUS, LENTIL OF SPAIN,
OR CHICKLING VETCH.

La Gesse cultivée.—Fr.

Notwithstanding the pernicious qualities assigned to the *L. sativus* by Duvernoy, as its causing rigidity of the limbs, delirium, and other dreadful effects, to such an extent that its use was prohibited by an edict of George Duke of Wurtemberg, in 1671, which was confirmed and enforced by his successors, yet it is still grown in some provinces of France, and elsewhere. Its seeds being used in soups, and its meal or flour mixed with that of the cereal grains, is made into bread; and also given to hogs, and other live stock, but generally in mixture. It is still given in various parts, as a green food for horses and cattle. *L. sativus* grows to the height of about three or four feet, attaching itself to branches, &c. for support, in the manner of pease; its leaves are small and grassy-like; flowers solitary and abundant, about half the size of those of the Common Pea, of a bright blue colour generally, but changing in some varieties; pods when fully grown about an inch and a half in length, by three-fourths of an inch in breadth, flattened, with two wing-like appendages running along the back, containing generally two flattish and rather irregularly-shaped seeds, of a dun or brownish colour, and of rather an agreeable taste.

There is another variety, termed the White-flowered Chickling Vetch, which differs from the common sort in nothing except in the colour of its flowers and seeds, which are white, and the foliage is also a slight shade lighter in colour.

Others of this genus also produce farinaceous seeds which may be used as food, but in too small quantities to admit of their being advantageously used for such in this country.

VICIA.—VETCH.

The seeds of most of the *Viciæ* may be eaten as food by man ; but they are generally too small, or produced too sparingly, to admit of their culture for this purpose being attended with any beneficial effects. The only species of the genus deserving attention for this purpose, is the *Vicia sativa*, and of its varieties,—the

VICIA SATIVA ALBA—WHITE TARE, LENTIL OF CANADA, OR
NAPOLEON PEA.

La Vesce blanche, ou Lentille du Canada.—Fr.

This variety differs from the Common Tare in being of dwarfer growth, and producing a much greater quantity of seeds, which are of a white or cream colour, and possesses a much milder taste. In France and Canada these are used as a substitute for pease, both green and ripe, in soups and other dishes ; they are also ground and made into bread, but in this case their flour is generally mixed with that of wheat, or others of the cereal grains. The White Tare has been known in Scotland for a considerable time, but from only being grown for soiling cattle, its culture was never extensive, owing to its dwarfness of growth, compared with the Common Tare.

The other varieties of *V. sativa* (Summer and Winter Tares), although cultivated sometimes for their seeds, belong more properly to the Leguminous forage and herbage plants.

LUPINUS.—LUPINE.

The Lupines are distinguished from others of the cultivated Leguminosæ by their strong branching habit of growth, as well as by their stamens, which are ten, being all united towards the base of their filaments (hence referred by some botanists to class *Monadelphia*, and order *Decandria* of Linnæus) ; anthers, five oblong and five round in each flower ; calyx two-lipped ; skin of the pods thick, pods compressed and swollen at the seeds.

The only species hitherto cultivated for their farinaceous seeds are the *Lupinus albus* and *L. luteus*, White and Yellow Lupines ; the former distinguished by its white flowers, white and slightly

compressed seeds, and the latter by having yellow flowers, and speckled roundish seeds.

The White Lupine was extensively cultivated by the Romans for its ripened seeds, which they used as food, and also as well as the green herbage for feeding their domestic animals ; at present, however, the Yellow Lupine is more extensively grown in Italy, for the same purposes, and also in some parts in the south of France, on poor dry grounds, for cutting in a green state, and ploughing down as manure.

Besides the preceding varieties, others of the Leguminosæ in the Museum might be enumerated as being cultivated for their seeds,—as *Ervilia sativa*, *Tetragonolobus purpureus*, *Ochrus pallida*, &c. which are grown in several parts of the Continent, but their produce is either so inferior in quantity or quality, as to render them of little value in domestic economy.

III. BUCKWHEAT, OR PERSICARIA.

(*Polygonæ.*)

POLYGONUM FAGOPYRUM.

1. COMMON BUCKWHEAT.

In Scotland the Buckwheat is seldom cultivated, except for feeding pheasants and other game. On the Continent, however, and even in some parts of England, it is used in the distillery, and its flour made into bread, which is palatable, and very nutritious. In France, besides being used for feeding fowls, pigs, &c. it is given to horses, and it is said that a bushel of its grain goes farther than two bushels of oats, and if mixed with four times its bulk of bran, will be full feeding for any horse a week. Its haulm or straw is said to be more nourishing than that of clover, and its beautiful pink or reddish blossoms form a rich repast for bees. The quantity of seed required is about one and a half bushel per acre ; it is always sown broadcast, and the produce of Common Buckwheat may be reckoned about four quarters per imperial acre.

POLYGONUM TATARICUM.

2. TARTARIAN BUCKWHEAT.

This sort differs from the former in having the edges of its seeds toothed, and being of a more slender but taller habit of growth. It is not considered so productive, but is more hardy, and better adapted for growing in mountainous situations, as in Switzerland, where it is sometimes cultivated, as well as in Siberia, which seems to be its native country.

POLYGONUM EMARGINATUM.

3. NOTCH-SEEDED BUCKWHEAT.

Seeds much larger than the Common Buckwheat, their wings also larger and notched. Native of Nepaul, where it is cultivated; but when grown in our climate, a considerable number of its flowers are generally abortive.

POLYGONUM CYMOSUM.

4. PERENNIAL BUCKWHEAT.

This sort was procured from M. Vilmorin and Co. last season, under the above name. The seeds are larger, thicker skinned, more winged and flattened on the sides than those of the Common Buckwheat.

IV. CHENOPODIUM—GOOSE-FOOT.

(*Chenopodææ.*)

CHENOPODIUM QUINOA.—WHITE AND BLACK SEEDED VARIETIES.

The following extract is from Loudon's Gardener's Magazine, December 1834:—"This plant, in Mexico, ranks in utility with the potato, the maize, and the wheat. The leaves are used as spinach or sorrel, or as greens; and the seeds in soups and broths, or as rice. Throughout great part of South America, and especially in Peru, the seeds are in as common use as rice is in Hindostan. The seeds are considered more heating than rice, and on that account they are frequently given to domestic poultry to make

them lay early. The seeds are small, yellowish-white, round, somewhat flattened, about a line in diameter, and, on a cursory glance, might be mistaken for those of millet; mixed with the latter seeds, and fermented, a pleasant kind of beer is said to be produced. They are contained in a single envelope, from which they are very easily separated. The Quinoa was first introduced into England in 1822, and it has ripened seeds at Kew. No particular notice, however, appears to have been taken of the plant till this season, when it was grown by A. B. Lambert, Esq. V. P. L. S. at Boyton, where it has ripened abundance of seeds, on plants varying from three to seven feet in height. We trust the plant will now have a fair trial, both in gardens and fields. To do any good in producing nutritious seeds, the plant should be subjected to field culture, in which we see not the slightest difficulty. It might be sown very thinly in drills, three feet apart, at about the same season as barley, and the plants afterwards thinned to the distance of one foot apart. There appears at present no reason whatever why it should not become as common in the fields of Europe as barley, wherever that grain can be cultivated."

About fifty seeds of the White variety, weighing not more than one-fourth of a drachm, were sown in Meadowbank Nursery, about the end of April 1835. The plants grew to the height of about four feet, producing short and compactly placed branches, and an abundance of succulent foliage, which was found an excellent substitute for spinage. In the first week of October, the plants being ripe, were cut up, and on being dried, the seed was rubbed out, and weighed exactly 4 lb. 2 oz., besides what was eaten by birds and lost from various causes.

The Red-seeded variety (if a variety it can only be termed) is very different from the White-seeded sort. It grows to the height of six or eight feet, and even more, with numerous long and spreading branches, producing a greater abundance of succulent foliage than the former, but from its lateness it seems wholly unfitted for cultivating in this climate, for its ripe seeds. Sown at the same period as the former: it is now, 12th November, only in full flower, with a few of the earlier seeds partially formed. The seeds of both these kinds of *Chenopodium* were presented by J. C. Loudon, Esq. conductor of the *Gardener's Magazine*, &c.

PLANTS CULTIVATED FOR THEIR HERB AGE AND FORAGE.

THE plants cultivated, or capable of being advantageously cultivated, in this country for herbage and forage, are arranged in the following order :—

- I. GRAMINEOUS (*Gramineæ*), comprehending the Grasses.
- II. LEGUMINOUS (*Leguminosæ*), having their seeds in legumes or pods, such as Tares, Clovers, &c.
- III. CRUCIFEROUS (*Cruciferae*), such as Cabbage, Rape, &c., and other herbage and forage plants, not included in the above, and belonging to other natural families, Chicory, Yarrow, Ribgrass, &c.

To this division of the Report Tables are attached, shewing the kinds and quantities of seeds best adapted for sowing down lands to grass under various circumstances, being the result of careful and minute trials and comparisons since the paper on this subject by Mr C. Lawson appeared in the *Quarterly Journal of Agriculture*, vol. iv. No. 23.

I. GRAMINEOUS HERBAGE AND FORAGE PLANTS,

Or such as belong to the natural order *Gramineæ* of Jussieu; and with a few exceptions (which are noticed in course), to the class *Triandria* and order *Digynia* of Linnæus.

Under this head it is by no means intended to particularize all the grasses in the Museum, but only such as more especially demand the attention of the agriculturist, either from their possessing qualities entitling them to cultivation under certain circumstances, or on account of their possessing properties injurious to the soil, or to such crops as they are generally found growing amongst.

In the following arrangement the different genera, as well as the species in each genus, are placed so as to follow each other, as much as possible, according to their relative value, or the estimation in which they are generally held by cultivators in this country, commencing with those sorts which are most prized.

LOLIUM—RYEGRASS.

GENERIC CHARACTERS.—Inflorescence spiked; spikelets many-flowered, and, except the terminal one, alternate, in two opposite rows, sessile, presenting their edge to the rachis, and those on the sides having each a one-valved glume at their inferior extremity, the terminating spikelet having two such glumes; germ or seed coated with two-valved paleæ, which adhere firmly to the seed when ripe.

I. LOLIUM PERENNE.—COMMON RYEGRASS.

L'Yvraie vivace.—Fr.

Spikelets longer than the glumes, beardless; root fibrous, perennial.

The Common Ryegrass possesses several good qualities to recommend it to the attention of cultivators, the principal of which are,—its suitableness to a great variety of soils; the facility with which it is propagated, by reason of its seeds being produced in abundance, and their uniformity in ripening; and, although last, not the least of its good qualities, the fibrous structure of its roots, which fit it in an eminent degree for alternate husbandry. However, notwithstanding all these good qualities, its culture, in this country at least, has doubtless been carried too far, to the exclusion often of sorts which would yield a greater return, and might in every respect be grown in similar circumstances, to far greater advantage.

In the south of France the climate is generally supposed to be unfavourable for the growth of the Common Ryegrass, from the great heat and drought of the summer; and even in the northern provinces it is only lately that its culture has been much attended to, but in them it is yearly on the increase. In North America its cultivation is little known; it has, however, been partially tried in Canada and the States, by settlers from this country, but found to be scarcely capable of withstanding the rigour of their winters.

Like other plants which have received an extensive cultivation, there are several varieties of the Common Ryegrass, the principal of which are as follows:—

1. COMMON PERENNIAL OR SCOTCH PERENNIAL RYEGRASS.—This is the sort most generally employed for sowing on such lands as are subjected to rotations, in which two or more successive seasons of

grass crop are required ; and in such cases the seeds should be saved from plants of at least two years' standing, by which means the produce is of more permanent duration than that of seed saved from the crop of the first season ; indeed, so much does the duration of Ryegrass depend on the previous manner adopted in saving the seed, that it is the produce of seeds saved successively from the first year's crop which constitutes that which, from the comparative shortness of its duration, is generally termed,

2. ANNUAL RYEGRASS,—owing to the acquired annual habits of the sort generally known by this name. It differs from the more permanent varieties by having fewer root leaves, and a greater quantity of culms or stalks, which are rather longer, and furnished with a smaller proportion of foliage than those of most of the perennial varieties. From the quantity and length of its stalks or culms, this sort has been considered as yielding a greater bulk of crop the first season, and so, better suited for single crops of hay than the perennial sorts ; but the results of late experiments tend to shew that the quantity of root and stalk leaves which these last produce, fully compensates for any deficiency which may arise from the weight of their culms, besides rendering the hay less wiry and more palatable than that of the Annual Ryegrass, which, in fact, seems to possess no superior quality, except that it yields a greater quantity of seeds.

3. WHITWORTH'S RYEGRASS.—So named in honour of Mr Whitworth, at Acre House, a gentleman who has paid much attention to the cultivation and improvement of the different varieties of *Lolium perenne*. In the Hortus Gramineus Woburnensis, this sort is mentioned as possessing in an eminent degree the properties of early and late growth, and to be of such a perennial nature, or so tenacious of life, that the ground requires two or three ploughings to overcome its vivacity so as to prevent its injuring the succeeding crop. Its foliage is remarkably fine, which renders it suitable as a mixture for sowing in pleasure grounds.

4. PACEY'S RYEGRASS.—This variety produces an abundance of foliage, both at the roots and on the stalks, which, although rather broader, and not so fine to appearance as that of the former, is also, from its perennial character, well adapted for pleasure grounds and

permanent pasture. Its spikelets are shorter, and contain fewer seeds than most of the other varieties.

5. RUSSELL'S RYEGRASS.—Named in compliment to the Duke of Bedford, who first pointed out the original plant, from whence the stock has been raised, to Mr Holdich, the late editor of the Farmer's Journal. It is of a much stronger habit of growth, and yields a greater bulk of crop than any of the preceding; it grows also early in spring, and remains late in the autumn.

6. MOLLE'S RYEGRASS.—This is a favourite variety in some places, it is rather of a slender habit, but grows tall, and yields a very bulky crop.

7. STICKNEY'S RYEGRASS.—This variety was raised by Mr Stickney, an intelligent agriculturist in Holderness. It resembles the last a good deal in habit of growth, but is more of a perennial nature, grows stronger and more freely in the beginning and end of the season.

In the Museum, seed of this variety from Mr Stickney; and a specimen of the grass by Mr Black, land-steward, Dalkeith, from the Duke of Buccleuch's agricultural garden.

8. POLLEXFEN'S RYEGRASS.—This variety acquires its name from being raised by Thomas Pollexfen, Esq. Kirkwall, in Orkney, who has, by devoting much attention to the improvement of the Ryegrass for a considerable period, obtained this superior variety, similar in its qualities to the preceding, but of a darker green colour.

Sample of seed communicated by Mr Pollexfen.

9. DEVONSHIRE EVERGREEN RYEGRASS, commonly termed *Devon Evers*.—This variety does not yield such a bulky crop as the last, but it is still more perennial in its nature, and withstands the rigour of winter well; hence it derives the name of Evergreen.

10. SPREADING RYEGRASS (*L. stoloniferum*).—This name is applied to a remarkably stoloniferous variety, the seeds of which were procured from Germany, evidently a distinct variety from the Stoloniferous Ryegrass mentioned by Sinclair in his Hert. Gram. Woburn. It was about a fortnight longer in running to seed in the nursery last

season than any of the other varieties of Ryegrass, and produced comparatively few flower-stalks. It is of early spring growth, pushing out long prostrate stolons or shoots, with an abundance of foliage, so that one plant, by the time the spikes begin to appear, will form a close tuft, extending from two to three feet in diameter; these shoots, however, although lying on the ground, never attempted to strike root until near the end of the season, and even then very sparingly. Entire height about fifteen or eighteen inches from the surface, but the length from the root to the point of the spike is often nearly three feet, spike long and slender; spikelets remote, small, and few seeded.

11. THICK-STALKED RYEGRASS.—This variety was procured from Vilmorin and Co., Paris, under the name of *Lolium grossum*; it is nearly as remarkable for its stiff and upright habit of growth as the last is for its slender stoloniferous habit; height about twenty inches; spike about eight inches long, and very broad; spikelets, which are very long, placed so that the point of the one reaches to the base of the next above, containing each eight or ten seeds. In bulk of crop (so far as can be judged from the produce of a small sample grown in the nursery along with the others), the *L. grossum* appears to be inferior to most of the preceding: the seed was sown two years ago, and the plants still remain lively, having ripened seed last year, but they do not seem to grow freely in the beginning, but stand well out in the end of the season.

The above are the most esteemed varieties of *Lolium perenne*, but there are many more of inferior importance, and possessing less permanent characters. Those of the most perennial habits, which are distinguished by their yielding a greater abundance of root leaves and fewer stalks or culms, are denominated Perennial; and those of shorter duration, which generally produce a smaller quantity of root leaves and a greater number of culms, are termed Annual Ryegrasses; but even these last will, under favourable circumstances, exist two or three years, while under unfavourable circumstances the most perennial varieties will scarcely exist more than one year. Of those termed Annual there is only one variety in cultivation. But even the sorts which are most permanent in their characters, or such as are most capable of producing the same sort from seed, have become so much changed in habits and characters from the effects of continued culture

upon different soils, and under different circumstances, as no longer to retain any traces of the properties for which they might have been originally distinguished.

II. *LOLIUM ITALICUM*.—ITALIAN RYEGRASS.

L'Ivraie d'Italie.—Fr.

SPECIFIC CHARACTERS.—Lower paleæ terminated by an awn or beard, which constitutes the most marked distinction between this and *L. perenne*, the varieties of the latter being all beardless. Botanists, however, agree in concluding that the presence or absence of the awn in *Gramineæ* does not constitute a sufficiently permanent character, from its being often caused merely by the effects of climate, soil, &c. Hence it has been concluded that the Italian Ryegrass is only a variety of *L. perenne*. The Italian Ryegrass, however, possesses other distinctive characters which, although they may seem of little consequence in the estimation of the botanist, are, nevertheless, (some of them at least), of considerable importance to the agriculturist. Compared with any of the varieties of Common Ryegrass, the *L. italicum* affords a stronger braird, arrives sooner at maturity, has a greater abundance of foliage, which is broader, and of a lighter or more lively green colour, grows considerably taller, is more upright, or less inclined to spread on the ground; its spikes are longer; spikelets more thinly set, and upon the whole producing a less bulk of seed, which is smaller, has the awn (above mentioned) adhering to it, and is generally little more than half the weight per bushel of that of Common Perennial Ryegrass when grown under similar circumstances. Another of its distinguishing characters is, that it is preferred by cattle to any of the common sorts, a fact which has been proved by numerous experiments in various parts of the country, as a confirmation of which the following instances may be adduced:—

Part of a grass-park at Pitfour Castle, Carse of Gowrie, sown down in spring (1833), was found to be so much preferred by cattle to the rest which was sown with common ryegrass, that while the latter produced a considerable number of stalks which flowered and perfected seeds, the former was kept quite bare, and scarcely allowed to produce a single stalk during the whole season; and the cattle, which were kept in a house at night, on being let out in the morning, were observed to go regularly straight across the whole park

without stopping to feed until they came to that portion occupied by the Italian Ryegrass.—Communicated by Mr James Young, land-surveyor and valuator, Perth, formerly land-steward at Pitfour Castle.

In spring 1833, an extensive park was laid down at Dalkeith Palace, part of which was sown with common ryegrass, part with the most approved mixtures for permanent pasture, and part with Italian ryegrass alone. The whole was depastured with sheep and cattle, and during the dry weather in July and August 1835, the stalks or culms of the common ryegrass (which were produced in great abundance) flowered and ripened seed, and assumed a dry withered-like appearance until the wet weather set in in September. The mixture produced a much less quantity of culms, and retained all along a much greener appearance than the last mentioned portion; and the Italian ryegrass produced scarcely any, from their being closely eaten down, while it retained its verdure much better than any of the others, not only during the warm dry weather, but also during the whole of the previous winter. However, from the upright habit of growth which it possesses, the Italian ryegrass has rather a bare rooted appearance, and seems better adapted for forming part of a mixture than for sowing alone as a pasture grass.—Communicated by Mr Black, land-steward, Dalkeith Park.

The following account of the introduction of the Italian ryegrass into Britain, and other circumstances connected with its culture on the Continent, &c. is extracted from Mr Lawson's Report, published in the *Quarterly Journal of Agriculture*, January 1832.

“In the 12th Number of the *Quarterly Journal of Agriculture*, the following observations, from the *Bulletin des Sciences Agricoles*, were made on Italian Ryegrass:—

“‘This plant is said to be distinguished from the common ryegrass (*Lolium perenne*), by its larger leaves, by its being of a deeper green, and by the greater height to which it grows. It is usually sown in autumn, as is the general practice with grass-seeds in the south of Europe. After the field is harrowed, it is sown at the rate of from 16 to 18 lb. per acre, and the seed rolled in. In the following autumn the turf is covered like an old meadow, and the crop of the following year is more than double. It may be also sown in spring. If it be sown with clover or lucerne, its growth is so rapid that it will quickly choke them. It is eaten greedily by cattle, whether green or dry, and yields fifty per cent. of hay.’

“ As there is no account of any trial having been made of this grass in Britain, it was an object of some importance to obtain a few seeds or plants of it, for the purpose of observing its characters and mode of growth in this country.

“ Mr Thomson of Banchory having procured a few seeds of it at the Agricultural Exhibition at Munich, had the goodness to communicate them to me. About the same time I obtained a small quantity of what was called a new kind of ryegrass from Hamburg. These two were sown last spring; and, at the same time, for the purpose of comparison, was sown along with them, a small quantity of Stickney's ryegrass, which is held to be one of the most valuable varieties of perennial ryegrass under cultivation. The progress of these plants was carefully observed. There was no difference in the period of their germination, or of appearing above ground. But in a short period afterwards, the seeds obtained from Italy and from Hamburg both exhibited a decided superiority in their growth over that of Stickney's ryegrass; and this superiority was afterwards maintained during the whole of the season.

“ The general appearance of these two foreign grasses was the same, they being broader in the leaf and much more luxuriant in growth than Stickney's ryegrass; and when examined after they came into flower, they were both found to be the same variety of ryegrass. It is not known whether this Italian ryegrass is a native of Italy or of Germany, neither is it known in which of these countries it was first cultivated. The whole character of this plant, so far as it has been observed, accords precisely with the account in the *Bulletin des Sciences Agricoles*; and although the small scale upon which the experiment was here made, did not afford an opportunity of ascertaining how it was relished by pasturing animals, the account obtained from Hamburg precisely confirms that above stated, for it is represented as being softer, more juicy, of a richer foliage, and more relished by cattle, than the common ryegrass.

“ Though the Italian ryegrass will be valuable as an early grass, it also retains its powers of growth to a late period in the season. A patch of it, which had flowered and ripened its seeds, was cut over in the first week in November; and notwithstanding the frosts that we have since had, occasionally pretty severe for the season of the year, at which period vegetation in plants is nearly dormant, these plants have put forth new leaves, which, at present (24th December),

have attained the length of above a foot, shewing a superiority to any other grass in producing winter herbage.

“ This grass, too, is found to be more hardy than the common ryegrass ; for, in the vicinity of Hamburgh, the common ryegrass will not stand the winters when very severe ; whereas the Italian ryegrass withstands the severities of winter, even when sown in September, and, consequently, the plants are young and tender when the frosts prevail.

“ That it is a perennial grass, too, has been ascertained by the cultivation of it at Hamburgh. A few plants in their second year have been sent here from that place, which, though completely checked in their growth by the effects of the sea-voyage, were planted about the middle of November, and have now put forth a number of fresh leaves.”

Specimens of Italian Ryegrass, with particulars regarding the cultivation, &c.

From the Right Hon. the Earl of Lauderdale. Communicated by Mr Thomas Fair, Woodheads.

Sample of the hay of Italian Ryegrass, sown without a crop on the 17th May 1834, and cut on the 9th of August following, when the seed was found to be perfectly ripe. The field from whence this specimen was taken produced nothing previously, except rushes and other plants indicative of a cold, marshy, moorish soil. In the month of January 1834, it was trenched and drained, and had about twelve single cart-loads of lime given it per acre, with no other manure whatever ; and although the produce was not weighed, yet it was reckoned by judges to be superior in bulk to what might have been expected from Common Ryegrass grown on the same extent of superior corn land. Horses were found to eat the hay with great avidity, and in preference to that of Common Ryegrass and Clover. The aftermath being allowed to grow until the 30th of September, was at that period nearly as good as the first crop ; when it was eaten down by sheep.

By William M'Dowall, Esq. of Garthland, Barr.

Hay of the second cutting of Italian Ryegrass 1834, from a field sown in spring 1833, and from which two cuttings were also obtained the first season. And also three plants, having each from seventy to one hundred stalks, in length from fifteen to thirty-six

inches. The first of these specimens, from Mr M'Dowall, tends to shew the perennial nature of the Italian Ryegrass, combined with its tendency to arrive early at maturity. The others shew its productiveness and liability to tiller, or its bushy habit of growth, if not sown too thick.

From Jonathan Richardson, Esq., Ingram Lodge, Lisburn, Ireland, communicated by Mr Airth.

Two specimens of Italian Ryegrass sown, without a crop, on the 4th May 1834; the first crop was cut on the last day of July following; average height four and a half feet. Second, cut in the end of September; average height of it four feet three inches.

By Mr A. Gorrie, Annat Garden.

A specimen of Italian Ryegrass, cut for seed third week of July 1834, from a field sown on the 9th of April 1833, and which ripened two crops of seed that same season. Also a sample cut from the same field on the 28th September 1834, at which period the fourth crop of seed was almost ripe. In order to ascertain the permanency of its duration, the Italian Ryegrass was allowed to stand for another season, but was found to yield a very small return (in 1835) owing to the exhausting effects which the previous ripening of four crops of seed must have had both on the soil and plants.

By Jas. Biggar, Esq. Maryholm, Dumfries.

Samples of the first and second crops of Italian Ryegrass seed saved by him in 1834. Weight of the former $17\frac{1}{2}$ lb. and of the latter 14 lb. per bushel.

Notwithstanding the favourable results of the above experiments, several parties who have tried the Italian Ryegrass, state that it is of less permanent duration than agrees with the characters generally given of it. In the case of the Italian, as in that of Common Ryegrass, occasional failures will no doubt take place, and these may often arise from local causes which, in many instances, may be difficult to account for.

As a farther elucidation of the character and habits of the Italian Ryegrass, we insert the following extract of a letter from M. B. de

Boutteville to M. Vilmorin, translated from the French periodical *Le Cultivateur, Journal des Progrès Agricoles*, August 1835, Paris.

"I have perused your observations, and those of M. Mathieu de Dombasle, on the Italian Ryegrass. I am convinced that at the end of two or three years its bulk of produce is considerably diminished; but one of the most advantageous modes of cultivating it is to sow it with clover. For a period of two years, after raising a crop of grain on a field in which I had sown clover, which was very thin, and even quite bare in some parts, I sowed along with it in autumn some Italian Ryegrass, which yielded a magnificent crop both of grass and clover. This season, I have sown some during spring and autumn among thin crops of clover, and have obtained very satisfactory results. Immediately after sowing this year's crops of clover, I have added some Italian Ryegrass, about 10 lb. to the acre, and my reason for not sowing more, is the fear of injuring my crops of oats and wheat. As soon as I have reaped my oat and wheat crops from these fields, if the clover and Italian Ryegrass seem not sufficiently thick, I intend sowing them anew. After last year's experiment, and that of the two former years, I am persuaded that my success will equal my expectations. I am surprised that M. de Dombasle (who sows the common ryegrass among clover,) has not substituted the Italian, which grows much quicker, and yields hay of a much superior quality. After the two first cuttings of clover, we have excellent pasture, which is always in a state of verdure.

"To resume, I do not think that the Italian Ryegrass is suited for permanent pasture;* but I think it is very proper as a rotation crop, either mixed with clover or by itself, and one or at most two years in the ground. In sowing it alone, this plant may succeed the clover with advantage, which cannot be sown with profit on the same ground oftener than every five or six years, at least in the north and in the Somme department, where my operations are conducted. If my observations seem worthy of notice, you may insert an extract from them in some journal.

"In 1835 I shall reap Italian Ryegrass, without mixture, from twelve acres. I have this year sown down other twelve acres; alto-

* This remark of M. Boutteville is only applicable to the Italian Ryegrass when sown alone for permanent pasture, for certainly if mixed with the more perennial sorts, it will tend much to increase the bulk of crop for the first two years, and as it dies out the others will occupy the spaces which are left.

gether, with my clover, I have sown thirty-two acrss, and I still intend sowing on my estate of Omiecourt about eight or ten acres more, as soon as the crops are reaped.

“ You see, Sir, that my experiments have been conducted on rather an extensive scale.

“ I can assure you that its hay is excellent for feeding horses and cattle; and that its nutritious qualities are greater in proportion to its weight than that of the other hays and clovers.

“ BON. DE BOUTTEVILLE.”

III. *LOLIUM TEMULENTUM*.—BEARDED DARNEL.

Also known in some districts by the name of *Doites*.

SPECIFIC CHARACTERS.—Spikelets generally about the same length as the glume; lower paleæ terminated by an awn from three to six times its own length; seeds, when fully grown, about one-sixth of an inch in length, swollen, and generally four in each spikelet; habit of growth stiff and upright; culm or stalk feels rough by drawing the finger upwards; root fibrous; annual.

This is a most pernicious weed in wheat fields, where it is sometimes abundant; but as agriculture advances, it is rapidly disappearing in this country. Judging, however, from the quantity of its seeds to be seen in most samples of foreign wheat, it must be very prevalent in some parts of the Continent. The seeds, if very abundant, mixed with wheat and made into bread, prove injurious to health, causing delirium and stupefaction. It is never to be met with except in wheat fields. From its seeds being about the same size, consequently difficult to separate, and ripening about the same period as those of the wheat, its presence no doubt arises from a bad stock of seed.

IV. *LOLIUM ARVENSE*.—*Var.* BEARDLESS DARNEL OF BRITAIN.

This differs from the preceding in having very short soft imperfect awns, and a smooth culm or stalk; but resembles it in its strong upright habit of growth, and in other particulars.

Specimen in Museum found by Mr Baird, foreman at Meadowbank Nursery, in a field of wheat near Largo, Fife, in 1834; also, in 1835, a specimen in grass, and a sample of seeds from Captain Pearson, Villoren, Falkirk. From the great similarity between this and

the preceding, it is generally thought to be a variety, and very likely possesses the same deleterious qualities.

V. *LOLIUM ARVENSE*.—TRUE ANNUAL BEARDLESS DARNEL.

This Darnel, the seed of which was received from Mr C. A. Fischer, Gottingen, under the above name, differs most essentially in its general characteristics from the preceding. Its spikes are short, nodding or drooping to one side, and seldom containing more than six or eight spikelets, whereas the last two generally contain about double that number; spikelets beardless, longer than the glumes, five to ten seeded; seeds considerably smaller, but of the same shape as those of the Common Beardless and Bearded Darnels; habit of growth dwarf and straggling; culms or stalks jointed, very slender, and slightly rough upwards; root fibrous; annual. From the smallness of this species, it is alike harmless and useless to the agriculturist.

PHLEUM.—CATTAIL GRASS.

GENERIC CHARACTERS.—Inflorescence paniced; panicle contracted so as to resemble a close spike; spikelets solitary, one-flowered; glumes two-valved, nearly equal, with a nerve running up the back, and terminating in a short bristle or awn; valves navicular or boat-shaped, inclosing the paleæ, which are two, boat-shaped, and beardless.

I. *PHLEUM PRATENSE*.—MEADOW CATTAIL, TIMOTHY, OR HERD'S GRASS.

Fléole des Prés—Fr.

SPECIFIC CHARACTERS.—Panicle spiked, cylindrical; glumes terminating abruptly, with a short awn or bristle nearly their own length, arising from the termination of the fringed or ciliated keel; root perennial; flowers in the end of June.

In America this grass is cultivated almost exclusively where the soil is favourable; and in Britain it is also coming into repute and cultivated to a considerable extent, particularly in some districts of England. It thrives best on moist soils or carse lands, and also on newly reclaimed moorish soils; when grown on dry light soils its roots become bulbous or tuberous. According to the Woburn ex-

periments, the Timothy grass possesses the advantage of affording double the quantity of nutriment when its seeds are ripe that it does if cut when in flower; hence it presents an increased stimulus to its cultivation, from its seeds being procured without its being lessened in value as a hay crop. Therefore, on tenacious, strong, and rather moist soils, it is entitled to a precedence almost to any other, and should at least form a considerable portion of the mixture employed for sowing down such, either for alternate husbandry or permanent pasture. Compared with several others, it is, however, rather deficient as an early spring grass, but is equal to any of the common ryegrasses. It receives the name of Cats-tail from the form of its contracted panicle; and is the Highland badge of the clan Sutherland, whose crest is a cat. The name of Timothy-grass it receives in America, from being originally brought by Mr Timothy Hanson from New York to Carolina. Herd's grass, or Herd-grass, is another American name for it.

Specimen of its hay, about two feet long, from the top of Gasconhall-hill, estate of Annat, 500 feet above the level of the sea, by Mr A. Gorrie, shewing its adaptation to such situations; also, specimens of first and second cuttings, 1834, raised on a strong damp soil from American seed, sown the previous season. Height of the first four feet, and of the second about three and a half feet; these seemed to possess a more vigorous growth, and produced longer spikes than the common sort of this country; but of it there is a considerable number of varieties differing from one another in the colour of the anthers and spike, also in the shape and length of the latter, and in other particulars.

II. PHLEUM NODOSUM.—KNOTTY-ROOTED, OR JOINTED TIMOTHY, OR CATS-TAIL-GRASS.

This name is often applied to the bulbous-rooted variety of *P. pratense* above mentioned, as being found only on dry soils; but it differs from it in the form of its culm or stalk, which is knee-jointed, and of a prostrate spreading habit of growth. Its panicles are shorter and more tapering towards the extremities, and its jointed culm more concealed by the sheaths of its foliage. With all these differences, however, it is generally considered as only a variety of the preceding. When grown from seed it retains its original characteristics.

Specimens in Museum grown in Meadowbank Nursery from seeds

procured in Holland, and from plants found naturally in the King's Park, Dalkeith Park, and on the road side near Roslin; this last differs from the preceding in having white anthers, whereas the others are of a dull reddish or brown colour.

ALOPECURUS—FOXTAIL-GRASS.

GENERIC CHARACTERS.—Inflorescence in a contracted panicle similar to the last genus, but differing from it in the glumes being less nerved, joined together at the base, and beardless; paleæ joined together except the half of one of the sides; with an awn proceeding from their base, glumes and paleæ adhering to the seed when ripe.

I. ALOPECURUS PRATENSIS—MEADOW FOXTAIL-GRASS.

Le Vulpin des Prés.—Fr.

SPECIFIC CHARACTERS.—Culm or stalk erect, smooth panicle cylindrically spiked, obtuse; glumes woolly or ciliated, joined below the middle; awn twice the length of the paleæ; root fibrous, perennial; flowers in May and beginning of June.

This is one of the earliest and best of pasture grasses, but not so well adapted for hay, as it produces but few stalks, which are but sparingly furnished with leaves; its root leaves are very broad, long, soft, slender, and grow rapidly when cut or eaten down by live stock; it grows naturally on rather superior soils of medium texture, and constitutes the greater portion of many of the richer natural pastures in Britain. It requires two or three years after sowing to arrive at full maturity.

Specimen by Mr J. Carmichael, Strontian, Argyleshire, where it grows abundantly in superior soils.

II. ALOPECURUS GENICULATUS—JOINTED FOXTAIL-GRASS.

Le Vulpin genouillé.—Fr.

SPECIFIC CHARACTERS.—Culm trailing on the ground, leafy, with kneeled joints, from which proceed roots when growing in wet places; panicle much smaller, tapering more towards the extremities than that of the *A. pratensis*, and generally of a darker colour; glumes united at the base, slightly hairy and fringed; awn twice as long

as the paleæ; root fibrous, and perennial; flowers in June, July, and August.

This species grows naturally in watery or marshy places, but seldom on peaty soils; its seeds are difficult to procure, owing to the small number of culms or seed stalks which it produces, and the remarkable irregularity of their ripening. It may be considered of little importance to the agriculturist on account of the small quantity of herbage which it yields; however, on some of the irrigated meadows near Edinburgh, and on the alluvial banks of rivers, where it is occasionally flooded by fresh-water tides, its produce is not so very inconsiderable, yet such places might be occupied by others which would yield a larger bulk of produce.

III. ALOPECURUS AGRESTIS—SLENDER FOXTAIL-GRASS.

Le Vulpin des Champs.—Fr.

SPECIFIC CHARACTERS.—Culm at first slightly kneed at the lower joints, afterwards erect, rough upwards, contracted; panicle generally of a purplish colour, long, and slender; glumes almost smooth, united below the middle; awn twice as long as the spikelet, kneed or jointed-like in the middle; root fibrous, of biennial duration; flowers in July and August.

This grass is generally termed an annual, but it will flower and last two seasons on a light dry soil. It is of comparatively little importance, but may be sown along with some others on light sandy soils on the sea coast, where it will grow much better than any of the common ryegrasses.

Specimen by Mr Black, from the Agricultural Garden, Dalkeith, the produce of seeds brought from Holland. And by Mr Robert Stark, from Dirlton Common, where it grows naturally on poor siliceous sandy soil.

ARRHENATHERUM—TALL OAT-GRASS.

GENERIC CHARACTERS.—Flowers male and hermaphrodite upon the same plant (consequently belonging to the class Polygamia, and order Monœcia of Linnæus); panicle loose, spreading; glumes two-valved and two-flowered; lowest floret male, or with stamens only, and a long twisted awn inserted a little above the base; upper one perfect, with a short straight bristle below the point.

I. *ARRHENATHERUM AVENACEUM*.—FIBROUS-ROOTED TALL
OAT-LIKE GRASS.

L'Avoine élevée.—Fr.

Also known by the names of *Avena elatior*, and *Holcus avenaceus*. The only botanical distinction between this and the following is in its having fibrous, while the other has bulbous or tuberous roots; it also differs in the colour of its foliage, which is of a more vivid green, grows taller, more close, or, in other words, produces a much greater number of stalks or culms upon a given space of ground, and it also produces a greater bulk of foliage on the culm than the bulbous-rooted variety, qualities which render it a valuable grass for cultivating, either for hay or pasture; its fibrous roots adapting it in an eminent degree for alternate husbandry, contrary to those of the bulbous-rooted sort, which render it a most troublesome weed in cultivated land, owing to the great tenacity of life which its tubers possess. Attempts have been made to account for the different forms of the root from the difference of soil on which they are cultivated (light dry soils causing the formation of the bulbous roots, and moist rich soils the fibrous ones). If the difference does arise from such causes, it must be from a very long continued growth on their respective soils; for the seed of the true fibrous variety never produces bulbous-rooted plants although sown on the most light dry soils, and suffered to grow on such for a great length of time; seeds of the bulbous-rooted sort, will, on the other hand, produce plants having bulbous roots the first season of their growth on whatever kind of soil they may be sown.

In France the Fibrous-rooted Oat-grass is cultivated to a greater extent than any other kind whatever, and is there sometimes known by the name of *Raygrass de France*. Although rather late in flowering, it yields a considerable quantity of foliage in the spring months, and reproduces rapidly after being cropped. It has not been as yet fairly tried in this country, but, judging from several experiments which have been made in various parts, it seems well deserving of a more extended cultivation.

II. *ARRHENATHERUM BULBOSUM*.—BULBOUS-ROOTED OAT-
GRASS, OR KNOT-GRASS.

This sort is more common than the other in most parts of this coun-

try, and is generally found growing on light soils. In cultivated fields and rocky places it is only to be overcome by proper tillage and gathering off its roots; its foliage is thin, and not well relished by cattle. It is admitted as forming a distinct species by some botanists, although it is more commonly termed a variety of the preceding.

DACTYLIS—COCKSFOOT-GRASS.

GENERIC CHARACTERS.—Inflorescence in a compound panicle; spikelets collected together, in crowded, one-sided heads or bundles towards the points of the branches; glumes of two unequal valves, the larger one-keeled, two to seven flowered; lower paleæ notched at the end, and having a small setaceous-like bristle; upper terminating into teeth-like points; seed not furrowed, surrounded by the paleæ.

DACTYLIS GLOMERATA.—ROUGH COCKSFOOT, OR ORCHARD-GRASS OF AMERICA.

Le Dactyle pelotonné.—Fr.

SPECIFIC CHARACTERS.—Panicle one-sided; spikelets crowded or in heaps, three or four flowered; leaves and culm rough or scabrous, the former keeled; root fibrous; perennial; flowers in June and July.

The Rough Cocksfoot is a well known grass, growing abundantly on all waste places where not very barely cropped by cattle. It is a valuable grass in cultivation on account of the great quantity of produce which it yields, and the rapidity with which its leaves grow after being cut. Its habit of growth is tufty, and rather unsightly, with broad foliage of a slightly glaucous-green colour, which renders it unfit for ornamental parks and pleasure grounds. Sheep are remarkably fond of it, but they should be put to graze early in spring, for if allowed to stand too long, it gets hard and coarse. When subjected to perpetual pasturage the Cocksfoot does not seem to last above five or six years, but gives place to the smaller and finer leaved sorts. This may be accounted for by its spreading very little in the ground, and being in general closely eaten down by cattle, particularly sheep. It is well adapted for growing in shady

moist places, under trees, &c. In America it is getting into extensive cultivation, under the name of Orchard-grass.

Specimen by Mr J. Carmichael.

FESTUCA—FESCUE-GRASS.

GENERIC CHARACTERS.—Panicle loose, crowded, or spiked; glumes opposite, unequal, beardless, and shorter than the lowest floret; paleæ two, the outer one pointed or bearded; seed inclosed by the paleæ.

I. FESTUCA PRATENSIS.—MEADOW FESCUE-GRASS.

La Fétuque des Prés.—Fr.

SPECIFIC CHARACTERS.—Panicle spreading, branched, and nodding a little to one side; spikelets long, and containing many cylindrical florets; outer paleæ acute, not bearded; leaves broad, and of a lively green colour; root fibrous; perennial; height generally from two to three feet; flowers in June and July.

This is an excellent grass either for alternate husbandry or permanent pasture, but more particularly the latter: when growing naturally it is generally found on superior, rather moist soils, and on such often forming a considerable portion of the natural pasture. It is well liked by all kinds of domestic herbivorous animals.

Specimen by Mr J. Carmichael.

II. FESTUCA LOLIACEA.—SPIKED OR RYEGRASS-LIKE FESCUE.

In habit of growth and bulk of produce this species much resembles the last, but differs from it in having its inflorescence spiked, as in the ryegrass, also by being naturally more adapted to grow in marshy situations. It is easily distinguished from the ryegrass by its spikelets having occasionally a short foot-stalk, always two glumes, and in improving in proportion to its age, which is directly the reverse of the ryegrass. The true *F. loliacea* produces little seed, and hence has been considered a hybrid between the *F. pratensis* and *Glyceria fluitans*, an opinion which seems justified in some respect by its growing generally on soils more moist than the former, but never in water like the latter. In the neighbourhood of Edinburgh it is rarely found in a wild state, but may be seen in Dalkeith and Dalmeny Parks, as also in a marsh above the new bridge at Pathhead

Ford. There are, however, many intermediate varieties between *F. loliacea* and *F. pratensis*, which have short branches towards the base of the spike, and become two-rowed towards the point; these are generally more prolific in seed, equal in value, and constitute the *F. loliacea* of the seed-shops.

By Mr T. Bishop, Methven Castle, Perthshire, a specimen of one of these hybrid varieties, approaching, however, very near to the true *F. loliacea*, and apparently of a very luxuriant habit of growth.

III. FESTUCA ELATIOR—TALL FESCUE-GRASS.

La Fétuque élevée.—Fr.

This species may be easily distinguished from *F. pratensis* by being much larger (nearly double) in all its parts. It is also like it perennial, and fibrous-rooted; grows naturally on moist superior soils, in waste places, by the banks of rivers, &c. It is rather a coarse-like grass, but may be sown either for hay or permanent pasture, on moist soils, shady places, &c. It yields an abundant crop, and notwithstanding its seeming coarseness, is relished by cattle generally. There seems to be several varieties intermediate between this and the *F. pratensis*. But the varieties of most importance to the cultivator are those distinguished by the names of *F. elatior fertilis* and *F. elatior sterilis*: the former produces an abundance of seeds, and may be at once known by its more pendulous or drooping panicle; the latter, which is the most common, in a wild state produces comparatively few perfect florets.

IV. FESTUCA HETEROPHYLLA—VARIOUS-LEAVED FESCUE-GRASS.

La Fétuque à feuilles variées.—Fr.

SPECIFIC CHARACTERS.—Panicle compound, loose, and spreading a little; spikelets five or seven flowered; seeds cylindrical, elongated, and awned; root leaves long, narrow, and flexuose, of a dark green colour; leaves of the culm or stalk broad, and of a lighter or more vivid green; culms numerous and upright; root fibrous, perennial; flowers in June and July; height four to five feet.

This species is a native of France, from whence it is said to have been introduced into Britain in 1812. It is grown pretty extensively on several parts of the Continent, particularly in the Low Countries, from which its seeds are imported. It appears well adapted for our climate, and ripens an abundance of seed. For one

crop of hay it seems particularly well adapted, and will yield as great, if not a greater, bulk of produce than any other of the Fescues whatever, but produces little else except root leaves after being cut. Upon the whole, it seems well fitted for sowing as a mixture, either on hay or pasture lands, but particularly on the former.

Specimen by Mr Black, from the Agricultural Garden at Dalkeith.

V. FESTUCA DURIUSCULA—HARD FESCUE-GRASS.

SPECIFIC CHARACTERS.—Panicle erect, and spreading mostly to one side; spikelets oblong, containing about six florets, which terminate in a point, or short awn; stem-leaves broader and more flattened than the root ones, which are rounded or wire-shaped; root fibrous, perennial; flowers in June and July; height from one and a half to two feet.

The Hard Fescue may be classed amongst the best native grasses for general purposes. It will thrive on a great variety of soils, and produce a greater weight of fodder than might be expected from its dwarf habit of growth, compared with some of the others, and is found to resist the effect of severe drought in summer, and to retain its verdure during winter in a remarkable degree. It constitutes a great portion of the best natural pastures in this country, especially where the soil is light and dry. From the fineness of its foliage and greenness in winter, it is well adapted for sowing in parks and pleasure grounds, especially for sheep pasture; but for short grass to be kept under the scythe, it should, from its wiry nature, enter sparingly into the mixture.

There is a variety of this species having remarkably long slender root leaves, and few stems. Specimens were received from Mr T. Bishop, under the name of *F. Uri*, shewing the remarkable length of its root leaves, some of which measure upwards of three feet in length.

VI. FESTUCA RUBRA—RED OR CREEPING FESCUE-GRASS.

This is considered by some as merely a variety of the former, slightly altered in habit, from growing always on light dry sandy soils. It is distinguished, however, by its creeping roots, broader and generally darker coloured foliage, and producing a smaller number of stems. From its creeping rooted habit, it is comparatively of little use to the agriculturist, except for sowing on light sandy sea coasts, after the shifting sand has been partly consolidated.

VII. FESTUCA ARENARIA—SAND FESCUE-GRASS.

This name is applied to a Fescue found growing abundantly amongst *Elymus arenarius*, *Ammophila arundinacea*, &c. on the verge of the blowing sands called the Sands of Barry, Forfarshire. Its characteristics are, panicle large, and spreading to one side; spikelets almost beardless, seven or nine flowered; glumes smooth, distinctly three-nerved; under or external paleæ covered by a thick hoary or velvety whitish down; internal one smooth, or nearly so; root leaves long and wiry-like, bundled together by long reddish sheaths; stem leaves also long, and a good deal flattened; stems nearly upright, with large slightly kneed joints; average height of specimens growing amongst the sand eighteen inches; root creeping, perennial; flowers in June and July.

By Mr A. Gorrie, a specimen grown for one year on a strong rich and rather moist soil, and found to retain its woolly spikelets, and other characteristics.

The cultivation of this Fescue has never been attempted on an extensive scale, but it would no doubt succeed well on light sands, yielding on such a considerable quantity of nutritious animal food, where few other grasses will grow, except the Sand Lyme and Reed grasses, which cattle refuse to eat. It is noticed by some botanists as being only a variety of *F. rubra* or *F. duriuscula*, but whether it be entitled to rank as a distinct species or not, it is certainly very distinct from either in habit and appearance.

Of these last mentioned three species (which seem to form a class of Hard Fescues by themselves), there are numerous intermediate varieties, some of which it is difficult to ascertain to what species they really belong, or whether they should be allowed to constitute new species altogether. To the cultivator, however, it is of the utmost importance to select such as seem to combine the greatest number of superior qualities,—such as those producing a greater number of stems on a given space; those which are of a tall habit of growth; those remarkable for producing an abundant supply of foliage early and late in the season; or possessing any other superior advantage, as adapted to particular soils, &c.

VIII. FESTUCA OVINA—SHEEP'S FESCUE.

La Fétuque Ovine.—Fr.

SPECIFIC CHARACTERS.—Panicle contracted, one-sided ; spikelets four or five flowered, beardless, or slightly bearded ; leaves very narrow and rough ; stem square ; seed small, cylindrical, and pointed at both ends ; grows in small tufts ; root fibrous, perennial ; height from a foot to eighteen inches ; flowers in June and July.

The Sheep's Fescue is easily distinguished from the *F. duriuscula* by its dwarf and more tufted habit of growth, its short, stiff, upright leaves, and above all by its square-like culms or stalks. Its quantity of produce is much inferior to that of the other cultivated Fescues, but it is admirably adapted for growing on elevated moorish sheep pastures, and is so well liked by these animals, that it has been said they have no relish for pastures except where it exists. Although its foliage be fine, yet it is not well adapted for sowing on bowling-greens, &c. on account of its small tufted habit of growth, and the difficulty experienced in cutting it with the scythe. Like most of the common Fescues, there are many varieties of the *Festuca ovina*, but the principal of these, at least in an agricultural point of view, and which has been termed a distinct species, is the

IX. FESTUCA TENUIFOLIA—FINE-LEAVED FESCUE.

La Fétuque à feuilles fines.—Fr.

This sort grows naturally in great abundance along with the Sheep Fescue, in many of the dry pastures of France, and may be met with occasionally in Britain also. It differs from the preceding in its being of a less tufted habit of growth, having shorter stems or culms, more loose panicles, awnless, smaller and brighter coloured seeds, and much longer and more slender leaves, which are of a light vivid green colour. It is well suited for sowing down pleasure grounds for short grass, but of little importance in field culture.

X. FESTUCA CALAMARIA—REED WOOD FESCUE-GRASS.

SPECIFIC CHARACTERS.—Panicle compound, thin and loose, having a fine delicate appearance ; spikelets small, four or five seeded, and placed on very slender footstalks, not bearded ; glumes small and bristle-shaped ; leaves broad, long, and tender-like, of a bright lively

green colour ; root fibrous, perennial ; height about four feet ; flowers in July.

This grass seems to possess qualities sufficient to entitle it to a share of cultivation. It is rather rare, being only found in old moist shady woods. It seems not to produce a great quantity of seed, which will prove a hinderance to its culture.

POA—MEADOW-GRASS.

GENERIC CHARACTERS.—Panicle loose, spreading, more or less branched ; spikelets containing two or more florets ; glumes two-valved, shorter than the florets, nearly equal ; paleæ bluntish, awnless, generally somewhat woolly at the base, the upper one terminating in two teeth-like points.

I. POA NEMORALIS—WOOD MEADOW-GRASS.

Le Pâturin des Bois.—Fr.

SPECIFIC CHARACTERS.—Panicle loose, spreading, and slightly bent to one side ; spikelets ovate, three-flowered ; paleæ obscurely nerved ; ligule, or small membrane at the junction of the stem leaves, with their sheaths nearly wanting ; leaves plaited at the base, broader and longer than the sheath ; culm slender, but pretty upright ; root fibrous, or slightly spreading, when growing in light sandy soil ; flowers in the end of June ; height two to three feet.

The Wood Meadow-grass, as its name implies, is naturally found in shady woods, particularly in alpine situations. It is therefore well adapted for growing under trees, but will also thrive on exposed places, and even on inferior light soils. Its habit of growth is delicate, upright, close, and regular, with its panicles partially drooping or bending when nearly ripe. There is no grass better adapted for pleasure grounds, particularly under trees, as it will not only grow in such places, but form a fine sward where few of the other fine grasses can exist. It produces a considerable deal of foliage early in spring, but grows rather slowly after being cut for seed. From the closeness of its habit of growth, it is found to displace annual and biennial weeds, and also those of more permanent duration, provided it be allowed to run to seed. There is a variety of *Poa nemoralis*

occasionally found with much narrower leaves, and generally more slender and jointed in the culm, but it is of inferior importance.

Specimen of *Poa nemoralis* in ripe seed, by Mr A. Gorrie ; cut in the first week of August 1834 ; height two feet nine inches ; and aftermath of ditto, cut on the 15th of September following, height eighteen inches. Also a dried specimen and plants of a curious variety, with white culms, together with the branches of the panicle, and large nerves on the back of the leaves, the spikelets and rest of the leaves being green. This variety seems permanent in its characters and forms an ornamental grass.

II. POA NERVATA—NERVED MEADOW-GRASS.

This species is said to be a native of North America, and was introduced to Britain in the year 1822. It bears a considerable resemblance to the last, but on close inspection, it is found to differ, in having larger spikelets, containing five to seven florets, and its seeds, when examined by a microscope, appear blunter, and distinctly seven-nerved ; its culm is more furrowed or angular, and is also more jointed. As a spring grass it is equally early with the *P. nemoralis*, and grows more rapidly than it, when cropped or cut for ripe seed.

By Mr T. Bishop, a specimen of the grass and sample of seed. And by Mr Black, from the Agricultural Garden, Dalkeith, a specimen of *P. nervata*, sown along with *P. nemoralis* on the 7th of April 1835. The panicles of the former appeared on the 20th of July, height at that time one foot, and the latter in about a week afterwards, height ten inches. From the above results the *P. nervata* would seem to claim the precedence, but it has not been so extensively tried in this country ; it yields seed more sparingly than the *P. nemoralis*.

III. POA TRIVIALIS—ROUGH-STALKED MEADOW-GRASS.

Le Pâturin commun.—Fr.

SPECIFIC CHARACTERS.—Panicle spreading equally on all sides ; spikelets about three-flowered ; florets downy at the base, five-nerved ; stem and sheaths roughish ; leaves rather smooth ; producing shoots from the base of the culms, which trail on the ground, and produce small roots at their joints in moist weather ; root fibrous, perennial ; flowers in the end of June ; height two to two and a half feet.

This is a valuable grass as a mixture for pasture lands, particularly on damp soils, and where partly shaded by trees ; its stoloniferous shoots begin to grow pretty early in spring, and by lying prostrate on the ground form a beautiful verdant carpet. As the season becomes more advanced, however, these shoots become dried from the effects of much sunshine, but shoot out again towards the end of the season, when the weather becomes more moist, and continue green during the most of the winter ; a habit of growth which fits it for mixing along with the upright growing sorts, such as the *Italian Ryegrass*. Although possessed of tender foliage, and so easily cut with the scythe, it is not adapted for sowing for short grass, not only as it is apt to get dried up in summer, but its stoloniferous shoots are apt to be raised by the rake or broom in cleaning off, and thus giving the work an unfinished appearance.

IV. POA PRATENSIS—SMOOTH-STALKED MEADOW-GRASS.

Le Pâturin des Prés.—Fr.

SPECIFIC CHARACTERS.—Panicle spreading equally on all sides ; root creeping ; upper or stem leaves shorter than their sheaths ; stem smooth ; leaves hardish and roughish ; height two feet ; flowers in the end of May ; grows naturally in very dry situations.

This grass has been greatly recommended for sowing as a pasture grass, from its yielding a large quantity of herbage at a very early period of the season ; but it possesses several bad properties, which render the propriety of its culture at least doubtful, except perhaps in very dry soils. Its creeping roots are impoverishing for the soil, and its foliage ceases in a great measure to grow after the month of June ; it is, moreover, apt to be injured by the disease called rust, and it grows in large patches, entirely banishing all the other grasses within its reach.

V. POA COMPRESSA—FLAT OR COMPRESSED STALKED MEADOW-GRASS

SPECIFIC CHARACTERS.—Panicle a good deal contracted, and confined mostly to one side ; culms or stalks of a straggling habit of growth, upright towards the extremity, knee'd at the joints, and lying on the ground towards the root, flattened or compressed ; leaves short and rather narrow, particularly those on the culm ; spikelets ovate-lanceolate, five to nine flowered ; root perennial, fibrous, or slightly

spreading; height one and a half to two feet; flowers in June. Grows naturally on dry, rocky, or stony places, old walls, &c.; seldom or never on good pasture soils.

There is a variety of this grass with more spreading panicles, less compressed, and rather more upright culms, and possessed of rather superior merits. But neither of them are deserving of culture, except for covering dry bare rocky places with an appearance of verdure. It appears to be this latter variety which is most common in the neighbourhood of Edinburgh, as at Salisbury Crags, old walls at St Leonards, &c.

VI. POA ANNUA—ANNUAL MEADOW-GRASS.

GENERIC CHARACTERS.—Panicle spreading on one side; spikelets oblong-ovate, five to seven flowered, florets without a web at their base; stem slightly compressed; roots fibrous; annual; average height about nine inches; flowers most part of the year.

The *Poa annua* is the most common grass in all temperate climates, and generally considered as a most troublesome weed. In some parts of Suffolk it forms whole fields to the total exclusion of all other grasses whatever, and is there greedily eaten by cows and sheep, hence it has been recommended as a pasture grass; but there are two obstacles which tend to prevent its cultivation, viz. its small bulk of produce, and the difficulty with which its seeds are collected; the latter owing to the irregularity with which they arrive at maturity, and their being easily shaken when ripe. It has, however, been beneficially employed for sowing on greens and bleaching grounds in towns and places where the perennial grasses are apt to be destroyed in winter; in summer it will ripen its seeds in four or five weeks from the time of sowing.

GLYCERIA—SWEET-GRASS.

This is a genus separated by modern botanists from those of *Festuca* and *Poa*, and distinguished by having slender elongated spikelets, five and nine flowered; glumes unequal; lower paleæ blunt, ending as if torn, or many-toothed; navicular or boat-shaped, with thin transparent membranous edges, embracing the upper, which is bifid-toothed, as in the genus *Poa*.

I. GLYCERIA FLUITANS—FLOATING SWEET MEADOW OR FESCUE GRASS.

Le Pâturin flottant ou Fétuque flottante.—Fr.

Known also by the names of *Festuca fluitans*, *Poa fluitans*.

SPECIFIC CHARACTERS.—Panicle very long and slender, slightly branched at the base, and bending at the top; spikelets very slender, and containing seven to nine florets; stem decumbent at base, oblique afterwards, and upright from the last joint to the panicle; leaves long, broad, and floating when in deep water; root fibrous; height two to three feet. Flowers from the middle of May to the end of August.

Grows naturally in, and by the sides of ditches, pools, rivers, and on alluvial fresh water marshy soils generally. This grass is eaten with avidity by horses, cattle, sheep, and swine. It has been said not to thrive except when constantly in water, but there are few grasses better adapted for irrigated meadows, and even on moderately dry ground it will yield a considerable produce. Besides being useful as an herbage and forage plant, its seeds are eaten greedily by wild ducks and other marsh fowls; as also by trout and other fresh water fish. They are very nourishing, and form the manna seeds, or manna croup, of the shops, which are used in soups and gruels. They are rather difficult to collect, from ripening irregularly, and being easily shaken when ripe. In Germany and Poland they are gathered by putting a cloth under the panicles, and shaking or beating them off with a stick (much in the same manner in which juniper berries are collected in our country), repeating the operation every two or three days until the whole are ripened.

There is a variety occasionally to be met with in this country; the seeds of which are much shorter, and which is on that account termed the *Short-seeded Floating Meadow-grass*, and sometimes imported from the Continent under that name. It seems inferior to the other in all its parts; and, besides the shortness of its seeds, it may easily be distinguished by a much dwarfer habit of growth, and having shorter and more branching panicles. It seems also less adapted for growing on dry soils.

Specimens of both varieties by Mr Black, grown on dry soil in the Agricultural Garden, Dalkeith Park.

II. GLYCERIA AQUATICA—WATER SWEET OR MEADOW-GRASS.

Le Paturin aquatique.—Fr.Also termed *Poa aquatica*.

SPECIFIC CHARACTERS.—Panicle erect, much branched, and spreading equally on all sides; spikelets elongated, about seven to nine seeded, and not very slender; seeds short, compact, and seven-nerved or ribbed; culm upright, cylindrical, and smooth or nearly so; leaves long, broad, tapering to the point, and of a vivid green colour; root powerfully creeping; height about six feet on an average, but often much more; flowers in the latter end of July.

Like the last species, this grows naturally in, and by the sides of pools, and on rich alluvial soil, more especially on the banks of rivers, where it is occasionally covered by fresh water tides. The following extract from Loudon's Encyclopædia of Plants, shews the habits and qualities of this grass:—"This is one of the tallest of British grasses, with a powerful creeping root; a native of most parts of Europe, and very common in the fens of Cambridgeshire and Lincolnshire, where it not only affords rich pasturage in summer, but forms the chief winter fodder. It is sometimes cut thrice in one season. It grows not only in very moist ground, but in deep water; and with cat's-tail, burr-reed, &c., soon fills up ditches, and occasions them to require frequent cleansing. In this respect it is a formidable plant even in slow rivers. In the Island of Ely they cleanse these by an instrument called a bear, which is an iron roller with a number of pieces of iron like small spades fixed to it; this is drawn up and down the river by horses walking along the bank, and tears up the plants by the roots which float, and are carried down the stream (*Curtis*)."

Specimen by Mr A. Gorrie, height ten feet. Grows abundantly on the alluvial banks of the Tay.

CATABROSA—WHORL-GRASS.

GENERIC CHARACTERS.—Panicle upright, with horizontal, whorled, spreading branches; leaves long, broad, and terminated abruptly at the point; young leaves, and the portions of the culm or stalk which are covered by the sheaths of the leaves, very tender, and possessed

of a remarkably sweet pleasant taste, resembling that of liquorice root; glumes unequal, membranaceous, broadly ovate, containing two beardless florets, which are much longer than the glumes; culm decumbent at the base, rooting at the joints, oblique afterwards, and terminating upright; root fibrous, perennial; height one to two and a half, and sometimes three feet; flowers in June

There is only one species of this genus, viz.:

CATABROSA AQUATICA—WATER WHORL-GRASS.

Lc Paturin canche.—Fr.

This species grows naturally in marshy places, or in such situations as the *Glyceria fluitans* is generally found; to which it bears a considerable resemblance in general habit, but differs essentially in the stiff branching form of its panicle, and in its spikelets containing only two florets; while those of the *Glyceria* contains from five to eleven, but more generally seven to nine. It is sometimes known by the name of *Water Hair-grass*, (*Aira aquatica*).

From a supposition that it will only grow in water or mud, the *C. aquatica* has been discarded as being unfit for cultivation, but it might no doubt be grown with advantage on irrigated meadows, as an instance of which it is found to thrive well on some of the irrigated meadows near Edinburgh, particularly those below Salisbury Crags. Cattle are very fond of its foliage, and it is also eaten by wild ducks and other aquatic fowls.

ELYMUS—LYME-GRASS.

GENERIC CHARACTERS.—Inflorescence in a simple or compound spike; two or three spikelets in each tooth of the rachis, containing three or more fertile florets in each, and having two-valved glumes attached laterally, or at one side of the base of every spikelet; lower paleæ entire, terminating in a bristle or awn.

I. ELYMUS SIBIRICUS—SIBERIAN LYME-GRASS.

SPECIFIC CHARACTERS.—Spike compound at or below the middle, pendulous; spikelets generally solitary on the lateral branches, and in twos or threes on the centre spike; about five-flowered; florets longer than the small and slightly bristled pointed glumes; lower

paleæ terminated by an awn nearly twice its own length; root fibrous; perennial; flowers in June; height four feet.

The Siberian Lyme-grass does not produce its foliage till rather late in the spring, but it grows rapidly afterwards; and its leaves, which are numerous, long, and broad (but soft and tender), cover the stem up to near the spike, and are, together with the culm, much relished by cattle, either in a green or dry state. Although termed a perennial, it is not so permanent in its duration as some of the other grasses, being more of the habit of the Ryegrasses in this respect; and, like most of them, it may no doubt be better fitted for alternate husbandry than for permanent pasture.

The soils best adapted for the growth of Siberian Lime-grass seem to be such as are of a free texture, and rather dry than otherwise; when grown on cold, wet, tenacious soils, its foliage is apt to be injured by rust.

Specimen of the grass and ripe seed by Mr A. Gorrie, cut in the second week of August, height about four feet; and aftermath of the same cut in the first week of October following (1834), height about two and a half feet, with the spikes nearly all developed and partly in flower.

II. ELYMUS ARENARIUS.—SAND OR SEA-SIDE LYME-GRASS.

L'Elyme des Sables.—Fr.

SPECIFIC DESCRIPTION.—Spike simple, erect and close; spikelets generally in pairs, and three-flowered; florets awnless, pubescent, rather shorter than the fringed glumes; leaves of a light glaucous colour, and partly rolled in at the edges; perennial, with powerfully creeping roots; height four feet; flowers in July.

This grass is not eaten by any of our domestic animals; owing no doubt to its excessive hardness and coarseness. Sir Humphrey Davy found, by analyzing the soluble matter afforded by this grass, that it contained one-third of its weight of sugar, hence it has been not inappropriately termed the sugar-cane of Britain; and its hay, from thus containing a considerable quantity of nutritious matter, has been recommended to be cut like chaff and given to cattle, either alone or mixed with other food. The purpose, however, for which *E. arenarius* is generally employed, and for which its creeping matted roots fit it in an eminent degree, is for binding loose sands, and preventing the encroachment of the sea, for which purpose

it is employed in several parts of Britain, and more extensively on the shores of Holland ; and is only to be met with growing naturally in such situations.

AMMOPHILA—SEA-REED.

Although possessed of no qualities to render it of any importance to the generality of cultivators, the genus *Ammophila*, from its similarity in use and habit, is so like the *Elymus arenarius* that it has been thought as well on the present occasion not to separate them, and it is therefore inserted in precedence to others of far more general importance.

GENERIC CHARACTERS.—Panicle cylindrical, pointed ; spikelets one-flowered ; glumes two-keeled ; valves chaffy, and longer than the floret ; floret surrounded with a tuft of hair at the base ; ripe seed, in size and shape resembling a grain of oats ; leaves involute, or rolled inwards at the edges, of a light green colour, hard, sharp-pointed, and rather longer than the culm ; root creeping ; perennial ; height one and a half to two feet ; flowers in July.

There is but one species of the genus *Ammophila*, viz. the *A. arundinacea*, Sea-Reed or Mat-grass, also known by the names of *Arundo arenaria* and *Psamma arenaria*. It is principally used, along with the preceding, for fixing or consolidating shifting sand, and for preventing encroachments of the sea ; for which purposes its value is so well appreciated, that there are several enactments prohibiting the destroying of the *Marrum*, as it is sometimes called, under severe penalties. It receives the name of Mat-grass from its being employed in the fabrication of mats ; it also affords excellent and durable thatch, and has been found to yield a fibre equal to flax, but short, and in smaller quantities.

Specimen by Mr Robert Stark, from Sands at Dirleton Common.

AGROSTIS—BENT-GRASS.

GENERIC CHARACTERS.—Inflorescence paniced ; panicle loose, spreading ; spikelets one-flowered ; glumes beardless, valved, unequal, longer than the floret ; outer paleæ large, nearly surround-

ing the seed, bearded, or not; inner one small, sometimes almost wanting.

I. AGROSTIS ALBA—(A. STOLONIFERA of some Botanists).—
FIORIN OR MARSH BENT-GRASS.

SPECIFIC CHARACTERS.—Panicle rather contracted, branches slightly hairy, branchlets spreading; under paleæ five-nerved, beardless; root perennial, fibrous when growing in marshy or damp soils, but assuming more of a creeping habit when growing on light dry soil; height one to one and a half foot; flowers in July.

There is a great number of varieties of *A. alba*, to several of which distinct specific names have been applied; of these may be enumerated *A. stolonifera*, Stoloniferous Bent-grass or Fiorin, *A. alba latifolia*, which seems to be the same with the preceding, *A. compressa*, *A. sylvatica*, and several others, which all seem to agree in acquiring a very stoloniferous habit when growing in moist situations, but assuming more of a tufted habit when growing on dry soils. The famous fiorin of Dr Richardson seems to be the *A. alba*, var. *latifolia*, which is distinguished by its broad leaves and more luxuriant habit of growth. In this country it has not been found in general to deserve the high characters which have been bestowed upon it; it is said, however, to be better adapted for the climate of Ireland. One reason why it may have partly failed in this country is, that cultivators who have been at the trouble to give it a trial may have done so on damp marshy soils indiscriminately, without paying attention to what particular soil may be best adapted for it. The soils and situations on which it is found to thrive best in a natural state are such as are of a free and porous texture, have a considerable portion of peat in their composition, and are well supplied with water, rather of a running than of a stagnant nature, such as the sides of ditches in reclaimed peaty lands. As the best means of propagating this grass, it has been recommended by Dr Richardson and others to cut down the stoloniferous shoots in small pieces, and strew them on the ground, giving them a course of rolling, and at the same time taking care that the weather be rather moist than otherwise; this, however, is a tedious as well as a precarious operation, and the principal reason given for it by its advocates is the difficulty of procuring seed, and its shyness in vegetating. These objections are, however, groundless, for seeds of this and several other varieties of

A. alba are yearly imported from Germany and France; and all that is found requisite to insure a regular braird, is to have the land in a fine pulverized state before sowing, otherwise the seeds are apt to be buried from their smallness. It is scarcely advisable to sow the Fiorin on any other than a damp or irrigated peaty soil.

II. AGROSTIS VULGARIS—COMMON OR CREEPING-ROOTED BENT-GRASS, ALSO BLACK SWITCH, SQUITCH, OR QUICK-GRASS.

This bent-grass is distinguished from the preceding and its varieties by its more loose and spreading panicles; creeping perennial roots, being generally confined to dry soils by its less stoloniferous and more tufted habit of growth.

It is generally considered as a troublesome weed in dry light soils, and from its not being well liked by cattle, it commonly attracts attention only as being a useless grass, to be got quit of as soon as possible, more particularly as its creeping roots prove highly injurious to the soil. The only effectual means to accomplish its destruction is repeated ploughing and harrowing the soil, and gathering its roots. However, notwithstanding its bad qualities, sheep are found to eat it, particularly in the winter months, and it is sometimes sown on bare gravelly places, where the more valuable grasses will not grow, for the purposes of covering them with vegetation.

As of the former, there are many varieties of *A. vulgaris*, the most remarkable of which may be mentioned. The *A. dispar*, distinguished by its larger panicle, broader leaves, more straggling habit of growth, and more powerfully creeping roots. This variety, or, as it is sometimes termed, a distinct species, is generally to be met with on strong, superior black land; and from this circumstance it may have acquired its more luxuriant habit, which, however, is permanent when raised from seed. Another variety, termed the *Creeping grass of Suffolk*, seems intermediate between these two, and possessed of no superior qualities to either.

III. AGROSTIS CANINA—BROWN BENT-GRASS.

SPECIFIC DESCRIPTIONS.—Panicle spreading equally on all sides, but not loose; branches long, but rather upright in their habit of growth, so as to give the panicle a slightly contracted-like appearance; glumes unequal, pointed, and slightly rough at the keel; lower paleæ enveloping the seed, with an awn proceeding from below the middle; upper paleæ wanting, or very minute; leaves narrow, and

pointed ; culms numerous, and generally upright ; slightly stoloniferous ; root fibrous ; perennial ; height about a foot and a half ; flowers in June and July.

Grows naturally in poor wet peaty soils, and is only valuable for cultivating on such. Cattle seem to prefer this to most others of the genus. One of the most distinct varieties of *A. canina* is that termed *A. capillaris* ; it has a more vigorous habit of growth, with a much larger, and more horizontal branched, spreading panicle. There are also numerous other varieties of less importance, all, however, distinguished from the two preceding species and their varieties, by having their florets less or more awned.

Specimens of the different varieties by Mr J. Carmichael.

IV. AGROSTIS SPICA-VENTI—SILKY, OR WINDWARD SPIKED BENT-GRASS.

Panicle very slender, nodding, or bending to a side ; branches in whorls, also slender ; awns very long, inserted below the point of the outer paleæ ; culms upright ; root fibrous ; annual ; flowers in July and August ; height two feet.

Grows naturally on sandy or gravelly soils ; from its annual habits it is of little importance to agriculturists, being only useful for sowing in blanks of grass fields, so as to insure one crop of hay in the season.

AVENA—OAT-GRASS.

FOR GENERIC CHARACTERS see Cereal Grains (*Avena*).

AVENA FLAVESCENS—YELLOWISH OAT-GRASS.

L'Avoine jaunâtre.—Fr.

Panicle loose, wavy, and much branched, of a yellowish-green shining colour ; spikelets containing three florets, the outer palea of which terminate in two bristle-like points, and has an awn arising from about the middle twice as long as the floret ; glumes unequal, the largest about as long as the florets ; root fibrous ; perennial ; height one and a half to two feet ; flowers in July. Grows naturally in dry pasture, on rather light and good soils.

The *A. flavescens* yields a considerable bulk of fine herbage, and

deserves to form a portion of all mixtures on light dry soils, either for hay or pasture. It arrives early at maturity, and, although a perennial, yet, if allowed to ripen seed, it is but of short duration, particularly if grown on stiff moist soils. It is the most useful as a hay and pasture grass of the genus *Avena*, as well as the smallest seeded of all the native species. This grass is separated by modern botanists from the genus *Avena*, and placed under that of *Trisetum*, which is distinguished from the preceding by having the lower paleæ terminated in two bristle-like points, and an awn proceeding from about its middle, so as to form in all *three bristles*, hence the name *Trisetum*.

There are other two species of the genus *Avena*, viz. *A. pratensis* and *A. vel Trisetum pubescens*, which have been recommended as deserving of cultivation; they are generally to be found on dry rocky soils, but possess too little merit to entitle them to farther notice.

ANTHOXANTHUM—VERNAL-GRASS.

This genus is distinguished from all other cultivated grasses, in having two stamens and two styles in each floret, and consequently belonging to the second class and second order, *Diandria Digynia* of Linnæus.

ANTHOXANTHUM ODORATUM—SWEET-SCENTED VERNAL-GRASS.

La Flouve odorante.—Fr.

SPECIFIC CHARACTERS.—Panicle spiked, oblong; florets upon short footstalks, and longer than their awns; root fibrous; perennial; height fifteen or eighteen inches; flowers in May. Grows naturally on dry pastures.

The Sweet-scented Vernal-grass yields but a scanty portion of herbage, and is not particularly relished by any kind of live-stock, except perhaps sheep, but cattle and horses do not refuse it when mixed amongst other grasses. It is remarkable for giving out a pleasant sweet smell during the process of drying, similar to that of the sweet-scented woodroof; and it is to the presence of this grass that hay from natural meadows owes its peculiar fragrance. It has been recommended to be sown in sheep pastures for the purpose of improving the mutton, a quality which it is said to possess, and which

is founded on the fact that pastures in which it naturally abounds are said to produce the finest mutton. On the whole, permanent pastures should not be sown without a mixture of this grass, particularly in parks and pleasure grounds, were it for no other reason than the pleasant scent which it gives out, not only when cut for hay, but also when the seeds become nearly ripe. Notwithstanding its dwarf growth and the close sward which it forms, it is but ill adapted for sowing on ornamental grounds intended for short grass, on account of its broad foliage, which has rather a coarse appearance.

There is a variety of the Sweet Vernal-grass, sometimes termed *A. alpinum*, which is distinguished from the common by its leaves being broader, culms shorter, and its panicles more spreading and barren towards the base. Generally found in woods and shady places, particularly in alpine situations; to the above distinctions may be added that of its flowering later in the season, and more irregularly.

CYNOSURUS—DOG'S-TAIL GRASS.

GENERIC CHARACTERS.—Panicle spiked; spikelets containing four or five florets; glumes shorter than the florets; and besides the glumes, each spikelet has a deeply cut or pinnatifid leaf attached to its base, termed an involucre; lower paleæ very acute, upper cleft at the point.

CYNOSURUS CRISTATUS—CRESTED DOG'S-TAIL GRASS.

Cretelle des Pres.—Fr.

SPECIFIC CHARACTERS.—Spike-like panicle, having the spikelets and their appendages on one side; spikelets beardless, much shorter than their pinnatifid involucre; culms upright; leaves short, rather narrow, and tapering gradually to the points; root fibrous, perennial; flowers in June and July; height one to two feet.

This grass seems to have a wide range of soils. It grows naturally on dry pastures, and also on those where the soil is damp and tenacious, and has been found to thrive well in irrigated meadows. Its stalks are not eaten by cattle, but allowed to stand and ripen seed, hence it has been said that it is undeserving of cultivation, as cattle will not eat it; but this applies only to the culms or stalks, as all domestic animals, and particularly sheep, are fond of the root

leaves, which, although short, are produced in abundance. Sheep are said to be less liable to be affected by the disease called foot-rot, when fed on pastures containing a considerable portion of this, than on such as are composed of the more tender and soft-leaved sorts. In pasture lands, where this grass does not naturally form a portion of the mixture, it is expedient to introduce a little of it; but, on the other hand, there are many pastures in which it is far too predominant. From its forming a close turf, and having rather fine foliage, it may be advantageously sown on bowling-greens, and other places to be kept under by the scythe, it not being so difficult to cut as its hardish-like culms and leaves would lead one to suppose.

BRIZA—QUAKING-GRASS.

GENERIC CHARACTERS.—Inflorescence paniced; panicle spreading, compound and loose; glumes boat-shaped, compressed, slightly cordate or heart-shaped at the base, and shorter than the florets; spikelets pendulous, three or more flowered; florets imbricated in two rows; external paleæ slightly heart-shaped at the base, embracing the upper, which is much shorter, and nearly round.

I. BRIZA MEDIA—COMMON QUAKING-GRASS.

La Brize tremblante.—Fr.

Panicle erect, of a reddish-brown colour; spikelets about seven-flowered, heart-shaped, drooping; culm erect, about one and a half or two feet in height; root fibrous; perennial; flowers in June; grows naturally in light inferior and rather dry soils.

The *B. media* possesses the remarkable peculiarities of thriving best on poor inferior soils, and from a given weight yielding more nutritious matter than any other grass indigenous to such soils. Owing, however, to the seeds not retaining their vegetating powers beyond a rather limited period, and the difficulty with which they are procured, its cultivation is attended with considerable disadvantage, for such soils as suit it best will not afford paying a high price for the seed, and its foliage is not produced in great quantities, owing to its shortness.

There is a variety occasionally to be met with in moors, differing

from the common in being of a much more light and yellowish-green colour, but in other respects the same.

AIRA—HAIR-GRASS.

GENERIC CHARACTERS.—Panicle spreading; branches slender; glumes two-valved, equal to or shorter than the florets; spikelets generally two-flowered; paleæ two, equal.

I. AIRA CÆSPITOSA—TUFTED HAIR-GRASS.

Glumes and florets equal in length; panicle diffuse; beards or awns straight, short; leaves long and flat; culm upright, bending at the top; root fibrous, perennial; height four feet; flowers in the beginning of August. Grows naturally on rather superior marsh or damp soils, forming large tufts or hassocks, as they are sometimes termed; and as the grass is scarcely eaten by domestic animals, it becomes the business of the farmer to extirpate these as soon as possible, not only on account of their unsightly appearance, but because they occupy a considerable portion of the soil which would otherwise be capable of producing more valuable grasses, particularly as these tufts or hassocks are generally the most predominant on the best soils. The most effectual manner of accomplishing this, is to root them fairly out with a large hoe, such as is generally used for cutting up whins or furze, afterwards stirring the soil, and scattering in a few seeds of any of the strong or fast growing superior grasses, such as the Rough Cock's-foot (*Dactylis glomerata*). Sometimes, however, the *Aira cæspitosa* may be advantageously sown as a cover for game, particularly rabbits and hares, and, in the neighbourhood of ponds and marshes, for snipes and other fowl which frequent those places.

Specimens of two varieties of *A. cæspitosa*, differing in their colour, the one being green and the other brownish, which is the most common, by Mr J. Carmichael; and of a viviparous variety found occasionally on the banks of the Tay, by Mr A. Gorrie.

There is, however, another variety, the seeds of which were obtained from Messrs Booth at Hamburgh, and which seems possessed of qualities superior to any other of the genus. This is termed *Aira cæspitosa lutescens*, Yellowish Tufted Hair-grass, and is distinguished from the common by having larger florets, perfectly smooth

culms, softer and much more early foliage, not so liable to grow in tufts, of a dwarfer habit of growth, and the whole plant (foliage, culm, and panicle) being of an agreeable yellowish-green colour. This sort seems to bear a much greater affinity to *A. alpina* than to *A. cæspitosa*, but differs from it also in having its leaves much broader and more flattened, and in having the awn inserted near the base of the outer paleæ; whereas (according to Hooker's Brit. Flor.), in the *A. alpina*, the awn is inserted above the middle of the floret. In flower about a month earlier than the Common Tufted Hair-grass. This will no doubt prove a superior and very early grass, but farther experience is required to confirm its characters.

Specimen by Mr Black, from Agricultural Garden, Dalkeith Park.

II. AIRA FLEXUOSA—WAVED OR ZIGZAG HAIR-GRASS.

Panicle spreading irregularly, centre branch waved; branches dividing in threes; spikelets three-flowered, as large as the glumes; awn jointed or bent, longer than the florets; culms upright and together, with the branches of the panicle of a dark reddish colour; leaves short and bristly; root fibrous; perennial; height one and a half to two feet; flowers in July. Grows naturally on heathy soils, and has been recommended for sowing on such; but as its chief produce consists in culms or stems, with very little foliage, and few joints, and as cattle do not seem to relish the former, it is scarcely deserving of culture, except perhaps in small quantities as a mixture, on moorish soils.

Specimens by Mr J. Reddie, Milnathort, and Mr J. Carmichael.

BROMUS—BROME-GRASS.

GENERIC CHARACTERS.—Panicle loose and spreading; glumes two, unequal; valves beardless, many-flowered, shorter than the florets; lower paleæ cleft in two at its extremity, with an awn proceeding from between or under the two points.

This characteristic in the genus *Bromus*, of the awn proceeding from under, instead of from the point of the outer valve of the floret, is the principal botanical distinction between it and the genus *Festuca*; but in their comparative merits as herbage and forage grasses, their difference is still more remarkable; for while the *Festuca* com-

prehends many of our finest and most nutritious sorts, the *Bromus* is distinguished in a great measure for the coarse appearance and in-nutritious nature of almost, if not all, the species which it contains, and several of which are most troublesome weeds to the agriculturist.

I. BROMUS GIGANTEUS.—TALL OR GIANT BROME-GRASS.
(*FESTUCA GIGANTEA*).

SPECIFIC CHARACTERS.—Panicle large, spreading, and hanging to one side, branches slender; spikelets three to six flowered; glumes very unequal, shortest one about half as long as the floret; florets slightly hairy or downy on the edges; awn proceeding from very near the point of the slightly cleft outer paleæ, scarcely half as long as the floret; leaves long, very broad, ribbed, and of a vivid green colour; root fibrous; perennial; height four to five feet; flowers in July and August. Grows naturally in woods, but not common. It yields an immense bulk of foliage, which, however, is not well relished by cattle, except in a dry state, mixed with other hay. Together with some of the other Brome-grasses, this is eaten by deer and roe in winter, and also by sheep when better food is scarce.

II. BROMUS PRATENSIS.—MEADOW BROME-GRASS.

Panicle nearly erect, spreading; spikelets large, drooping when ripe, slightly rough, and containing eight or ten florets; glumes large, slightly triangular, and nearly equal; awn short, inserted almost on the point of the paleæ; culms smooth; leaves long, slender, and pendulous; root fibrous, perennial; height two to three feet; flowers in July. Said to be a native of some parts of England.

From the softness and great length of the foliage of this grass, it may turn out one of the most useful in the genus, but as yet its properties are not sufficiently known.

III. BROMUS SECALINUS.—RYE-SEEDED BROME-GRASS OR GOOSE-GRASS.

This is a well-known weed in wheat and rye fields; it is easily distinguished by its large hanging panicles, large drooping spikelets, and the seeds when ripe somewhat resembling rye. These seeds, when ground amongst flour and made into bread, impart to it a bitter taste, and are said to produce the same dangerous effects as those of the Bearded Darnel (*Lolium temulentum*). Wheat and rye were formerly, and are yet supposed by some to degenerate into this

grass ; but it is needless to add, that such notions are only founded in a total ignorance of the laws of nature relating to vegetation.

IV. BROMUS MOLLIS—SOFT OR DOWNY BROME-GRASS ; AND BROMUS RACEMOSUS—SMOOTH BROME-GRASS,

Are common weeds in Ryegrass fields, particularly the former. They both grow much taller than the Ryegrass, have large branching drooping panicles, and are distinguished from one another by the smoothness and rougher downyness of their spikelets.

The seeds of *B. mollis* are said to produce giddiness in the human species and quadrupeds, and to prove fatal to poultry ; and as they both contain but little nutritious matter in their leaves or stalks, and occupy a considerable portion of ground, from their bushy habit of growth, to the deterioration of the hay crop, it becomes a desirable object to extirpate them, or rather to prevent their appearance ; and the only effectual way of accomplishing this, is to make a proper selection of seed. In a sample of Ryegrass seeds, it is very easy to detect those of either the *B. mollis* or *B. racemosus*, by their being larger, much broader towards the point, and generally terminated by a short awn.

HOLCUS—SOFT-GRASS.

This genus, like that of *Arrhenatherum* (p. 116.), belongs to the class *Polygamia* and order *Monœcia* of Linnæus, and is distinguished from the above-mentioned genus by having the upper floret of the spikelet with stamens only, and awned, with the lower floret perfect and awnless, being just the reverse of what takes place in the other.

I. HOLCUS LANATUS—WOOLLY SOFT-GRASS, OR YORKSHIRE FOG.

La Houque laineuse.—Fr.

SPECIFIC CHARACTERS.—Panicle rather crowded and upright ; spikelets two-flowered ; awn much shorter than the floret, and recurved ; culms numerous and upright ; leaves downy ; root fibrous, perennial ; height one and a half to two feet ; flowers in June and July. Grows naturally on inferior light soils, and particularly on

such as have a little peat in their composition, and are of a dampish nature. On such soils it is generally found in a natural state.

The *H. lanatus* yields a large bulk of foggage, which, however, is not liked by cattle, either in a green state or when made into hay, owing, it is supposed, to its soft spongy nature, and not having a sufficiency of a subacid or saline taste; hence it has been recommended to sprinkle its hay over with a little salt when stacking it, or before giving it to cattle.

II. HOLCUS MOLLIS—CREEPING SOFT-GRASS.

This is easily distinguished from the preceding species, by its producing fewer culms, having more loose panicles, longer awns (hence it is sometimes termed *Bearded Soft-grass*), broader foliage, and powerfully creeping roots; grows naturally in a great variety of soils.

It is possessed of no property to recommend it for cultivation; and, therefore, where it abounds naturally it should rather be extirpated to make room for superior sorts.

These two species of *Holcus* are distinguished from all the rest of our common grasses by the soft and woolly appearance of their panicles; those of *H. lanatus* assume a great variety of shades in colour, from a white to a beautiful red, but generally on a whitish-like ground.

TRITICUM—WHEAT-GRASS.

FOR GENERIC DESCRIPTIONS see *Cereal Grains*.

I. TRITICUM CANINUM—BEARDED WHEAT-GRASS.

SPECIFIC DESCRIPTIONS.—Glumes shortly bearded; spikelets five-flowered, florets having long awns; culms nearly upright, spike bending towards the point; whole plant greatly resembling the Common Couch-grass, except in its spikes being more bearded, foliage more abundant, and having fibrous roots; grows naturally in woods as well as on the sea coast.

The foliage is eaten with avidity by cattle, and from its bulk of produce might be reckoned a superior grass, but it is found very liable to be injured by rust; perhaps by paying proper attention to the selection of soils, this disadvantage might be overcome.

II. TRITICUM REPENS—COMMON COUCH-GRASS, DOG-GRASS, QUICKENS, &c.

This grass is too well known to require any description. It is one of the most troublesome weeds in arable land, and is only to be overcome by judicious fallowing or fallow-cropping.

Sir H. Davy found the roots to contain nearly three times as much nourishment as the stalks and leaves; they are sweet and greedily eaten by cattle and horses. Hence, by gathering them before being too much dried, and giving them a proper washing, they might, as food for domestic animals, considerably more than repay the trouble attending the operation.

HORDEUM—BARLEY-GRASS.

For GENERIC CHARACTERS see *Cereal Grains*.

HORDEUM PRATENSE—MEADOW BARLEY-GRASS.

SPECIFIC CHARACTERS.—Lateral florets male or barren, with a short beard; glumes bristly and rough; culms kneed and not very upright; foliage scanty; roots fibrous; perennial; height one and a half to two feet; flowers in June. Grows naturally in moist meadows; rare in Scotland.

This grass is adapted for irrigation; it is also very nutritious; but its produce is inferior in bulk, and its seeds not so easily procured as those of several other grasses equally suitable for such situations; it is also liable to rust, and therefore not deserving of much attention.

MELICA—MELIC-GRASS.

GENERIC CHARACTERS.—Glumes unequal, two to five flowered, membranaceous or chaff-like, nearly as long as the florets; terminal florets abortive and stalked; seed not furrowed; panicle either simple or compound.

I. MELICA UNIFLORA—ONE-FLOWERED MELIC-GRASS.

SPECIFIC CHARACTERS.—Panicle slightly branching, hanging to one side; spikelets two-flowered, only one of which is perfect;

paleæ beardless ; culm leafy ; leaves broad, thin, and tender-like, of a vivid green colour ; root fibrous, perennial ; height one and a half to two feet ; flowers in May and June ; grows naturally in shady woods.

As a fine grass for growing under trees, this might perhaps be cultivated with advantage ; cattle are very fond of it.

The *M. nutans* is another wood grass in habit somewhat resembling this, but differing in having longer spikelets, containing each two or three fertile florets, and having its panicle less branched or nearly simple. It seems, however, of a more tender or delicate habit, and not likely to succeed so well under cultivation as the *M. uniflora*.

II. MELICA CILIATA—CILIATED MELIC-GRASS.

La Melique ciliée.—Fr.

Panicle resembling a cylindrical spike, nodding slightly ; outer paleæ of the lower floret much ciliated or fringed ; culm erect, rather leafy ; root fibrous ; perennial. Grows naturally and very abundantly in France on stony gravelly situations, and has been recommended for cultivating on such places.

III. MELICA ALTISSIMA—TALL OR SIBERIAN MELIC-GRASS.

La Melique élevée.—Fr.

Panicle spiked, nodding, and the spikelets whitish coloured, hanging on one side, three-flowered, third flower imperfect ; paleæ smooth ; culm erect, leafy ; leaves tender, long and very broad, of a vivid green colour ; height three or four feet ; root perennial ; fibrous ; flowers in August. Native of Siberia.

The Tall Melic-grass has been much recommended on the Continent. Cattle are found to be very fond of it, and it yields a considerable bulk of produce. It comes late in spring, and does not stand well out in the end of the season.

MOLINIA.

This is a genus separated from that of *Melica* by modern botanists. The *Molinia cærulea*, *Blue Molenia*, or *Melic-grass*, is a smooth-stalked tufted growing grass, with a contracted bluish colour-

ed panicle, which grows abundantly on some moors; it is remarkable for its culm (which rises to about a foot and a half in height) having no joints except one within an inch or so of the ground, consequently its foliage, which is short and hardish, is chiefly all produced from the roots. The culms are hard and tough, and in some parts of England are used for making brooms; it is also used in the Orkney and Shetland Isles by the fishermen for making ropes for their nets.

Specimen by Mr J. Reddie, Milnathort, grown on a dryish peaty soil; height eighteen inches. On account of the toughness of the culms, and their want of joints, Mr Reddie suggests that they might be used advantageously in straw-plait. Also by Mr J. Carmichael, Strontian.

The plant is not nutritious, and is seldom eaten by domestic animals.

PANICUM—MILLET-GRASS.

FOR GENERIC CHARACTERS *see Cereal Grains.*

PANICUM ALTISSIMUM—TALLEST MILLET-GRASS.

Le Panis élevé.—Fr.

This grass is a native of America, where it is sometimes cultivated for hay or forage. It grows to the height of four or five feet, with a large spreading panicle, and is said to be relished by cattle. It does not perfect its seeds well even in its native country, and is therefore propagated chiefly by dividing its roots, for the trouble of which the large return which it yields is said to be a handsome remuneration. It has been tried in France within the last few years, but not to any great extent. In botanical collections it is found to grow well in this country, but has never been subjected to field culture.

PASPALUM.

This name is applied to a tribe of Millet-like grasses chiefly natives of warm climates. The *P. stoloniferum* was introduced some years ago from Peru to France, with very high recommendations as

an agricultural plant. It is a stoloniferous grass (as its name imports), and has an abundance of large, broad, and very tender foliage, which is much relished by cattle. In the neighbourhood of Paris, however, it rarely ripens its seeds, and is, moreover, apt to be injured in winter; so there is little probability of its ever being of any benefit in our climate.

PHALARIS—CANARY-GRASS.

For GENERIC CHARACTERS see *Cereal Grains*.

PHALARIS ARUNDINACEA—REED-LIKE CANARY-GRASS.

SPECIFIC CHARACTERS.—Panicle spreading, crowded, generally of a dark reddish colour; seed long, smooth, and shining; culms upright, and nearly covered by the sheaths of the long, broad, tapering, dark green leaves; root creeping; height four to six feet; flowers in July. Grows naturally on alluvial soils, by the sides of rivers, lakes, pools, &c.

According to the experiments of Sir H. Davy, this grass contains a considerable portion of nutritious matter; but from its coarseness, cattle in general refuse it, but are said to eat it if cut into chaff and mixed with other food. It yields a vast bulk of hay, which in some parts is found very convenient for littering cattle. The common *Gardener's Garter* is a variety of this grass.

ARUNDO PHRAGMITES, OR PHRAGMITES COMMUNIS. —COMMON REED.

This is a well known grass, and the tallest of all the British *Gramineæ*. It grows naturally by the banks of rivers, edges of pools, &c. but to greatest perfection on rich alluvial deposits which are occasionally flooded by fresh water tides, as on the north banks of the Tay in the Carse of Gowrie, where it is found of considerable importance for thatch. It has powerfully creeping and very deep roots, and becomes a troublesome weed when such places as it grows naturally upon are drained and subjected to cultivation. In the Carse of Gowrie there are several tracts of the best alluvial deposit which have been under cultivation for upwards of a century, and yet

the *A. phragmites* grows as luxuriantly amongst the crops as at first. The panicles of this grass will dye wool of a greenish colour.

II. ARUNDO DONAX—CULTIVATED REED.

Native of the south of Europe, where it is cultivated for a great many purposes; it supplies materials for looms, fishing-rods, &c. and is generally imported from Spain and Portugal. With us it grows to a great size (eight or ten feet high) in a season, and its large broad foliage is very ornamental about fishing-ponds, &c. but our climate is too cold to allow of its arriving at maturity, or acquiring that hardness of texture which it does in warmer countries.

The following collection of Grasses were presented by Mr J. Reddie, Milnathort, September 5. 1834; they were grown on land which, until the previous year, had not been under cultivation for a period of forty years; and the pasture in its unimproved state was not worth five shillings an acre, but has now by a proper system of draining and trenching more than quadrupled in value.

LOLIUM ITALICUM, Italian Rye-grass.—Sown 10th May, height two and a half feet, seed ripe; ditto, sown 20th June, height nearly two feet, in flower.

FESTUCA ELATIOR, Tall Fescue.—Two samples sown 10th May and 20th June, length of the leaves fifteen inches and twelve inches. No appearance of running to flower in this or the next five sorts.

FESTUCA GIGANTEA, Giant Fescue.—Sown as above, height twelve and ten inches.

FESTUCA HETEROPHYLLA, Various-leaved Fescue.—Sown as above, height six and four inches.

FESTUCA LOLIACEA, Spiked or Darnel Fescue.—Sown as above, height twelve and nine inches.

FESTUCA TENUIFOLIA, Fine-leaved Fescue.—Sown as above, height four and three inches.

GLYCERIA AQUATICA, Water Sweet Grass.—Sown as above, height sixteen and thirteen inches.

POA NEMORALIS, Wood Meadow-grass.—Sown as above, height sixteen and twelve inches. The first in full flower, the other coming in ear.

GLYCERIA FLUITANS, Floating Sweet Grass.—Sown 10th May, height fourteen inches; coming in ear.

AVENA FLAVESCENS, *Yellowish Oat-grass*.—Sown 10th May, height twelve inches ; coming in ear ; and

FESTUCA PRATENSIS, *Meadow Fescue*.—Sown 19th June, height eight inches.

Also exhibited in the Museum.

Samples in seed of the superior Hay and Pasture Grasses, by the following parties :—

Messrs Nash, Adams and Nash ; Messrs Wm. and John Noble, London ; Messrs J. G. Booth and Co., Hamburg ; M. Vilmorin, Andrieux, and Co., Paris.

II. LEGUMINOUS HERBAGE AND FORAGE PLANTS,

Belonging to the natural order *Leguminosæ* of Jussieu, and to the class and order *Diadelphia Decandria* of Linnæus.

* *Leguminous herbaceous plants, having no tendrils with which to attach themselves to other bodies for support.*

Next to *Gramineæ*, the natural order *Leguminosæ* comprehends the most important class of herbage and forage plants, as well as of those more exclusively cultivated for their seed. And of the numerous genera belonging to this order, the most important, at least to European agriculturists, is the genus

TRIFOLIUM—CLOVER.

GENERIC CHARACTERS.—Stamens ten, nine of which are united, and one solitary ; petals generally remaining attached when dry or withered ; legume or pod in general shorter than the calyx ; one or few seeded ; flowers crowded in an oblong or globular head ; leaves composed of three leaflets.

I. TRIFOLIUM PRATENSE—COMMON RED OR PURPLE-HEADED CLOVER OR TREFOIL.

Grand Trèfle rouge.—Fr.

SPECIFIC CHARACTERS.—Spikes dense, globular, or slightly elongated ; calyx teeth bristly-like, the lower one longer than the rest ;

stipules (or small leaf-like appendages at the junction of the leaf-stalk with the stem) ovate, and bristle-pointed; leaflets oval, or inversely heart-shaped; habit of growth upright and branching; flowers in June and July; colour generally reddish-purple, but of various shades, and sometimes even white flowered.

The varieties of *T. pratense* may be divided into two classes, viz. the *Perennial* and *Biennial* sorts; the former of which comprehends those of most permanent duration, and such as are best adapted for sowing in permanent pastures; the latter such as are most suitable for alternate husbandry, from their being of shorter duration; to these, however, the term *Biennial* is not strictly applicable, as, under favourable circumstances, the most short-lived varieties are found to last for a series of years.

† PERENNIAL RED CLOVERS, *Trifolium pratense perenne*.

1. NATIVE PERENNIAL RED CLOVER.—This sort is so distinct in its general appearance from the common cultivated varieties of *T. pratense*, that some have supposed it to constitute a different species. Compared with the common Red Clover of the fields, its flowers, foliage, and stems, are in general darker coloured; leaflets narrower, and, together with the stems, much more downy or hairy, and roots more fibrous; it differs also in the form of the calyx, and in some other characteristics of minor importance. This sort grows naturally in old pastures, heathy moors, &c. and presents several varieties, differing slightly in colour and in habit of growth, but retaining more or less of the narrowness and woolliness of their foliage, and all agreeing in their permanency of duration.

2. COMMON CULTIVATED PERENNIAL RED CLOVER, OR COW-GRASS.—The variety generally cultivated in this country under the above name, bears a good deal of resemblance to the biennial sort in its general habits and appearance, and differs from it only in having rather more woolly leaves, in being of fully more permanent duration, and a few days later in coming in flower; the seeds being higher priced than those of the Common Red Clover, it becomes a matter of consideration with cultivators whether the slight difference in their duration be a sufficient compensation for the additional cost. Either of the three following varieties are of much more permanent duration than this.

3. DUKE OF NORFOLK'S COW-GRASS.—This variety is of much more permanent duration than the last; it is easily distinguished from it by being much darker coloured in its stalks, leaves, and flowers, having more fibrous roots, and being earlier by nearly a week.

Sample of seeds from which this specimen was grown at Meadowbank Nursery, from Mr Samuel Couper, Bury St Edmunds.

4. PERENNIAL RED CLOVER OF ARGOVIE. *Le Trèfle d'Argovie*, Fr.—This variety was originally introduced into France from Switzerland, where it is much cultivated. The French reckon it the most perennial variety which they possess, and as such cultivate it to a considerable extent. The *Trèfle d'Argovie* is rather of a dwarf and more spreading habit of growth than any of the other varieties; its leaves and flowers are light coloured, and the former are generally marked by lightish coloured spots or blotches near the base of each leaflet.

A sample of this variety, sown in the Nursery at Meadowbank in the second week of April 1833, was in full flower on the 20th of August following; and in 1835 it flowered fully a fortnight earlier than any other variety of *T. pratense* in the collection, except the following.

5. PERENNIAL RED CLOVER OF GERMANY.—This variety was received in 1834, from Mr A. C. Fischer, Inspector of the Botanic Gardens at Gottingen, under the name of *T. pratense perenne*. It very much resembles the last, but differs from it in being a few days later, and rather more luxuriant in its habit of growth.

† † BIENNIAL RED CLOVERS, *Trifolium pratense*.

COMMON OR ENGLISH RED CLOVER.—In addition to their shortness of duration, this and the rest of the biennial clovers are distinguished from the more permanent sorts by their roots being more fusiform (thick and fleshy, or carrot-shaped), and by their leaves and stems being generally more smooth, or less hairy. That variety more particularly denominated English Red Clover, is of a strong luxuriant habit of growth; its seeds are large, and in sample are of a bold purple colour. It is more particularly adapted for rather superior soils, but like the other varieties, it derives its name from the

country in which it is grown ; and from being often the produce of foreign seed, it in such cases partakes to a certain degree of the qualities of that particular variety from which it may have been produced.

Of the other varieties may be mentioned Holstein, German, Cologne, Juliers or Dutch, Flemish, French, American, and Normandy Red Clovers ; and of these the most important are the Juliers or Dutch, and French varieties. The former of these is of a light colour, of a strong and coarse-like habit of growth, and succeeds better than most of the others on strong soils of an inferior description, particularly such as are of a dampish nature ; its seeds are easily distinguished by their being large, less plump or well filled, and of a more yellow colour than those of most of the others, arising from the humidity of the climate in which it is produced. The French Clover is remarkably smooth in all its parts, leaflets roundish, and altogether of a rich green succulent appearance ; its seeds, which are chiefly from the southern departments of France, are small, plump, and have a considerable portion of purple in their colour ; it is best suited for superior soils, in sheltered situations. The Normandy Red Clover, *Trèfle de Normandie*, Fr., is from the north of France ; it is as yet not very well known in this country, but appears to be of a strong luxuriant habit of growth, of a dark green colour, produces comparatively few flowers, and is some days later than the common sorts. The American variety has smaller seeds, in which the yellow colour is predominant, not quite so luxuriant in growth, its stalks are hard and small, and it is considered of more permanent duration than any others of the biennial kinds.

II. TRIFOLIUM REPENS—WHITE OR DUTCH CLOVER.

Le Trèfle blanc.—Fr.

SPECIFIC CHARACTERS.—Heads globular ; pods four-seeded ; teeth of the calyx unequal ; colour of the flowers white, or sometimes tinged with very light pink ; leaflets inversely heart-shaped, often having a black or darkish coloured blotch near the base ; flower-stalks without leaves, upright ; stem creeping on the ground and rooting at the joints ; roots fibrous ; perennial ; flowers throughout the summer months and beginning of autumn. Grows naturally in pastures, in a great variety of soils and situations.

The White Dutch Clover is too well known as a pasture plant to require any farther description.

III. TRIFOLIUM HYBRIDUM—HYBRID OR BASTARD CLOVER,

Is so named from being intermediate in its appearance between the two preceding species.

SPECIFIC CHARACTERS.—Heads globular, stalked ; pods four-seeded ; teeth of the calyx nearly equal ; leaflets ovate, and slightly serrated ; stems branching, and in habit of growth not so upright as those of Common Red Clover ; root fibrous ; perennial ; flowers in June and July.

Seeds of this clover brought from Sweden, and presented by Mr George Stephens, land-drainer, Edinburgh, under the name of Alsike Clover, and which were sown at Meadowbank Nursery on the 17th April 1834, produced flowers on the 25th August, and ripened seed in the beginning of October following ; height of the plants about twenty inches. And in 1835 the same plants were in full flower on the 18th June, and ripened seed in the beginning of August ; height about two feet.

From what has been seen of the *T. hybridum*, it seems to be a valuable perennial clover, and well adapted for growing in this country, but hitherto seeds have not been obtained in sufficient quantity to give it a fair trial in field culture. From the dissimilarity between this and the Common Clover, it may very likely be found to thrive on such soils as are termed by farmers *clover-sick* ; should such prove to be the case, it will be a most valuable acquisition.

IV. TRIFOLIUM MEDIUM—ZIGZAG CLOVER OR MARL-GRASS.

Also sometimes termed *Cow-grass*.

Of all our native clovers this bears the greatest resemblance to the common red sort, *T. pratense*, but it is easily distinguished from it by its more rigid zigzag stems, narrower and darker green spotless leaflets, and above all, by its creeping roots, and being always found growing in considerable patches, instead of solitary plants, like the other, and on very dry banks, tops of old walls, &c.

From the name of Cow-grass being sometimes applied to this as well as to the perennial variety of *T. pratense*, they have often been confounded with one another. It has been recommended to sow the zigzag clover in mixture with the permanent pasture grasses, on ac-

count of its permanency of duration ; but its advocates must either have taken it for the true cow-grass as before mentioned, or had not been properly acquainted with its nature and habits ; for it can only be considered as a pestiferous weed in places where it is naturally abundant, from the circumstance that cattle seldom eat it, or at least in small quantities, except their pasture be very bare, its powerfully creeping roots too which displace every other plant within their reach, must prove very hurtful to pasture : nor are the seeds of this clover produced in sufficient quantities for the purpose of sowing extensively, were it even found more deserving.

V. TRIFOLIUM ALPESTRE—OVAL-HEADED CLOVER, ALPINE CLOVER.

This species resembles in some measure the preceding, with which it is often confounded. It is more fibrous-rooted ; stem upright, straight, and scarcely branched ; heads always in pairs, and more elongated or oval-shaped. Native of Hungary, Austria, and several other countries of Europe.

Sown in the Nursery April 1834, it flowered about the middle of August following ; height eighteen inches. In 1835, it flowered about the 18th of June, and ripened seed in the beginning of August ; height from eighteen inches to two feet.

The culture of *T. alpestre* has been recommended by several continental writers, but it does not seem possessed of properties sufficient to recommend it to the notice of cultivators, in this country at least, particularly as its stalks are very hard, and its foliage scanty, so that it is not likely cattle would be so fond of it as of the common red clover.

From its large and beautiful purple heads of flowers, it forms an elegant ornamental plant.

VI. TRIFOLIUM INCARNATUM—SCARLET, CRIMSON, OR ITALIAN CLOVER, OR TREFOIL.

Le Trèfle incarnat.—Fr.

SPECIFIC CHARACTERS.—Spikes or heads oblong, tapering, and nodding to one side, of a beautiful bright scarlet colour when in flower ; leaflets roundish ; stem pretty upright, much branched ; the whole plant (stem, branches, leaves, and calyx) villous or covered

with short wool or hair ; flowers in June and July ; height eighteen inches to two feet ; root annual. Native of Italy.

The *T. incarnatum* has long been known in this country amongst horticulturists as a beautiful border annual. But it is only within these few years that its cultivation has been recommended as yielding an excellent and abundant crop of fodder for feeding cattle. It has been grown with much success in England, particularly in the southern counties ; but hitherto its culture has not been attended with the expected success in most parts of Scotland ; whether this want of success should be attributed to the effects of climate, or to the mode of culture has not yet been satisfactorily ascertained.

In England it has been found to succeed best, either drilled (in rows at the distance of from eight inches to one foot) or sown broadcast on stubble after the corn crops have been removed, and with no previous preparation save a course or two of harrowing, just sufficient to stir the soil to the depth of an inch or two, so that the seed may be more easily covered. In very tenacious soils a very shallow ploughing is given ; but in general it is found better to dispense with the plough altogether, for the many failures which occurred previous to its culture being properly understood, are now attributed entirely to the ground having been too much loosened and pulverized by repeated ploughings.

The advantages to be derived from the cultivation of *T. incarnatum* are, that when sown in autumn it may be cut and cleared from the ground in the beginning of June following, and the land fallowed for wheat or spring corn ; it forms a valuable green food for cattle at an early period of the season, and, if cut when in full flower, it yields a more abundant crop, and makes a superior hay to that of common clovers, at least it is more readily eaten by horses. There can be no doubt but the south of England is better suited for the growth of the crimson clover than any part of Scotland, from the circumstance that the corn crops are much earlier removed, consequently the young plants have more time to attain strength before the winter season sets in ; however, it does not follow but that it may be grown with advantage in the more favourable districts of Scotland, were its culture fairly understood.

In England about 18 lb. or 20 lb. of seed is allowed to the acre, but in Scotland it has been thought advisable to add a few pounds more, to provide against contingencies ; when drilled, of course, the quan-

tity required will be less, and it may be increased or lessened according to the nature of the climate and soil.

VIII. TRIFOLIUM MOLINERI—MOLINER'S CLOVER.

This clover has a great resemblance to *T. incarnatum* in general habit and appearance, and is on that account considered by some as only a permanent variety. It differs, however, in the colour of its flowers, which is a light pink or French white; it is also earlier in arriving at maturity, and more of a biennial nature, and might be found better suited for the climate of Scotland, but has not yet been tried in the field. It is cultivated in some parts of France and Switzerland.

VIII. TRIFOLIUM ALEXANDRINUM—ALEXANDRIAN OR EGYPTIAN CLOVER.

SPECIFIC DESCRIPTIONS.—Heads slightly oblong or oval, stalked; calyx villous or hairy; teeth narrow, and sharp pointed, unequal; leaflets long, and narrow, slightly toothed, and, together with the stems, almost smooth; stem branching, and nearly upright; colour of the flowers light sulphur-yellow or French white; root annual; height eighteen inches to two feet; flowers in June and July; native of Egypt.

As an agricultural plant, the introduction of the Alexandrian is more recent than that of the crimson clover; compared with which it is of a taller and more straggling habit of growth, and not so well clothed with leaves; it is also a few days earlier in flowering. As yet it has not been satisfactorily ascertained whether the same preparation of the ground before sowing, which is in practice in the case of *T. incarnatum*, be equally applicable in the case of *T. Alexandrinum*, or if the ground should be more pulverized. It should, however, be sown at the same time, viz. the end of August, for an early spring crop. And it has been suggested that one or both might be sown in spring along with the Italian Ryegrass for summer feeding, instead of the common tares, particularly since they are found to be less injurious to the soil.

About the same quantity of seed is required per acre, as of the crimson clover (p. 155).

IX. TRIFOLIUM FILIFORME—YELLOW SUCKLING CLOVER OR TREFOIL.

SPECIFIC CHARACTERS.— Heads small, loose, and five-flowered colour of the flowers bright yellow ; flower-stalks slender or flexuose ; stems procumbent, leaflets scarcely having foot-stalks ; grows naturally on dry rocky or gravelly places.

Common Suckling Clover has been recommended for growing on dry gravelly or rocky places, which are incapable of supporting the more valuable grasses and clovers, but, from the small bulk of produce which it yields, the propriety of its cultivation is questionable, and, besides, cattle are not found to relish it if they can procure more nutritious food. Although generally termed an annual, *T. filiforme* is often found of biennial duration, especially when grown in medium good soil, or when eaten down by cattle or sheep.

X. TRIFOLIUM PROCUMBENS—HOP TREFOIL.

This species grows on similar soils and situations with the last, and, like it, has also been recommended for cultivation. It is, however, possessed of still less merit, as cattle are generally found to refuse it, and it may be seen in dry pastures, towards the end of July, when the seeds are ripe, completely withered or dried, and so forming a very unsightly contrast with the green verdure around ; it is, moreover, very liable to be much injured by mildew.

T. procumbens is readily distinguished from *T. filiforme* by its more compact, upright, and branching habit of growth, and by its close globular shining heads of yellow flowers. Its average height is from four to six inches.

XI. TRIFOLIUM FRAGIFERUM—STRAWBERRY-HEAD CLOVER.

Heads globose, upon long foot-stalks ; colour of the flowers light pink ; calyx after flowering inflated, and reddish coloured towards the period of ripening (which gives the heads the appearance of strawberries), membranaceous, downy, with two of its teeth bent down ; leaflets obcordate, and serrated ; stem creeping ; root fibrous, perennial. Grows naturally on light dry sandy soils, particularly in the vicinity of the sea.

In habit of growth the *T. fragiferum* approaches that of *T. repens*, but it is rather more creeping and easily distinguished by its inflated calyces and strawberry-like heads.

The cultivation of this species has hitherto met with little atten-

tion, but it might be grown with advantage as a mixture in permanent pasture on partly consolidated sands near the sea-coast.

Specimen from Aberlady and Dunbar Bays, East Lothian, where it grows naturally, by Mr Robert Stark.

The following species of *Trifolium*, although occasionally enumerated amongst agricultural plants, are not possessed of qualities sufficient to entitle them to a share of cultivation in this country, except as ornamental plants in flower borders.

XII. *TRIFOLIUM RUBENS*—LONG-SPIKED DARK PURPLE-HEADED CLOVER.

Native of the south of Europe, yields a good bulk of herbage, but seldom perfects seeds; root fibrous; perennial.

XIII. *TRIFOLIUM BADIUM*—VILLOUS-STALKED CLOVER.

A native of the Pyrenees, yields rather a small bulk of herbage, and its seeds are easily dispersed when ripe, so that they are difficult to collect in considerable quantities. It produces an abundance of globular heads, of a bright shining yellow colour, which render it a desirable object in flower borders. Root fibrous, perennial.

XIV. *TRIFOLIUM PANNONICUM*—HUNGARIAN CLOVER.

Native of Hungary; flowers whitish; a strong and upright grower, but rather delicate for field culture. Root fibrous, perennial.

XV. *TRIFOLIUM STELLATUM*—STARRY TREFOIL.

Grows naturally on light soils in the vicinity of the sea; rare in Britain. A curious upright growing annual, but not deserving of culture as an agricultural plant.

MEDICAGO—MEDICK or LUCERN.

GENERIC CHARACTERS.—Stamens diadelphous (nine united, and one solitary); legume or pod one-celled (having no divisions between the seeds); sickle-shaped, or spirally twisted, compressed and membranaceous.

I. MEDICAGO LUPULINA—BLACK MEDICK, NONSUCH, OR YELLOW CLOVER.

La Luzerne lupuline.—Fr.

The Common Yellow Clover (as this plant is generally termed in this country) is too well known to require any description ; it has been cultivated in mixture with red clover and ryegrass for a great length of time. Its seeds, which are produced in much greater abundance, are consequently cheaper than those of any of the other clovers, and it is questionable whether this circumstance may not contribute to the extensive cultivation which it receives more than any other superior merit which it possesses. Although its produce is bulky, yet cattle are generally rather unfond of it either in a green or dry state, and only eat it with a seeming relish when mixed with more nutritious and esteemed food ; on which account it should enter but sparingly into mixtures.

II. MEDICAGO SATIVA—PURPLE MEDICK OR LUCERNE.

La Luzerne cultivée ou Foin de Bourgogne.—Fr.

SPECIFIC CHARACTERS.—Stem erect, branching, smooth ; leaflets long, toothed ; flowers in racemes or clusters, generally of a purplish colour ; pods loosely spirally twisted ; root thick and branching, penetrating very deep into the subsoil ; perennial ; height about three feet ; flowers in June and July.

The cultivation of Lucerne is of unknown antiquity in Italy, Spain, and the south of France ; it is also cultivated in Persia, and several other countries of Asia, Peru, and elsewhere in South America, and in the Canadas and United States of North America.

In Britain, a great deal has been said in its favour as an early plant for yielding fodder before the red clover, and its cultivation has often been attempted, and attended with various degrees of success. The climate of Scotland has been considered by some as too cold for the growth of lucerne, but the numerous failures which have taken place may be more justly attributed to an improper choice of soil than to any other cause. The soils which appear most congenial to it are those of a very light sandy or dry nature, as, for example, several places in the neighbourhood of Musselburgh, where it is found to thrive well, although exposed to the direct influence of the sea breeze, and to be fit for cutting at least a fortnight earlier

than common ryegrass and red clover. Provided, however, the sub-soil be always dry, and particularly, if it be of a calcareous nature, it is not indispensable that the surface-soil be very sandy, as lucerne in such cases is found to grow freely on medium black loams ; but lands which have a damp subsoil, or are of a tenacious nature and damp in winter, are totally unfit for growing it, even although they may be, in the general acceptation of the term, very good soils.

Various modes of culture have been employed in the case of lucerne, as sowing it broadcast, or drilled, either with or without a corn crop ; but that which is decidedly the best is to sow it in drills (about eight or ten inches distant) without any other crop whatever, and keeping it quite free from weeds by hoeing and hand-cleaning during the summer ; also thinning out such parts as may be too thick, so that the plants left may stand at the distance of three inches or thereabouts separate.

If proper attention be paid to the young plants, they will yield a considerable crop the succeeding season, but it is the third season after sowing at least before they arrive at full maturity ; and afterwards they will continue to produce good crops for eight years, and even more, provided they receive a good top-dressing occasionally in winter, and kept free from couch-grass and other perennial weeds. The quantity of seed generally allowed per acre is about 15 lb. when drilled, and 20 lb. when sown broadcast.

III. *MEDICAGO SATIVA* var. *RUSTICA* ; *MEDICAGO MEDIA*.— BROWNISH-FLOWERED OR INTERMEDIATE LUCERNE.

La Luzerne rustique.—Fr.

This is supposed to be a sort of intermediate variety between the Common Lucerne and the next species (Yellow Lucerne), an opinion which seems to be founded chiefly on the colour of its flowers, which are of a dull yellowish-brown. Compared with the last species this sort produces longer and more slender shoots, which are more prostrate or lying on the ground.

Plants of this sort have been growing for several years in the Nursery, the seed of which was procured from M. Vilmorin, and are found uniformly to yield a greater bulk of fodder than the common lucerne ; but as yet it does not appear to be much cultivated even in France.

IV. MEDICAGO FALCATA.—YELLOW SICKLE MEDICK, OR YELLOW LUCERNE.

La Luzerne faucille.—Fr.

This species differs from the Common Lucerne principally, in three particular characteristics, viz. in being of a stronger or more woody upright habit of growth; in the colour of its flowers, which is bright yellow; and in its pods, which are only bent or sickle shaped, instead of being spirally twisted like those of the Purple or Common Lucerne.

The cultivation of the Yellow Lucerne is chiefly confined to Switzerland, and the more mountainous parts of France. It possesses no superior advantage over the common, except in thriving on inferior soils; and is certainly of less value as food for cattle, on account of its hard and coarse woody habit of growth.

A species of *Medicago* presented by Mr A. Gorrie, the seeds of which were gathered in North America by Mr P. Shirreff, Mungoswells, bears a considerable resemblance to the *M. falcata*, but differs from it in several minute botanical characteristics. It does not, however, appear to be more deserving of cultivation.

There are several other species of the genus *Medicago* which yield a good deal of herbage, and apparently deserve cultivation, but cattle are found to reject them, as is supposed from their having too bitter and disagreeable a taste. Of these may be mentioned *Medicago muricata*, *M. cretacea*, *M. scutellata*, &c. Seeds of these three, as well as of the following interesting collection, were presented by Mr C. A. Fischer, Inspector of the Botanical Garden, Gottingen.

MEDICAGO PROSTRATA.

...	ECHINUS.
...	ELEGANS.
...	TEREBELLUM.
...	TRIBULOIDES.
...	ACULEATA.
...	MACULATA.

MEDICAGO NIGRA.

...	UNCINATA.
...	MUREX.
...	ARENARIA.
...	CIRCINATA.
...	GLUTINOSA.
...	HELIX.

LOTUS—BIRD'S-FOOT TREFOIL.

GENERIC CHARACTERS.—Stamens, nine united, and one free ; legume or pod indistinctly one-celled, many seeded, cylindrical, and straight.

I. LOTUS CORNICULATUS—COMMON BIRD'S-FOOT TREFOIL.

Le Lotier cornicule, ou Trefle cornu.—Fr.

SPECIFIC CHARACTERS.—Flowers eight or ten, in depressed heads, generally of a bright yellow, but sometimes orange-coloured, especially before being fully expanded ; stem decumbent, smooth ; root thick and fusiform ; perennial ; flowers about the 20th of June, and continues till the end of August. Height from six inches to one foot. Grows abundantly on dry elevated pastures and heathy soils.

This plant is well deserving of cultivation on light dry and high elevated inferior soils, and on such will yield a greater bulk of herbage than any of the cultivated clovers. It is highly nutritious, and eaten with avidity by cattle. From the great depth to which its roots penetrate, it is not liable to be injured by drought, and is thereby enabled to retain its verdure after the grasses and other plants are burnt up.

II. LOTUS MAJOR—GREATER BIRD'S-FOOT TREFOIL.

This species grows naturally in moist situations, by the sides of ditches, damp hedges, and bushy places, and attains its greatest luxuriance in such soils as have a portion of peat in their composition. Some eminent botanists are of opinion that this is nothing else than a variety of the preceding, and account for the difference in their appearance from the natural place of growth of the *L. major* causing a greater development of its parts ; but besides its more luxuriant habit, it differs materially from *L. corniculatus* in the form of its roots, which are fibrous and creeping, while those of the latter are thick and fusiform, characteristics which both retain when cultivated in any soils, or under any circumstances. But perhaps the principal distinction is in the seed of *L. major* being scarcely one half the size of that of *L. corniculatus*, and of an olive-greenish colour when ripe, while that of the latter is not only larger in size but is of a dark brown or almost black colour ; but they may be easily distinguished by the leaves of *L. major* being closer and more rounded, and, when in

flower, by its having more compact heads, with more numerous and smaller flowers.

LOTUS VILLOSUS.—*Le Lotier velu*, Fr.—Is only a villous or downy-leaved variety of *L. major*, which grows better on good dryish soils than the smooth-leaved variety. Both of these, with several intermediate varieties, may be seen growing naturally on damp soils by the sides of hedges, ditches, &c.

MELILOTUS—MELILOT.

GENERIC CHARACTERS.—Legume one-celled, one or more seeded, longer than the tubular five-toothed calyx; keel of the flower shorter than the wings and standard; flowers disposed in racemes or long loose clusters; leaflets in threes.

I. MELILOTUS OFFICINALIS—COMMON MELILOT.

SPECIFIC CHARACTERS.—Pods two-seeded and rough; flowers yellow, more than twice the length of the calyx, and disposed in long loose one-sided clusters or racemes; stipules or small leaf-like appendages at the base of the leaf; footstalks small, sharp pointed, and undivided; stems upright and branching at the base from three to five feet in height. Generally termed an annual, or biennial, but is often of four years' duration; grows naturally in dry pastures and waste places; flowers in July.

Cattle in general are very fond of this Melilot when cut in a young and tender state, but, like all the rest of the genus, when allowed to arrive at full flower, its stalks become so hard and woody that the tops and leaves only are fit for being eaten. It might be cultivated to advantage on poor dry soils, either alone or in mixture with some of the grasses or other herbage plants; and although not well suited for hay, on account of its hard and woody nature, and the small bulk of its foliage when dried, yet a slight mixture of it is found to impart to the whole crop an agreeable sweet scent, similar to that of the sweet-scented vernal grass (*Anthoxanthum odoratum*).

There is a variety of this species cultivated in France under the name of *M. officinalis altissima*, which grows rather stronger, and is later in flowering than the common sort.

It is to the *M. officinalis* that the famous Gruyere Cheese owes its

flavour; the flowers and seeds after being dried, are bruised or ground and mixed with the curd before pressing.

II. MELILOTUS MACRORHIZA—LONG-ROOTED OR SIBERIAN MELILOT.

Le Melilot blanc de Siberia.—Fr.

This species, which is a native of Hungary, differs from the preceding in having white flowers; long thick carrot-shaped-like roots; generally one-seeded pods; grows considerably taller, and is rather shy in flowering.

This species, like the former, is best adapted for growing on light dry soils, and is cultivated on such to a considerable extent in some parts of the Continent, particularly on the light sandy coasts of Holland, and some parts of France, where it is sometimes sown in mixture with *Vicia biennis*.

III. MELILOTUS CÆRULEA—BLUE-FLOWERED MELILOT OR SWEET TREFOIL.

Le Melilot bleu, Lotier odorant, Trèfle musqué.—Fr.

This species is only of annual duration, and is distinguished from all the others by its blue-coloured flowers.

M. cærulea is well known in our flower borders under the name of Sweet Trefoil, but its cultivation for cattle's food is as yet chiefly confined to Germany. It is of rapid growth, and might be sown in fields where the common clover may have partly failed, but should be cut before being in full flower, as its large hollow tubular stalks become very hard and woody afterwards.

There are several other Melilots which might be cultivated with equal advantage to any of the above, but their seeds are less easily procured. One species, viz. *Melilotus leucantha*, deserves to be tried: as yet, however, it is very rare, being only found in two or three places in Scotland, as on the south shore of the Firth of Forth, near Aberlady, and on the Sands of Barry, Forfarshire, in which latter locality it grows to the height of about two feet on the partly consolidated sea sands, along with *Ammophila arundinacea*. *M. vulgaris* is occasionally cultivated in Germany; it much resembles the *M. macrorhiza*, but scarcely grows so tall, and its roots are more fibrous.

ONOBRYCHIS—SAINFOIN.

GENERIC CHARACTERS.—Pod one-celled, one-seeded, thick-skinned with a rough netted-like surface, crested or winged; calyx five-toothed, or parted.

ONOBRYCHIS SATIVA—COMMON OR CULTIVATED SAINFOIN.

GENERIC CHARACTERS.—Leaflets nine to fifteen on each leaf, opposite, acute, smooth; pods toothed at the margin and ribs; wings of the flower about as long as the calyx; flowers in spikes, on long foot-stalks, of a beautiful pink or flesh colour; stems nearly upright; roots subfusiform, and penetrating to a considerable depth; perennial; height two to three feet: flowers in June and July. Grows naturally in light chalky soils in various parts of England.

Although a native of England, the Sainfoin is said to have been originally introduced as an agricultural plant from France, and is now considered the most important leguminous herbage and forage plant in the calcareous districts of both countries, and particularly on the poor, dry, thin, chalky districts in the South of England. It may be sown either broadcast or drilled, but the former system is generally preferred; from the seeds being large, they require to be deeper covered than those of clover, and for this purpose it has been recommended to plough them in, with a very shallow furrow. When the broadcast system is adopted, from 100 lb to 110 lb., or about four bushels of seed, are required per acre; and when drilled, about one-fourth less will suffice. A very judicious method, which is practised in some parts, is to sow it with about half the quantity of barley or other grain usually sown for a full crop, which gives it the advantage of being shaded and kept moist during the first summer, without the chance of the plants being weakened from the closeness of the corn crop. In cases where the barley or corn is drilled, the Sainfoin should be drilled across the field, or the drills running at right angles with those of the corn crop. The usual period of duration of Sainfoin, in a profitable state, is from eight to ten years in chalky soils, and seven or eight in those of a sandy or gravelly nature; but although the plants lose a good deal of their vigour at that age, they have been known to exist for nearly a hundred years. The duration of the crop may, however, be increased by judicious top-dressing, and the manures found most suitably for this purpose are such as contain a consider-

able portion of gypsum, as Dutch ashes, ashes of various kinds of peat, &c.

In Scotland the cultivation of Sainfoin has hitherto been little attended to, partly, no doubt, from an opinion that it is only suited for chalky soils; but it has been ascertained to succeed well on almost any soil, provided it be sufficiently dry; and particularly on such as are of a calcareous sandy nature, or are incumbent on limestone, and on such of these as are too thin or dry for producing good crops of corn or grass, it might be grown with very beneficial results.

A variety of Sainfoin, which was received from M. Vilmorin and Co. Paris, under the name of *O. sativa*, var. *bifera*, and which was sown in the nursery at Meadowbank two years since, was found to grow faster, and produce flowers earlier than the common sort; and during the last summer their comparative merits were as follows:—

O. sativa, common variety, in flower June 8th; height at that period two feet; seed ripe August 4; height two and a half feet; second cutting flowered on the 20th of September; greatest height from one and a half to two feet.

O. sativa bifera. In flower June 4; height two and a half feet; seeds ripe July 28; height fully three feet; second cutting in full flower on the 4th of September; greatest height about two and a half feet.

HEDYSARUM

The genus Hedysarum, from which that of *Onobrychis* is separated by modern botanists, differs from it in having two or more seeded, celled, jointed-like pods, and the only species entitled to attention as an herbage plant is the

HEDYSARUM CORONARIUM—FRENCH HONEYSUCKLE.

This well known beautiful scarlet-flowered biennial is grown in the fields in several of the southern countries of Europe, for the purpose of feeding mules and horses. It is said to be very nutritious, and yields an immense crop, being from four to five feet in height; it is used either in a green state or made into hay. The French Honeysuckle has been recommended for cultivation in this country, but it does not seem deserving of much attention, as, independently of its biennial nature, and consequently only yielding one good crop in two seasons, it is tender, and easily destroyed by frost in the spring

months, so that it could only be grown in the warmest dry soils in sheltered situations.

Besides the scarlet-flowered variety there is one with white flowers, which, however, is of inferior importance, from its producing a smaller bulk of herbage.

GALEGA—GOATS-RUE.

GENERIC CHARACTERS.—Calyx with small sharp-pointed, nearly equal teeth ; stamens ten, all united ; pods with oblique streaks between the seeds.

GALEGA OFFICINALIS—OFFICINAL GOATS-RUE.

SPECIFIC CHARACTERS.—Leaflets long, pointed, and together with the stems, quite smooth ; stipules or appendages at the base of the leaves, small, and sagittate or arrow-headed-like ; flowers in racemes, those of the common variety light purple or pinkish coloured ; pods upright, five to eight seeded, nearly cylindrical, and distended with air, most swollen at the seeds, which are longish ; stems upright ; about three feet in height ; root perennial ; flowers in July and August. Native of Spain.

Although the cultivation of this plant has been recommended, owing to the great bulk of produce which it yields, yet it seems questionable whether or not it would be expedient, from the circumstance that cattle are generally found to refuse it, except in small quantities, and when they can get nothing more agreeable to their taste. Granting, however, that its herbage should be found to be wholesome and nutritious, this dislike which they seem to manifest might be overcome by habit.

CORONILLA—CROWN VETCH.

GENERIC CHARACTERS.—Calyx two-lipped, under two and upper three toothed ; standard of the flower about the same length as the wings ; stamens ten, nine united and one free ; pods round, straight, and jointed.

None of the species of this genus are natives of Britain, and only one of them has been recommended to be grown as food for cattle, viz.

CORONILLA VARIA—VARIOUS-FLOWERED CROWN VETCH.

SPECIFIC CHARACTERS.—Flowers light purple or pinkish various-coloured, collected together in round heads or crowns; leaves compound, long, and smooth; stem also smooth, and declining towards the base when full grown; roots perennial, and powerfully creeping; height about three feet.

This is a native of the Continent, and may occasionally be met with in gardens. It thrives best on light, warm, dry soils, and on such will yield two very bulky crops of green fodder in a season; but its powerfully creeping roots render its culture inadvisable except in waste places. Cattle are not fond of it, owing, as is supposed, to its possessing a rather disagreeable bitter taste.

ANTHYLLIS—KIDNEY-VETCH.

GENERIC CHARACTERS.—Calyx five-toothed, inflated, inclosing the small, roundish, one-seeded pod; stamens ten, all united towards the base of the filaments, or *monadelphous*.

ANTHYLLIS VULNERARIA—COMMON KIDNEY-VETCH.

SPECIFIC CHARACTERS.—Leaves various, compound, terminal leaflet much larger than any of the others; flowers in crowded heads, generally yellow, with hairy calyces; stem prostrate towards the base, about one foot to eighteen inches in height; grows naturally on very dry soils, and particularly on such as are of a calcareous nature; root thick, long, and descending, perennial.

The Common Kidney-Vetch does not yield much produce, but is eaten with avidity by horses, sheep, and cattle, as also by hares, and rabbits, and might therefore be introduced into mixtures for very dry soils.

ASTRAGALUS—MILK-VETCH.

GENERIC CHARACTERS.—Stamens ten, nine united and one free; style smooth; keel of the flower blunt; pods swollen, and two-celled, with the seeds in two rows.

ASTRAGALUS GLYCYPHYLLUS—SWEET MILK-VETCH OR
BASTARD LIQUORICE.

SPECIFIC CHARACTERS.—Leaves smooth, compound; leaflets oval;

Pods subtriangular and curved, several together on a common foot-stalk, which is shorter than the leaves; flowers yellowish-green coloured; stem prostrate towards the base; about three feet in height; roots long, and very thick, penetrating to a great depth in the soil; perennial; native of Scotland, but not common; grows naturally on superior soils by the sides of streams, &c.

The leaves and roots of this plant possess a sweet taste, somewhat resembling liquorice, but in the former mixed with a slight degree of bitter. It yields a heavy crop, and cattle are said to become fond of it after being used to it for some time.

*** Leguminous Herbaceous Plants, termed Climbers, or having tendrils on their leaves, with which they attach themselves to bodies for support.*

VICIA—VETCH.

In its generic characters this is distinguished from others of the climbing *Leguminosæ* by the style having a tuft of hair under the stigma; stamens diadelphous, nine united, and one free.

I. VICIA SATIVA—CULTIVATED VETCH OR COMMON TARE.

La Vesce commune.—Fr.

SPECIFIC CHARACTERS.—Flowers generally in pairs, without foot-stalks, and of a red or purplish colour; stamens ten, nine united and one free; leaflets oblong, terminating abruptly, with a small point in the middle; stipules small, and toothed; pods more or less downy or hairy; root annual.

In a wild state *Vicia sativa* is found (but in most parts rather scarce) growing by hedges, road sides, and in stony places where not very dry, as in rubbish heaps about quarries, &c. The wild variety, however, differs from those generally cultivated, in being of much dwarfer, and of a more slender habit of growth, and also having much smoother leaves and stalks.

Those sorts in general cultivation are the Common or Summer Tare, and the Winter Tare, which resemble one another in general appearance, but the latter variety is distinguished by being usually of smaller growth, and its pods being more smooth and cylindrical, containing more seeds, and in its general habit it is liker the wild variety.

The Common or Summer Tare presents in the appearance of its seeds much diversity of size, arising from soil and culture ; the larger sizes are better known in many places by the name of Vetches, whilst the smaller samples are denominated Tares, and are either sown as a green food for cattle, or for their ripe seed. In the former case they are generally sown with oats or barley, and so as to come in for use between the first and second crops of grass. The quantity of seed required per imperial acre may be two and a half bushels of tares, and one or a half of oats or barley, or from three and a half to four bushels of tares when sown alone. The practice of sowing one or other of the cereal grasses amongst tares is to be highly recommended, not only as it insures a greater bulk of produce from the stems of the grasses rising above the tares, but they also serve to prevent them lying on the ground, and so becoming injured in damp weather ; cattle are also fonder of the fodder in a mixed than in an unmixed state. When sown for their ripe seed the summer tare is generally mixed with beans, or pease and beans, in the proportion of about a fourth part in bulk, or less, of the whole quantity of seed per acre.

The Winter Tare, when intended for early spring food, is sown in autumn, either alone, or, what is far more preferable, in mixture with rye. About the same quantity of seed is allowed per acre as in the case of the summer tares, for although the seeds are smaller (consequently producing a greater number of plants from a given measure) ; yet, from the inclemency of the season, the young plants are more apt to be destroyed.

It has been ascertained that winter tares, repeatedly sown in spring, acquire more of the tender nature peculiar to the summer sort. Therefore it is essential for cultivators to sow only such seed as is not only the produce of the true winter tare, but of it, sown in autumn. When winter tares are sown for their seeds, the general practice has hitherto been to sow them alone ; but since the introduction of the winter beans it may be more advisable to sow them in mixture,—the seeds, as well as those of the spring or summer sort, being easily separated from the beans when thrashed by means of a properly sized riddle.

To insure a good crop of tares, the soil is not only required to be of a superior nature, but also well cleaned or free from root and annual weeds ; and it is also requisite in most cases to apply an extra quantity of manure. They should never be allowed to remain on the ground until nearly ripe, except when intended for seed, as they

prove highly injurious to the soil, being considered the most impoverishing of all our commonly cultivated leguminous crops.

White-seeded Tare, or Lentil of Canada, is grown chiefly for its seeds, and is therefore placed amongst *plants cultivated for their farinaceous seeds* (which see).

VICIA BIENNIS—BIENNIAL VETCH OR SIBERIAN TARE.

La Vesce bisannuelle, ou Vesce de Siberie.—Fr.

SPECIFIC CHARACTERS.—Flowers about eight or ten together, on long peduncles or footstalks, of a light purplish-pink colour; leaflets small, smooth, and sharp pointed, about ten or twelve in each leaf; tendrils long, and generally branching; pods smooth and flattened, from an inch to an inch and a half in length, by about two-eighths in breadth; seeds small, round, and of a dark dull green colour; habit of growth slender, and branching; height six to eight feet, generally of annual duration when allowed to ripen seed on stiff wet soils, but will grow two seasons under favourable circumstances; flowers in July and August; native of Siberia; introduced to Britain about the year 1753.

This Vetch has been much recommended for cultivation, as it not only grows to a great height, and yields a large bulk of fodder, but it remains green throughout winter in defiance of the most severe frosts. Although recommended by MILLER, about 1759, its culture has not been attended to in this country, but it is grown in some parts of France, and particularly in Germany on light soils. Those who cultivate it in the latter country find it advisable to sow it in mixture with one or other of the Melilots, as, from its tall and slender habit of growth, unless supported, it is apt to become lodged and much damaged in damp weather, and for this purpose the biennial species of the genus *Melilotus* are exceedingly well adapted, owing to their strong upright habit of growth and similarity of duration.

III. VICIA CRACCA—TUFTED VETCH.

SPECIFIC CHARACTERS.—Peduncles, or footstalks of the flowers, longer than the leaves; flowers in a closely imbricated, elongated, one-sided cluster or raceme, of a bluish or purple colour; leaflets lanceolate, and, together with the stems and peduncles, slightly hairy, and of a hoary light bluish-green colour; roots small and creeping; height four to five feet. Grows naturally by the sides of plantations, in hedges, &c.

V. Cracca yields a considerable bulk of fodder, which is greedily eaten by cattle, and is considered as being more nutritious and healthy food than the Common Tare, from its containing a much smaller proportion of watery matter. It thrives best on a soil of medium texture, but will grow well on such as are of a light sandy nature, as also on strong clays, provided they be well drained, and the moisture not allowed to stagnate about the roots in the winter or spring months.

In 1833, a portion of ground at Meadowbank Nursery, containing 360 square yards, was sown with *V. Cracca*, the seed of which was procured from Mr P. Shireff, Mungoswells. In 1835, the first flowers of the same were appearing on the 12th of June, average height at that period two and a half feet; ripe and cut on the second week of August, average height or length of the shoots four to five feet. The same was thrashed out on the 16th of September, and the whole produce found to be 30 lb. clean seed, 24 stones dried straw or haulm, and 2 stones of chaff, or broke separated from the straw and seed in the operations of thrashing and cleaning. No second cutting or after-math was produced.

A variety, seeds of which were received from M. Vilmorin & Co., Paris, under the name of *V. Cracca*, turns out to be very distinct from the Common Tufted Vetch of this country, in its having broader and smoother dark green foliage, much darker purple flowers, is about a week later in flowering, and yields a greater quantity of seed.

IV. VICIA SYLVATICA—WOOD VETCH.

SPECIFIC CHARACTERS.—Flowers arranged as in the last species, of a variegated pink-like colour; leaflets elliptical; stipules small, sublunate, and bristle-pointed; tendrils large and branching; whole plant almost smooth; root very slightly creeping, perennial; height four to six feet; flowers in July. Grows naturally in stony places, amongst trees and bushes, also on strong damp tilly inferior soils, as on some parts of the banks of the Tay above Perth; it is also found growing luxuriantly within the influence of the sea breeze, and even when subjected to the salt spray arising from the waves, as amongst the rocks on the sea coast to the east of Arbroath. Cattle are fond of the Wood Vetch as fodder, but although it yields a large bulk of herbage on soils and in situations where few other plants will thrive, its cultivation has been hitherto neglected. One great hinderance to the procuring of its seeds in large quantities, is the irregularity with

which they ripen, and the liability of the ripe pods to drop or become detached from the stalks, so that, in order to obtain the full crop of seeds, they require to be gathered with the hand as they arrive at maturity.

Specimen, five to six feet in length, by Mr J. Carmichael, Strontian, Argyleshire, where it grows naturally in waste places, amongst bushes, &c. And by Mr A. Gorrie, a variety having white flowers.

V. VICIA LUTEA—YELLOW-FLOWERED SEASIDE VETCH.

SPECIFIC CHARACTERS.—Pods solitary, without footstalks, reflexed, broad, flattened, and hairy ; stem branching and very prostrate, except when supported by other plants ; flowers of a dull yellowish colour ; root fibrous, not strictly perennial, but lasting for several years ; height two to three feet. Grows naturally on stony or gravelly situations on the sea coast, and can only be valued, in an agricultural point of view, as being capable of growing on such, and affording rather more produce than the common clovers grown under similar circumstances.

One obstacle to the cultivation of the perennial Vetches, particularly *V. Cracca* and *V. sylvatica*, for herbage, is the want of strong growing plants of similar duration to grow amongst them for their support, and which might also be cut at the same time for cattle's food. For this purpose it has been recommended to sow common beans, which may do very well during the first and second seasons after sowing,* but as the vetches become older, they increase in luxuriance of growth for at least several years ; while, on the other hand, beans, or any other annual plant, will become weaker, not only from being repeatedly sown on the same soil, but from the soil becoming too hard from not being ploughed or worked. In the case of the Wood Vetch, this latter objection might be partly overcome, by growing it in drills at least two feet apart, the interstices being dug or ploughed every year, and a little manure added if required, and then beans or any other strong growing annual plants might be sown in the middle of each space. This mode of culture is, however, not so applicable in the case of *V. Cracca*, from its more running or creeping roots.

* There can be little doubt but the best, as well as the most natural, season for sowing the native vetches, particularly the perennial sorts, is when their seeds are ripe, or early in autumn ; although that operation may likewise be deferred till spring.

However, on those soils and situations where they grow naturally, they may form part of mixtures in permanent pastures.

VI. VICIA SEPIUM—BUSH VETCH.

SPECIFIC CHARACTERS.—Flowers on short footstalks, about four or six together, generally of a red or dull purplish colour, lightest and slightly striped on the upper petal or standard; leaflets broad and roundish, smaller towards the point of the leaf, and, together with the flowers, thickest or most abundant at the point of the shoot; root slightly creeping, perennial; average height about two feet. Grows naturally in shady places, and generally on superior and rather dry soils.

This is another perennial vetch, but from its rather dwarf and close bushy habit of growth, it does not require the aid of other plants for support to the same extent as the last mentioned sorts.

Cattle in general are very fond of the Bush Vetch, and it seems naturally well adapted for sowing along with the superior wood grasses, under trees, or in such shady places where the common clovers will not succeed well; but like most of the other perennial vetches, its seeds are difficult to procure in large quantities.

Specimens by Mr J. Carmichael; and by Mr J. Reddie, Milnathort. Also specimens of a variety having white flowers, found on a bank by the roadside near Lasswade.

VII. VICIA VILLOSA—VILLOUS OR HAIRY VETCH.

At first sight this species is apt to be mistaken for *V. Cracca*, which it very much resembles in its flowers and foliage, but differs essentially in having an annual root, while that of the other is perennial. The whole plant of the *V. villosa* is also more villous or hairy, of a taller and more branching habit of growth, and produces a much greater quantity of pods, which are also larger and broader than those of the last mentioned sort.

Specimen of one plant, from nine and a half to ten feet in length, having numerous branches, and producing from twelve to thirteen hundred ripe seeds, by Mr A. Gorrie, who discovered a few of its seeds, with some others, in a sample of Dantzic Wheat, in 1834, and had them sown, for the purpose of ascertaining the kinds of weeds most predominant in the wheat fields about that place. The other seeds turned out to be of *Ervum hirsutum*, *Agrostemma Githago*, *Lolium temulentum*, and a few more peculiar to the wheat fields of this country.

Part of the above seeds were sown in the Nursery at Meadow-bank on the 10th of April 1835; the plants flowered about the 20th of July, and produced a full crop of ripe seeds by the last week of August; average height about eight feet.

The *V. villosa* is of slender growth, and relying, like the *V. Cracca*, for support on whatever stronger plants may be growing beside it; for which purpose the Sweet Melilot (*Melilotus cœrulea*), or some such strong growing annual, might be introduced with advantage in the case of this and the other slender growing annual vetches. It also possesses the same advantages as the *V. Cracca*, of containing less watery matter than the Common Tare, and being greedily eaten by cattle or horses, either in a green or dry state. Compared with the Common Tare, the *V. villosa*, when sown in spring, comes away rather slower at first; but its actual weight, or bulk of produce from a given space of ground, when fully grown, may be reckoned nearly double that of the other. Young plants, which were sown the previous autumn, were found to withstand the last winter, at Annat Garden, without suffering the least apparent injury. Should farther experience prove it suitable for sowing as a winter vetch (as there is little doubt but it will, considering the great severity of the winters in its native country), it will add greatly to its value.

VIII. VICIA PSEUDO-CRACCA—BASTARD TUFTED VETCH.

This species also differs from the true Tufted Vetch in having annual roots, and from the preceding in being of dwarfer growth, having smoother and finer foliage than either, and also in having much lighter coloured flowers. It is a native of the South of Europe, and has been recommended for field culture, but its merits are as yet little known in this country.

IX. VICIA ATROPURPUREA—DARK PURPLE-FLOWERED VETCH.

SPECIFIC CHARACTERS.—Peduncles many-flowered, shorter than the leaf; teeth of the calyx setaceous, very villous; leaflets dark green coloured, and slightly villous; pods short, broad, and pretty well filled, containing three or four seeds; height three feet; root annual. Native of the north of Africa.

This is also recommended for field culture by the French, but from its coming from such a warm country as the North of Africa, it is not likely to succeed so well in this climate as some of the preceding.

X. VICIA ANGUSTIFOLIA—NARROW-LEAVED VETCH.

Flowers reddish coloured, single, or in pairs, without footstalks ; pods of a shining black colour when ripe ; leaflets narrow, and terminated abruptly at the points, smoothish and dark green coloured ; root annual ; height three to four feet. Grows naturally in woods and hedges in Germany.

The Narrow-leaved Vetch yields a large portion of foliage, and stands well in the end of the season, not being so easily injured by frost as the clovers and common tares, and from its being much less soft and juicy than the latter, it is not so liable to be damaged in damp weather.

XI. VICIA TRICOLOR—THREE-COLOURED VETCH.

This species is easily distinguished by its flowers, which are without peduncles, being of a jet black colour on the wings or alæ, inclining to a dull brown towards the posterior extremity, and the rest of the flower being of a green colour ; height two to three feet ; annual. Native of America, from which it was recently introduced.

This vetch was first recommended by Mr Loudon, in his Gardener's Magazine, as a new plant, which might be grown with advantage in this country as food for cattle.

Specimens by Mr A. Gorrie, from seed procured through Mr Loudon, from Mrs Marryat, Wimbledon House. It seems dwarfer in growth than some of the other annual vetches, but yields a greater quantity of seed. Farther experience is, however, required respecting it.

XII. VICIA NARBONENSIS—NARBONNE OR BROAD-LEAVED VETCH.

SPECIFIC CHARACTERS—Pods either without or with very short footstalks, one or two, and sometimes three together, large, flattish, and of a darkish colour when ripe ; leaflets about six on each leaf, large, roundish, and entire ; colour of the flowers reddish-purple ; stems much branching, thick, soft, and hollow, of rather a stout habit of growth, and not relying much upon other plants for support ; height two to three feet. Native of France ; annual.

The *V. narbonensis* is cultivated in Germany, and some other parts of the Continent, as a substitute for the Common Tare. It yields a large and close-growing crop of succulent fodder, of a strong beany taste, and is at first not well liked by cattle ; however, if sown in autumn, it stands our winters well, and grows very fast in the

early spring months, at which period cattle are fonder of it than they are when the clover season comes on.

Samples in straw and seed by Mr A. Gorrie, Annat Gardens, who has grown it for several successive seasons, and has all along found it to retain its greenness in winter in a remarkable degree, and to yield an abundant crop in the spring months ; and in grain by David Falconer, Esq. of Carlourie.

XIII. VICIA SERRATIFOLIA—SAW-LEAVED VETCH.

This species is a native of Hungary, and so like the former in its general appearance, as to be only considered a variety. It differs chiefly in having its leaves and stipules deeply indented or serrated, while those of the former are entire, or almost so. It is cultivated in some parts of the Continent as the preceding.

Specimens by Mr Robert Fairbairn, Freeman Cottage.

XIV. VICIA PLATYCARPUS—LARGE-PODDER VETCH.

Pods solitary, without footstalks, large, broad, and inflated ; leaves resembling those of the *V. narbonensis* ; stems strong, and nearly upright ; height one and a half to two feet. Seems much inferior to the two last in bulk of produce.

The three last species may be said to form a kind of class of *Viciæ* by themselves, from the broadness of their leaves, their strong habit of growth, and the thickness and succulency of their stems, and seem to form as it were the connecting link between the Tares, and other slender climbing sorts, and the *V. Faba*, or Bean, which has been separated by modern botanists into a genus by itself.

Several other species might probably be cultivated with equal success to many of the foregoing, particularly the following, which are part of a collection from Mr C. A. Fischer, Inspector of the Botanic Garden, Gottingen, but which have not been as yet sufficiently tried.

VICIA PANNONICA, *Hungarian Vetch.*

... DUMETORUM, *Great Wood Vetch.*

... BICOLOR, *Two-coloured Vetch.*

... INTERMEDIA, *Hybrid Vetch.*

... BENGALENSIS, *Bengal Vetch.*

... PISIFORMIS, *Pea-shaped Vetch.*

LATHYRUS—VETCHLING AND EVERLASTING PEA.

GENERIC CHARACTERS.—Stamens diadelphous (nine united and one free); style plane, downy above, broader upwards; mouth of the calyx oblique, with its two upper segments shortest.

I. LATHYRUS LATIFOLIUS—BROAD-LEAVED EVERLASTING PEA.

SPECIFIC CHARACTERS.—Flowers reddish or purple, many together on long peduncles; tendrils with two ovate-elliptical leaflets; stem winged, about six feet in length; perennial; flowers July and August. Grows naturally in woods, but rare in Britain, in a wild state; it is, however, often cultivated in gardens as an ornamental climber.

II. LATHYRUS SYLVESTRIS—NARROW-LEAVED EVERLASTING PEA.

SPECIFIC CHARACTERS.—Peduncles about four to six flowered; tendrils with a pair of long narrow or sword-shaped leaflets; stem winged, from four to five feet in length; perennial. Grows naturally in woods, but also rare in a wild state.

These two Everlasting Peas yield an extraordinary bulk of foliage and stems, and hence have been recommended for culture as cattle's food. They both produce but little seed, which scarcely ripens in this country, except in early situations; they may, however, be propagated with facility by dividing the roots, were their culture to a great extent found beneficial; cattle seem to have a dislike for the produce, particularly in a green state, which might perhaps be overcome by habit. They both certainly deserve to be made the subjects of farther experiments. With regard to providing for their support by means of introducing stronger growing herbage plants, the same remarks are applicable in the case of the Everlasting Peas as in that of the *Vicia sylvatica*, &c. (see page. 172).

III. LATHYRUS PRATENSIS—YELLOW OR MEADOW VETCHLING.

SPECIFIC CHARACTERS.—Flowers bright yellow coloured; from two to eight on very long peduncles; pods of a blackish colour when ripe; tendrils with two long pointed, three-nerved leaflets; stipules arrow-shaped, nearly as large as the leaflets; stem winged, two to three feet in height; root powerfully creeping; perennial; flowers

in July. Grows naturally either in moist or dry soils, but generally on such as are of good quality.

Cattle in general eat this species with avidity, hence it has been recommended for being grown on very dry soils. The creeping nature of its roots, however, presents a considerable objection to its culture, except when it is intended to remain permanent.

Specimens by Mr J. Reddie, Milnathort, and by Mr J. Carmichael.

IV. LATHYRUS HIRSUTUS—ROUGH-PODDED VETCHLING.

La Gesse velue.—Fr.

SPECIFIC CHARACTERS.—Peduncles two and three flowered; each tendril with a pair of linear lanceolate leaflets; stem winged; standard of the flowers crimson, other parts pale; pods rough or hairy, broad slightly flattened, containing five or six small round rough blackish-coloured seeds; height two feet; root annual; grows naturally in the South of England, but rare.

The cultivation of this species has been attempted in some parts of France, and it is found to succeed pretty well as a winter vetch, being sown in autumn, and cut for use early in the ensuing season.

V. LATHYRUS CICERA—FLAT-PODDED VETCHLING.

Also termed *Chickling Vetch*; but this latter name is more often applied to the *L. sativus*—See plants cultivated for their Farinaceous Seeds, page 96.

Le Gesse chiche.—Fr.

SPECIFIC CHARACTERS.—Peduncles one-flowered, colour of the flower red; tendrils two-leaved; pods ovate, compressed, channelled at the back; height two to three feet; annual; flowers in June and July. Native of the South of Europe.

In this country the *Lathyrus cicera* has not hitherto been subjected to culture as an agricultural plant; but in the South of France it is grown pretty considerably in some districts for the purpose of feeding live-stock, particularly sheep. Its seeds also are occasionally used like those of *L. sativus*, being ground and the flour mixed in small quantities with that of the cereal grasses, and made into bread; but when used alone, it is even more injurious to health than the last mentioned.

The following are a few of the most interesting of a collection of

the genus *Lathyrus*, by Mr C. A. Fischer, Gottingen ; those which seem at all applicable for being cultivated as food for cattle are marked thus*.

- * LATHYRUS CORNUTUS, *Horned Pea*.
- ... AMPHICARPOS, *Earth Pea*.
- * ... CLYMENUM, *Clymenum*.
- * ... ALATUS, *Winged Vetchling*.
- * ... AURICULATUS, *Jointed-podded Vetchling*.
- ... ANGULATUS, *Angular-seeded Vetchling*.
- ... NISSOLIA, *Nissolia*.
- ... APHACA, *Yellow Vetchling*.
- ... ITALICUS, *Italian Vetchling*.
- ... LUSITANICUS, *Spanish Vetchling*.

ERVUM—WILD TARE.

GENERIC CHARACTERS.—Stamens, nine united and one free ; stigma round-headed, hairy, or downy all over.

I. ERVUM ERVILIA VEL ERVILIA SATIVA—CULTIVATED ERVILIA.

L'Ers ervillier.—Fr.

This species is distinguished from others of the genus, by its upright branching habit of growth, requiring no support from other plants ; also by its small jointed-like swollen pods, which contain two to five whitish seeds, about the size of those of the Common Tare ; its leaves contain eight to fourteen pairs of leaflets, and are terminated by a very small tendril. The average height of the plant does not exceed eighteen inches.

This species is cultivated in some parts of the Continent both for its seeds and green or dried culms and leaves, which are considered highly nutritious, and are given to milch cows and working animals. The seed being ground to a coarse flour, which is mixed with bran and a little salt, is made into cakes which are given to horses and cattle, but found less suitable for feeding swine. The herbage is also considered so nutritious as to recompense for the smallness of its bulk, and is seldom given to animals except in mixture. It is found to thrive well on very poor sandy soils.

II. ERVUM HIRSUTUM—COMMON OR HAIRY WILD TARE,
MOUSE TARE, FETTER, &c.

Peduncles many-flowered ; flowers small and whitish ; pods hairy generally two-seeded ; leaflets linear-oblong, and terminated abruptly ; stem two to three feet long, weak, straggling, and relying on other plants for support ; annual.

Grows naturally on dry soils, amongst bushes, by sides of hedges, and often too abundant in wheat fields both in this country and on the Continent ; when such is the case it proves highly injurious to the grain crop, and can only be got rid of by always taking care to prevent its seeds becoming ripe. The liability with which its seeds become shaken or dispersed when ripe, and the length of time which they are known to retain their vegetative powers when buried in the soil, together with the smallness of its bulk of herbage compared with common tares, renders the cultivation of this plant not worth attending to ; but in cases where it abounds naturally, it forms excellent food either for cattle or horses.

*** *Leguminous Shrubby Plants.*

ULEX—WHIN.

I. ULEX EUROPEUS—COMMON WHIN, FURZE OR GORZE.

GENERIC CHARACTERS.—Stamens ten ; monadelphous (all united towards the base of their filaments) ; calyx two leaves, with two small scale-like appendages attached laterally at their base ; pods turgid, little longer than the calyx ; leaves spiny.

The common whin is too well known to require any specific description ; it has been employed for an unknown length of time in this country for feeding horses, cattle, and sheep, during the winter months. Whins are given to horses and cattle in a green state, after undergoing a process of thrashing or bruising until the prickles are so far reduced or deprived of their acute points, that the animals can eat them with perfect safety or without endangering their mouths ; sheep, on the other hand, are merely turned out to feed on whins when the snow is too deep for allowing them to get at the grass ; and although they are found to fatten and thrive much better on the former, yet they seldom touch them until forced to do so from not getting at the grass, but when once accustomed to the whins, they continue to eat them in greater or less quantities according to the state of the pasture, until the young grass comes in in the be-

ginning of summer ; hence, when whins are plentiful in the winter pasture, shepherds always look with anxiety for a snow storm in the early part of that season.

For bruising whins, the flail was the only instrument formerly used, but several machines have now been invented for that purpose.

In this climate the whin will not succeed beyond 900 feet above the level of the sea, but many sheep-walks might be improved by introducing it on moors under that altitude. The plant has been used sown on the tops and in the face of mud fences as a cheap and efficient hedge on dry and poor soils, where thorns will not prosper. For sowing a single line a mile in length 3 lb. to 4 lb. of seed will be sufficient.

Some poor uplands might be profitably laid under whins, sown broadcast, with or without a corn crop, at the rate of 20 lb. or 24 lb. an acre, to be mown annually for winter green food.

THE DOUBLE FLOWERED Whin, a variety of the above which is propagated by cuttings, has been recommended for hedges where spreading of whin seed in the neighbouring ground should be guarded against.

II. ULEX STRICTA vel HIBERNICA.—UPRIGHT OR IRISH WHIN.

This differs from the last in being of a much more upright and compact habit of growth, and in its shoots and prickles being so soft and tender that cattle of any kind can eat them without their undergoing the operation of thrashing or bruising. One great objection, however, to its extensive culture is, that it is not capable of being propagated by seed, as it produces but few flowers ; but its superior merits may on many occasions repay the attention requisite in cultivating it by cuttings of the young shoots, which are found to root freely by being planted about the end of August in a shady situation (as at the back of a wall) amongst clean sand, or sand with a slight mixture of any light rich soil in its composition. When so treated, they will produce roots in spring or summer following, and may be finally planted out in the succeeding autumn or spring months.

CYTISUS—BROOM.

GENERIC CHARACTERS.—Calyx two-lipped, upper generally entire, and lower slightly three-toothed ; stamens ten, monadelphous, en-

closed by the blunt keel ; pod compressed, many-seeded ; leaves generally ternate.

CYTISUS vel SPARTIUM SCOPARIUM—COMMON BROOM.

This well known plant has been recommended for sowing on sheep pastures, for the purpose of affording those animals a supply of winter food ; but although they are found to eat it down when growing naturally within their reach ; yet from its excessive bitterness of taste, and the diuretic qualities ascribed to it, it may be questioned whether they do not take it rather by way of medicine than for actual nourishment. And the propriety of introducing it to a great extent is doubtful, particularly as it is said to produce bad effects when eaten in large quantities.

GENISTA—GREENWEED.

GENERIC CHARACTERS.—Calyx two parted, the upper two and lower three, toothed ; stamens ten, monadelphous scarcely enveloped by the keel ; pods generally many-seeded.

I. GENISTA PILOSA—HAIRY GREENWEED.

This is a small, slender branched yellow flowering shrub, having its pods, leaves, and young shoots, all over downy. Native of some parts of England, and found abundantly in the pastures in some parts of France, where its cultivation has been much recommended, from its being well adapted for growing on light sandy soils, and much sought after by sheep.

II. GENISTA TINCTORIA—DYER'S GREENWEED.

This species bears some resemblance to the last in its habit of growth, but differs materially in the smoothness of its young shoots and foliage.

Grows naturally in some parts of Scotland, and abundantly in England ; it has also been recommended for sowing in sheep pastures, but with less propriety than the former. Its principal use is its affording a fine yellow dye.

III. CRUCIFEROUS AND OTHER HERBAGE AND FORAGE PLANTS, not included in the two foregoing divisions.

I. PLANTS belonging to the class *Tetradynamia* of Linnæus and to the natural order *Cruciferae* of Jussieu.

BRASSICA—CABBAGE.

GENERIC CHARACTERS.—Petals four, equal, and placed opposite each other at right angles, or cruciate (as in all the genera belonging to this natural order, and from which its name *Cruciferae*) is derived. Cotyledons two, folded together, enwrapping the radicle or embryo roots ; silique or pod nearly cylindrical, with valves opening lengthwise, and having a linear dissepiment or internal partition ; seeds globular ; style small, short and blunt ; calyx closed, or pressing upon the base of the petals.

I. BRASSICA OLERACEA—COMMON OR WILD CABBAGE.

SPECIFIC CHARACTERS.—Root hardish and fusiform ; leaves always smooth, of a glaucous colour, somewhat thick or fleshy ; waved, irregularly lobed, and generally somewhat lyrate-shaped ; pods not beaked ; flowers in May and June ; biennial. Native of Britain, but confined chiefly to cliffs on the sea coast of England.

When in flower, the *B. oleracea* bears a considerable resemblance to the common corn-mustard or charlock (*Sinapis arvensis*), except in the colour and smoothness of its foliage. As an agricultural plant it is entirely undeserving of attention, were it not from the circumstance of its being generally considered as the origin from which all our cultivated varieties of the cabbage tribe are derived, notwithstanding the remarkable diversity in their appearance. From this circumstance the *B. oleracea* and its cultivated varieties are often alluded to as being a remarkable proof of the advantages resulting from a careful cultivation, improvement, and selection of the most deserving varieties of any of our cultivated economical plants. Nor can a more suitable example be adduced than to compare this insignificant weed-like plant of the sea-coast with the gigantic growth of the Tree or Cow Cabbage, the large close head of Drumhead Cabbage, or with different forms or habits of growth apparent in the

Brussels Sprouts, Red Cabbage, Cauliflower, Kohl Rabi, and numerous other varieties; to attempt any thing like a description of the whole of which is in the present instance thought to be quite unnecessary, particularly as the greater number belong more properly to what are generally termed Horticultural Plants. The following therefore are such as either are, or may be most advantageously cultivated, as food for live-stock, particularly cattle and pigs.

1. **TREE OR COW-CABBAGE, &c.**—Habit of growth, strong and upright, with numerous branches, and rather small and thin, smooth, vivid green coloured leaves, stalks and branches very hard or woody, except towards the point, roots large and spreading, average height about five feet; but in very deep rich soil, the plants will often attain double that height before beginning to shoot or run to seed. In Jersey, and some of the northern departments of France, where this variety is chiefly cultivated, the longest of the stalks are used for supporting kidney beans, pease, &c., and also as cross-spars for the purpose of supporting the thatch or roof of the smaller class of farm-buildings, cottages, &c., and when kept dry, are said to last upwards of half a century. (For farther information, see Loudon's Gardener's Magazine, and Encyclopedia of Agriculture). This variety is also known by the following names: Chou Cavalier, Chou à Vaches, Branching Cabbage, JERSEY KALE, &c. The produce of seeds of this last variety, however, which were procured from France, seems to be slightly different from the true Cow-Cabbage, and to occupy an intermediate space between it and the 1000-headed cabbage. Another variety received from the same quarter (and said to be only of recent introduction), under the name of Chou Laponic, Lapland Cabbage, seems to differ very slightly from the Cow Cabbage, and may be considered as only a very slightly improved variety.

In Museum, specimen of a stalk of Cow-Cabbage $11\frac{1}{2}$ feet in height, by the Very Reverend Principal Baird.

2. **THOUSAND-HEADED CABBAGE.**—This is also a branching sort, bearing a considerable resemblance to the Cow Cabbage, but of a more close or compact habit of growth, with rather darker green and more rough or wrinkled leaves.

3. **COMMON PLAIN-LEAVED OR SCOTCH KALE.**—Habit of growth

upright, unbranched, leaves very large, thickish, and very close set ; plain and light red or purplish coloured, average height above two feet. This variety was formerly very extensively cultivated by the cottagers in various parts of Scotland, but has of late become rather scarce, arising, no doubt, from inattention in growing the seed, allowing it to become mixed or hybridized by being raised too near that of German greens, and other varieties of the same species. When genuine, this is an excellent sort, considered either as a pot vegetable or for growing as food for milch cows, and other cattle, pigs, &c.

4, 5. GREEN, AND RED OR PURPLE TALL GERMAN GREENS.—Average height about four feet ; stems unbranched ; leaves numerous, of medium size, and very much curled, which is the distinguishing characteristic of what may be denominated the tribe to which the term German Greens is applied. The epithet Tall is applied to the two varieties here mentioned from their habit of growth, compared with most of the other sorts, which are much dwarfer, and although considered finer in quality, are far deficient in quantity of produce to either of the tall sorts.

6. SCOTCH DRUMHEAD OR LATE CABBAGE.—This, and all the other varieties to which, in this country at least, the term Cabbage is generally understood to apply, are distinguished by their plain smoothish leaves, and, before running to seed, by the terminating leaves being collected or bundled together, so as to form a solid-like hard or compact globular or conical-shaped head. The Drumhead or Late Cabbage is too well known to require any description. The same remark may be also applied to the Scotch Grey, and Large York and Sugar-loaf Cabbages, which four (and the two first in particular) are generally reckoned the best adapted for extensive field culture of all the numerous tribe generally designated Cabbages.

From the garden of Thomas Williamson Ramsay, Esq. Lixmount, two specimens of Drumhead Cabbage, weighing $18\frac{1}{2}$ and 23 lb., grown in rich lightish garden soil.

7. LARGE SAVOY, CAPE, OR DRUMHEAD SAVOY.—The Savoy's resemble the Cabbages in the solid-like globular form of their heads, but differ in their leaves being very rugose (rough or coarsely wrinkled). The variety here mentioned is considered as one of the hardiest, as well as the most productive of leaves, and may therefore be reckoned

as one of the best for field culture, and its merits may be stated as rather superior to the early York or Sugar-loaf Cabbages, with this addition, that the Large Savoy is considerably hardier, and better adapted for use in winter than either.

8. KOHL-RABI, LARGE RED AND GREEN FIELD SORTS.—Kohl-Rabi differs most essentially from all the other varieties of *B. oleracea*, in having its stems towards their upper extremity swollen out into a large globular pulpy mass, in consistence and texture somewhat resembling a Swedish turnip, from and near the summit of which the leaves, which are smooth, of various shapes and shades of colour, proceed. The varieties of Kohl-Rabi are numerous, but those of most importance for field culture are the Large Red and Green sorts; these are grown to a considerable extent on some parts of the Continent, particularly in the Low Countries and the North of France, for feeding cattle, and especially milch cows, a purpose for which they seem admirably adapted, as, from their having a taste similar to the leaves of others of the species, they are found not to impart any of that peculiar disagreeable taste to the milk which it acquires when the cows are fed on turnips.

Specimens of the above two sorts by Mr Robert Fowls, Fordel, Fifeshire, grown on medium black soil, about eight inches in depth, incumbent on whinstone, and which was well manured with farm-yard dung; the plants were placed at the distance of fifteen inches apart from each other; average weight of two bulbs of the purple sort, 7 lb. 7 oz., ditto of the green sort, 6 lb. 5 oz.; and by Mr Spindler, 24. Greenside, Edinburgh, two bulbs of transparent green Kohl-Rabi, weighing $5\frac{1}{4}$ and $5\frac{1}{2}$ lb.

Also, by Mr James Barnet, Superintendent of the Experimental Garden, Inverleith Row, Edinburgh, a very interesting collection of the cultivated varieties and subvarieties of *B. oleracea*, many of which are recently introduced from the Continent, and when more generally known, there seems every probability that some of them will be found valuable acquisitions to that class of hardy esculent vegetables.

Besides the varieties above enumerated, many others have been recommended by speculative agriculturists as being eminently suitable for field culture, such as Brussels Sprouts, Broccoli, and even Cauliflower; but although, when grown to any considerable extent for the market, the waste leaves, &c. of these and others, may be

beneficially used as cattle's food, yet, for growing for that purpose alone, in their relative values, compared with most of those mentioned above, they will be found deficient. One variety, however, viz. *Perennial Woburn Kale*, is said to possess merits which entitle it to particular attention ; farther experiments are, however, required to ascertain its fitness for Scotland.

Much has been said and written recommendatory of the Cabbage tribe being more extensively subjected to field culture in this country, for feeding cattle, sheep, swine, and even poultry ; but, judging from any trials which have been made, as well as from the natural habits of the whole tribe, their culture seems only likely to be attended with any chance of decided advantage on the most superior class of soils, particularly on such as are of rather strong texture, and where an abundant supply of manure can be had ; and even in many such cases it is questionable how far they ought to be preferred to turnips, over which, however, they possess the advantage, as has been already hinted at, of improving rather than deteriorating the quality of the milk of cows fed upon them, and also of growing freely on lands which are too stiff in texture for the growth of any sort of turnips.

In field culture the Cabbage tribe may be planted in March, or in May and June, the plants in the former case being the produce of seeds sown in the previous autumn, and in the latter case they may be from seeds sown in February or March immediately preceding. The young plants should be dibbled in on the top of drills prepared in the same manner as is usually done for turnips, with the addition of a slight rolling, to level or smooth down the tops ; the drills may be made at the distance of two feet, and the plants placed at the distance of fifteen or eighteen inches in the row, increasing or diminishing the width and distance, according to the size and habit of growth of the variety (at the distance of two by one and a half feet, 14,500 to 15,000 plants will be required for an imperial acre). The after culture of hoeing and weeding is the same as is required in other drilled green crops. The Cow Cabbage, Kale, and other open-headed varieties, will yield a regular supply of leaves from the time when the plants are from one to two feet in height, which are obtained by stripping off the under tiers successively, until the entire crop be taken ; but in the case of the other Cabbages, stripping off the leaves, if at all attempted, should be done with more caution, otherwise the swelling and firming of the heads will be materially checked. These

last should be all off the ground before the winter sets in with severity, otherwise the outer leaves are apt to become injured, in which case they, as well as decayed leaves at any period, should never be given to milch cows, as they impart a disagreeable taste to their produce. The open-headed sorts, however, may be allowed to remain on the ground with less danger of being injured, until they shew symptoms of running to seed, after which period they, together with all the Brassicæ, become very exhausting to the soil, a disadvantage which, in rather a considerable degree, is said, and seemingly not without good cause, to attend the Cow Cabbage, and some of the other large varieties, at all periods of their growth.

II. BRASSICA CAMPESTRIS—SUMMER RAPE, WILD NAVEW COLSAT OR COLZA.

SPECIFIC CHARACTERS—Root tapering, hard, and woody; root-leaves lyrate and roughish when young; those on the stem clasping or subcordate, oblong, and subpinnatifid; all somewhat fleshy, and of a dark green colour, with a glaucous bloom; seeds larger, similar to those of the Swedish turnip; biennial. A somewhat doubtful native, found abundantly in some districts of England, but chiefly on and near the borders of fields, hence supposed to be the offspring of cultivation.

This species is sometimes termed *Brassica campestris olifer*, from its being reckoned the best sort of rape for cultivating for oil, and also to distinguish it from the *B. campestris rutabaga*, or Swedish turnip, which is only a variety of this species. The name of Summer Rape it acquires from its arriving earlier at maturity than the next sort, as also from being generally supposed less capable of withstanding severe winters; being therefore better adapted for a summer or autumn, than for a spring crop.

III. BRASSICA NAPUS—COMMON OR WINTER RAPE, COLE-SEED, &c.

SPECIFIC CHARACTERS.—Root tapering, hard, and woody; leaves all smooth, glaucous, thickish, or fleshy; those of the root lyrate, and those of the stem clasping or cordate, notched, and pinnatifid; biennial. Found in similar situations with the last species, from which it is easily distinguished when young, by having smooth leaves, while those of the other are roughish. Its seeds are also generally larger than those of the *B. campestris*; but this is not to be depended upon as a distinguishing characteristic, as the size of seeds in this

as in most other plants are liable to be materially altered from the soil on which they are grown, or previous culture of the seed stock.

A very superior variety of this species, under the name of *Brassica napus major*, is much cultivated in Alsace, and is highly deserving of attention on account of the largeness of its leaves.

IV. BRASSICA PRÆCOX—EARLY RAPE, SMOOTH-LEAVED SUMMER OR ANNUAL RAPE of the Germans.

Also termed *Kohl-reps*.

SPECIFIC CHARACTERS.—This species differs from the preceding in being only of annual duration, consequently running to seed much sooner, and in being less hardy, or when sown in the end of the season. Its lower stem-leaves are also more lyrate, and its seed-pods more erect; native of the Continent. Said to have been first introduced into this country about the year 1812.

Seeds of this and the next species by Messrs J. G. Booth and Co. Hamburg.

V. BRASSICA RAPA—ROUGH-LEAVED SUMMER ANNUAL, OR TURNIP RAPE.

SPECIFIC CHARACTERS.—Roots small, hard, and fusiform; root-leaves lyrate, vivid green, and without the least appearance of that glaucous bloom for which the foregoing sorts are so distinguished; stalk-leaves slightly glaucous, smooth, or nearly so, lower ones generally lobed or cut, upper almost entire. Annual when sown in the earlier part of the season. Seeds small, and similar to those of the Common Turnip, of which it seems to be either a variety or the origin from which the latter has been derived.

Although the rapes be generally included amongst oil plants, yet their importance in some parts of Britain, as plants sown entirely for the feeding of domestic animals, entitles most of the sorts to a place amongst forage and herbage plants; one or two, however, which are hitherto less known, and which are supposed to be particularly distinguished for the oleiferous properties which they possess, will be noticed in the division denominated “Plants cultivated for their Oils,” *which see*. The place which rape should occupy in a regular rotation is the same as that allotted to turnips or potatoes; but it is likewise sown and found to answer very well (when the soil is of superior quality) as a first crop on newly reclaimed or broken up grass land, to be eaten off in the end of autumn and succeeding win-

ter by sheep. In some parts of England where the corn crops are removed from the field at an early period, they are often succeeded by a crop of rape which is either sown on the stubble and covered in by a slight harrowing, or after the ground has received one ploughing, which method is always preferred when it can be done with convenience, and provided the soil be not too soft in texture, and too wet for allowing the crop to be eaten off by sheep during the winter months. Although this method of sowing rape has often been tried in Scotland, it has never been found to succeed so well as in England, owing to the comparative lateness of the period at which the previous crop is removed from the ground. The only sorts, however, the growth of which has hitherto been attempted in both countries, are *B. campestris* and *B. napus*; and it is therefore not at all improbable that *B. præcox* or *B. rapa*, (sorts which, although they yield a smaller supply of produce, yet arrive much sooner at maturity), might be found to succeed corn crops with more advantage in this climate of Scotland, than the two first mentioned species, particularly than *B. napus*. In some districts rape is found a very beneficial crop for sowing in June or beginning of July, on land that has previously undergone a course of summer fallowing. The crop in this case may either be eaten off with sheep in the months of September and October, and the ground immediately ploughed for wheat; or cut with the scythe and ploughed down as manure.

When rape is sown for the purpose of being eaten off with sheep, both the broadcast and drill systems are adopted, but when intended to be cut for feeding cows or other cattle in the house, the drill system is often preferred. Rape will succeed well on all good turnip soils, and also on such as are rather too stiff in texture for the latter. When sown in drills, three to four pounds of seed to the acre will be sufficient; and when broadcast eight to ten will be necessary. The commonly cultivated sorts of rape succeed well by being transplanted; and although this method is sometimes followed on the stubbles in England, yet it is attended with too much labour to be a profitable system, farther than perhaps filling up any vacancies which may occur in the general crops.

Besides the green leaves of rape for feeding sheep and cattle, they as well as horses are found to eat the smaller dry twigs or branches of the plants with avidity after the ripe seed has been thrashed out, and the thicker portions of the stalks may be employed as litter. This

practice of disposing of the straw or offal yields a greater return of manure, and is therefore deservedly recommended as preferable to that of burning it, as is generally done by such as grow the seed for the oil manufactory.

BUNIAS—HILL MUSTARD.

GENERIC CHARACTERS.—Cotyledons incumbent, linear, spirally twisted ; silicle (small round pod) nut-like, not opening ; two to four celled.

BUNIAS ORIENTALIS—ORIENTAL BUNIAS OR HILL MUSTARD.

SPECIFIC CHARACTERS.—Habit of growth upright, producing numerous branches, with yellow flowers ; root, leaves, linear, dark green and roughish, those of the stems few and small ; pods ovate, two-celled, somewhat warted ; roots spreading, whitish, thick, and fleshy. Height about four feet. Perennial ; native of the Levant, from which it was introduced to Britain about the year 1731.

The field culture of *Bunias orientalis* has been greatly recommended by several French agriculturists, but although it is perfectly well suited to the climate of this country, it does not seem possessed of merits sufficient to entitle it to much attention ; the principal objections to it are the small quantity of leaves which it yields, particularly on the flower stalk, which are very hard, and the tardiness of its growth after being cut. It seems to thrive best in a rich, dry, and rather light soil.

Amongst other herbage and forage plants of minor importance, belonging to this division, might be mentioned *ISATIS TINCTORIA*, *Dyers' woad*, which, however, belongs more properly to that class of plants cultivated for their dye or colouring matter, (*which see*) ; also *CRANBE MARITIMUM*—*Sea-Cale* ; *HESPERIS MATRONALIS*, *Common Rocket* or *Dame's Violet*, several of the *Mustard* family, &c., which, although eaten by cattle, are either too limited in their bulk of produce, or require too nice or careful cultivation to render them worthy of attention, except when grown for other additional purposes.

II. PLANTS belonging to the class *Syngenesia* of Linnæus, and to the natural order *Compositæ* of Jussieu.

CICHORIUM—CHICCORY OR SUCCORY.

GENERIC CHARACTERS.—Flowers of the disk and ray all hermaphrodite; involucre surrounded with scales or smaller leaflets; receptacle naked or almost so, pappus (crown of the fruit or seed) sessile, scaly, shorter than the pericarp or seedvessel.

I. CICHORIUM INTYBUS—COMMON OR WILD CHICCORY.

SPECIFIC CHARACTERS.—Flowers blue, in pairs, each having very short, or almost no footstalks, numerous, and placed upon very long branching stems; leaves of various shapes and shades of colour, but generally more or less hairy and runcinate (having their lobes hooked back); roots rather thick and fleshy; height, when in full flower, from four to eight feet, and often more; perennial; grows naturally in and about the edges of fields.

Although the cultivation of Common Chicory has been a good deal recommended as food for live-stock, particularly cattle and swine, yet it seems not to have hitherto been followed to that extent to which its superior merits entitle it. It thrives best on rich soils, and such as are rather light and well drained. It may be sown alone, either in drills or broadcast, and mixed in small quantities, amongst grass, clover, and other seeds for pasture lands. When the drill system is adopted, which in most cases is to be preferred, the rows may be at from fifteen to twenty inches distant, to admit of hand and horse hoeing, and the plants should stand at least six inches distant in the rows; the sowing may be deferred till the month of May, as, if this be done at an early period of the season, the plants are apt to commence running to seed in the autumn months, whereby they will be materially weakened, and the first crop of the succeeding season considerably lessened. The operation of thinning should be attended to when the plants are very young, and they should be pulled with the hand, in soft weather, in preference to cutting them with a hoe, as the roots are very tenacious of life, and will push out new buds although cut a good deal below the surface. One considerable crop of root-leaves may be obtained in the end of autumn the first season, and three, four, or even more, may be obtained under very favourable circumstances during each of the four or five

seasons following, particularly if the first cutting be completed about the time of the plants first shewing their flowers, when the average height will be from three to five feet ; and in any case, the cutting should not be deferred until the plants arrive at a more advanced state, as the stalks then become hard and the future vigour of the plants impaired. The broadcast system should only be attempted where the soil is previously in a high state of fertility and completely free from root and annual weeds. The period of duration from the time of sowing will be from four to six years, if cut regularly before arriving at full flower, after which they may be ploughed up and the ground fallowed to get clear of the roots ; if, however, the seed be allowed to ripen, the plants will lose much of their vigour even after the first crop. When drilled, 4 lb. or 5 lb. will be a sufficient quantity of seed per acre, but 10 lb. or 12 lb. will be necessary for sowing broadcast.

There are numerous varieties of Chicory, none of which seem possessed of much permanency in their characters when raised from seed, at least so far as accords with present experience ; the most distinct, however, is one with long thick roots, distinguished in France by the name of *Chicoree à café*, which is there grown for its roots as a substitute for coffee.

Seeds of the Coffee Chicory by M. Vilmorin and Co. Paris, and specimens of the common sort, when coming in flower, height six feet ; and one in ripe seed, height nine feet, by Mr A. Gorrie, Annat Gardens.

II. CICHORIUM ENDIVIUM—COMMON ENDIVE.

SPECIFIC CHARACTERS.—Peduncles or footstalks of the flowers twin, one short, with three or four flowers, and one long, generally only one-flowered ; flowers capitate ; annual ; height two to three feet. Said to be a native of the East Indies ; introduced about the year 1548. The flowers of the Endive are similar to those of the Common Chicory, from which it is, however, easily distinguished, not only by its annual nature and other characteristics given above, but also by its having much more slender branches or stalks, on which are comparatively few and small stalk leaves.

There are numerous varieties of Endive cultivated as a salad plant in gardens, distinguished by the names of plain-leaved, curled-leaved, green broad-leaved, &c. Although eaten by cattle, and with the same apparent relish as Common Chicory, yet none of these varieties

yield a sufficient quantity of leaves to entitle them to extensive culture. As most of them, however, stand the weather in the earlier winter months better than Lettuce, a small quantity might be found of advantage by the cottager to plant after early potatoes have been dug, for affording fattening and wholesome food for pigs; for this purpose the green curled and broad-leaved plain varieties are best adapted.

LACTUCA—LETTUCE.

GENERIC CHARACTERS.—Flowers of the disk and ray all hermaphrodite; involucre imbricated, cylindrical; its scales with a membranous margin; receptacle naked; pappus simple, having a short stalk.

LACTUCA SATIVA—CULTIVATED LETTUCE.

Under *Lactuca sativa* is generally understood to be included all the cultivated lettuces, but they are also by some botanists described under various specific names, as *L. sativa*, *L. palmata*, *L. crispa*, &c. Some of the varieties have been cultivated, both in this country and on the Continent, for feeding pigs. The chief advantages to be derived from the growth of lettuce are its arriving early at maturity, thereby affording a considerable bulk of food (if grown on fallow land), which may be removed, when sown early in the season, in time to admit of the soil being farther wrought, if necessary, before the usual period for sowing winter wheat. Another advantage is, that it rather serves to enrich than exhaust the soil. When a regular and large supply of lettuce is required, from about midsummer till the end of autumn, it will require to be sown at intervals of three weeks or a month from the end of March to the end of June. The usual practice in field culture is to sow the seeds in drills about fourteen inches apart, and to thin the young plants out with the hand to the distance of eight or ten inches in the rows; they may also be sown in beds and transplanted by dibbling, which latter practice is generally preferred when grown on a small scale, as by cottagers who keep only one or two pigs. When drilled as above, 4 lb. or 5 lb. of seed will be sufficient for an acre; and the most esteemed varieties for that purpose are the White and Green Cos, and Large Cabbage Lettuces. The soil should be rather rich, and well pulverised before sowing.

ACHILLEA—MILFOIL.

GENERIC CHARACTERS.—Florets of the disk hermaphrodite, of the ray female; involucre ovate; imbricated unequal; receptacle plain, chaffy; florets of the ray five to ten, roundish, obcordate; pericarps naked.

ACHILLEA MILLEFOLIUM—COMMON MILFOIL OR YARROW.

SPECIFIC CHARACTERS.—Leaves bipinnate, slightly hairy, their segments linear, toothed, acute; flower-stalks furrowed; root stems, which creep on the ground, striking root in the soil during damp weather; flowers generally white, but occasionally pink and sometimes even deep red; perennial; grows naturally in dry pastures on light soils.

The Yarrow is reckoned a grateful food for sheep when mixed with the common pasture grasses, and is therefore generally sown along with such other seeds as are reckoned best adapted for permanent sheep pasture, on such soils as it is found naturally to thrive; the quantity of seed should never exceed $1\frac{1}{2}$ lb. or 2 lb. per acre.

Specimen of a variety with bright red flowers by Dr Knapp, 9. Duncan Street, found by him near Queensferry, and which is preserved on paper in a very superior manner, and so as to retain the true colours of the flowers and foliage in their original perfection.

Another species of the genus *Achillea*, viz. *A. moschata*, or *Musk Milfoil*, a native of the south of Europe, is said to be a grateful food for cattle, and on that account cultivated in Switzerland. Farther experience is, however, required concerning it, to ascertain whether or not it is deserving of recommendation as such in this country; the same may be said of several other plants of the family *Compositæ*, which have also been recommended for similar purposes, viz. several species of the genus *Hieracium*, *Rudbeckia laciniata*, &c. Many, also, of our common weeds, belonging to the same order, are eaten with avidity by cattle, sheep, and swine, but none of them seem deserving of cultivation for that purpose; although as weeds, when necessarily allowed a temporary growth, gathering them as cattle's food may be the most economical mode of getting them eradicated. Of these may be mentioned, *Leontodon Taraxacum*, Dandelion; *Sonchus oleraceus*, Common Annual Sow-thistle; *S. arvensis*, Perennial Corn do.; *Apargia autumnalis*, Autumnal Dandelion; *Lap-*

sana communis, Common Nipplewort; and *Cnicus arvensis*, Common Corn or Horse Thistle.

III. PLANTS belonging to the class and order *Monœcia Polyandria* of Linnæus, and to the natural order *Rosaceæ* of Jussieu.

POTERIUM—BURNET.

GENERIC CHARACTERS.—Male and female organs in distinct flowers, but on the same plant; calyx of four leaves; corolla four-parted; stamens in the male or barren flower, about thirty to forty; female or fertile flower having two germens; fruit two-celled, invested with the calyx.

POTERIUM SANGUISORBA—COMMON BURNET.

SPECIFIC CHARACTERS.—Leaves compound; leaflets serrated or toothed; stems somewhat angular, branching; stamens much longer than the calyx; perennial; height two or three feet; grows naturally on chalky pastures in England.

The burnet was formerly sown either along with, or as a substitute for clover amongst grass seeds for hay or pasture, to a very great extent in some of the chalky districts of England; but late writers concur in stating that its cultivation is now rather on the decline, although still grown to a considerable extent. It was never grown much in Scotland, nor does it seem deserving of more general encouragement, except, perhaps, in small quantities, as a mixture on light sandy or calcareous soils.

IV. PLANTS belonging to the class and order *Pentandria Monogynia* of Linnæus, and natural order *Boraginææ* of Jussieu.

SYMPHYTUM—COMFREY.

GENERIC CHARACTERS.—Flowers monopetalous, inferior; cylindrical or subcampanulate, with a short tube and a tubular inflated limb; orifice with five subulate rays converging into a cone; stigma simple; seeds two or more, naked, gibbous, not pierced at the base.

SYMPHYTUM ASPERRIMUM—ROUGH OR PRICKLY COMFREY.

SPECIFIC CHARACTERS.—Leaves very rough stalked, heart-shaped,

broad and tapering to a point, of a bluish-green colour; stem thickly set with reversed prickles; limb of the flower campanulate; colour of the flower red or blue (changeable); height six to ten feet; perennial; roots branching, thick and fleshy. Native of Siberia. Introduced in 1799.

As an agricultural plant, "the Prickly Comfrey was first brought into notice by D. Grant, a nurseryman at Lewisham, and tried by a number of cultivators. Cattle of every kind are said to be fond of it; and Mr Grant thinks an acre might be made to produce thirty tons of green fodder in one year. The plant is of easy propagation by seeds or roots; it is also of great durability, and if once established would probably continue to produce crops for many years; and in that point of view it would seem to be a valuable plant for the cottager who keeps a cow."—*Loudon's Gardener's Magazine*, 1830.

Farther experience tends to prove that cattle become fond of this plant, if not permitted to grow until the leaves and stalks get too hard, although they may refuse it at first. Its great quantity of produce, as stated above, does not seem overrated; and with regard to its duration, what has been there anticipated is correct. The best mode of propagating it seems to be by dividing the roots, and planting them in a good deep soil, in rows two feet apart and at least fifteen inches between the plants. Seeds seldom ripen in quantity, and seedling plants are long in arriving at maturity.

Others of the genus *Symphytum*, and particularly of the natural family *Boraginæ*, might be equally relished by cattle, but few or none of them can be compared to the above for bulk of produce.

V. PLANTS belonging to the class and order *Hexandria Monogynia* of Linnæus, and to the natural order *Hemerocallideæ* of Jussieu.

HEMEROCALLIS—DAY-LILY.

GENERIC CHARACTERS.—Seeds producing only one seed-leaf; perianth (apparently corolla, but properly the calyx) inferior, coloured, bell-shaped, with a subcylindrical tube; stamens delicate; stigma small, simple, and villous.

HEMEROCALLIS FULVA—COPPER-COLOURED DAY-LILY.

SPECIFIC CHARACTERS.—Leaves light green, keeled, long and pointed; apparent petals copper-coloured, three inner obtuse, wavy; nerves of the outer branched; root fibrous; perennial; height three to four feet. Native of the Levant; introduced into Britain about the year 1596.

This plant was first introduced to the notice of agriculturists in the Gardener's Magazine, vol. v., by the late Mr J. Ellis, an eminent English gardener and very worthy man. Cattle are extremely fond of the foliage, which is produced in abundance at a very early period of the season; the principal hinderance to its extensive cultivation is its shyness in producing seed, from which circumstance it can only be propagated by dividing and transplanting the roots. Another species, *H. flava*, Yellow Day-lily, has also been recommended; it is considerably inferior to the other in produce, but of a more creeping habit of growth, and may therefore be propagated with greater facility.

VI. PLANTS belonging to the class and order *Pentandria Digynia* of Linnaeus, and to the natural order *Umbelliferae* of Jussieu.

APIUM—PARSLEY.

GENERIC CHARACTERS.—Seeds in pairs, unarmed, without wings, roundish or ovate, with acute ribs; flowers in umbels, five-petaled, superior; petals roundish, with an inflexed point, nearly equal; styles much swollen at the base.

APIUM PETROSELINUM—COMMON PARSLEY.

SPECIFIC CHARACTERS.—Root leaves compound, terminal leaflets largest, and together with the rest plain, irregularly toothed, serrated, or curled (changing in different varieties); stem-leaves generally linear, with minute sheaths; stems much branched, height three to four feet; colour of the flowers light yellow; roots fusiform, biennial. Native of Sardinia, from whence it is said to have been first introduced to Britain in the year 1548.

Parsley is eaten by most of our herbivorous domestic animals, particularly sheep; and from being believed to act as a preventive of the liver-rot in that animal, it has been recommended for sowing in their pastures. Although its biennial duration does not suit well for

this purpose, it may enter into such mixtures in small quantities, when the soil is of a light and medium description ; and if the pasture is not kept very bare, it will be found to ripen, and scatter a sufficient quantity of seed to perpetuate its existence. Of the numerous varieties cultivated, that generally employed for the above purpose is the Common Plain-leaved.

Others of the same natural family have been recommended, and seem deserving of attention as cattle's food, particularly a species of *Heracleum*, Cow-parsnip, from Siberia, which yields an extraordinary bulk of root-leaves, of which cows are remarkably fond. As yet, however, little more can be said regarding this plant, which was presented by Mr James Smith, nursery and seedsman, Ayr ; who also exhibited it at the Highland and Agricultural Society's Show at that place in 1835.

VII. PLANTS belonging to the class and order *Tetrandria Monogynia* of Linnæus, and to the natural order *Plantagineæ* of Jussieu.

PLANTAGO—PLANTAIN.

GENERIC CHARACTERS.—Flowers monopetalous, inferior, four-parted, with a reflexed limb, in an ovate or oblong spike or head ; calyx also four-cleft ; stamens very long, seed vessels two-celled, two or many seeded.

PLANTAGO LANCEOLATA—Rib-GRASS.

SPECIFIC CHARACTERS.—Leaves lanceolate, tapering towards both ends, spreading, prostrated or lying on the ground ; spikes or heads dark coloured, short, and ovate ; stems without leaves, angular, and rising to the height of twelve or eighteen inches ; cells two-seeded ; perennial. Grows naturally on dry pastures.

The Rib-grass produces its foliage at an early period of the season when it is eaten by cattle, sheep, and horses, on which account its mixture with grasses on dry pastures has been much recommended, and practised ; however, it seems deservedly getting into less repute, from its close spreading leaves occupying too great a surface, to the partial exclusion of the more profitable grasses, clovers, &c., and also from live-stock in general seeming rather to manifest a dislike to its stalks and leaves, as the season becomes more advanced.

VIII. PLANTS belonging to the class and order *Decandria Pentagynia* of Linnæus, and to the natural order *Caryophyllæ* of Jussieu.

SPERGULA—SPURREY.

GENERIC CHARACTERS.—Segments of the calyx five ; petals five, entire ; seed-vessel ovate, five-valved, one-celled, many-seeded.

SPERGULA ARVENSIS—COMMON SPURREY OR YARR.

SPECIFIC CHARACTERS.—Leaves subulate, in whorls ; flowers white ; footstalks becoming reflexed towards the period of seed ripening ; seeds somewhat kidney-shaped, angular, rough, and of a black colour ; annual ; height six inches to a foot. Grows naturally in corn fields, on very light dry soils.

Spurrey is much grown in Germany, as winter pasture for sheep and cattle ; it is sown on the stubble after the corn crops are removed. Mutton, as also the milk and butter of cows, fed on it, are said to be of very superior quality. There is also a very distinct variety, termed *SPERGULA ARVENSIS RAMOSUS*, *Branching Spurrey*. Cultivated in the same country, which is rather earlier than the common sort, and in bulk of produce compared with it, may be reckoned as three to two. It does not appear, however, that either of these deserve much attention from the British agriculturist, and in inferior light soils there is generally a sufficient quantity of the common sort naturally, if the tilth is too fine.

IX. PLANTS belonging to the class and order *Icosandria Pentagynia* of Linnæus, and to the natural order *Rosaceæ* of Jussieu.

SPIRÆA—MEADOW-SWEET.

GENERIC CHARACTERS.—Petals five, inferior (under the seed-vessel), calyx five-cleft, spreading ; seed-vessel opening inwards, one-celled, two-valved, one to three seeded.

SPIRÆA ULMARIA—COMMON MEADOW-SWEET, OR QUEEN OF THE MEADOW.

SPECIFIC CHARACTERS.—Leaves compound, roughish, downy beneath, terminal leaflet largest, and divided into three lobes, side ones undivided ; flowers white, leaves mostly produced from the root ; height two to three feet ; perennial. Grows naturally in damp situa-

tions, by the sides of ditches, rivers, &c. and may be always considered as indicative of a superior damp soil.

The culture of this plant has been recommended by several agricultural writers (chiefly French), but it is very apt to be injured by mildew, and cattle do not seem particularly fond of it; and, at any rate, such soils as it will thrive on may be occupied by several other plants with much greater profit to the cultivator.

X. PLANTS belonging to the class and order *Monoccia Monadelphia* of Linnæus, and to the natural order *Cucurbitaceæ* of Jussieu.

CUCURBITA—GOURD.

GENERIC CHARACTERS.—Stamens three, united towards the base of the filaments; calyx and corolla in both the male and female flowers five-parted; seeds of the fruit with a tumid edge.

CUCURBITA PEPO—PUMPKIN.

SPECIFIC CHARACTERS.—Leaves rough, cordate, indistinctly five-lobed; flowers large, yellow, and campanulate; fruit roundish or oblong, smooth; stems trailing or spreading on the ground, to the length of ten, twenty, and, under favourable circumstances, have been known to extend as far as forty or fifty feet from the root; annual. Supposed to have been first introduced from the Levant in 1570.

The Pumpkin, as well as several others of the genus, is cultivated in some parts of America, and other warm countries, as food for cattle and pigs; they will eat the young leaves and fruit, but not with much apparent relish, except, perhaps, when for some time accustomed to them. The fruit, when in a state for using, should not be much more than half grown, when the average weight of each may be computed at from 10 lb. to 20 lb. But although the plants will grow and ripen fruit under favourable circumstances, they are scarcely considered worthy of the cattle-feeder's attention in this country.

Specimens of the fruit of others of the genus presented to the Museum, are included amongst horticultural productions (which see).

PRANGOS PABULARIA,

From the Himalaya Mountains, where it is said to form a valuable hay and forage plant, but concerning which little more is as yet known than the name.

Specimen of seeds by Messrs Vilmorin, Andrieux, & Co., who received them this year from Botanic Garden, Calcutta, 1835. These seeds were sown in August but did not vegetate.

ON THE KINDS AND QUANTITIES OF GRASS SEEDS FOR SOWING DOWN LAND.

In an article by "Mr Lawson" on this subject (in the *Quarterly Journal of Agriculture*, vol. iv.) Tables are given of the weights, and of the kinds and quantities, of Grass Seeds suited to alternate husbandry, permanent pasture, pleasure grounds, &c. per Scotch acre. The subject is of considerable importance; and although much remains yet to be done by a continuation of careful and minute trials and comparisons, yet since the publication of those Tables, the results of experiments have warranted some alterations on them, and which are now introduced in the following improved Tables, in which economy to the cultivator has been attended to; and they are accommodated to the imperial acre, now the legal standard of measure.

In preparing Grass Seeds for sowing in mixture, it has been found that a reference to weight is more correct in practice than to measure; and for the sake of comparison, the former Tables, with some additions, giving the average weight of a bushel of each kind of seed, are here inserted.

Weight of the Seeds of Grasses and other Plants, per imperial bushel.

Agrostis stolonifera, . . .	13 lb.	Festuca tenuifolia, . . .	13 lb.
vulgaris, . . .	12	pratensis, . . .	12½
Aira flexuosa, . . .	6½	rubra, . . .	10
Alopecurus geniculatus, . . .	6	sylvatica, . . .	10½
pratensis, . . .	5½	Glyceria fluitans, . . .	14½
Arrhenatherum arenaceum, . . .	7	Poa glauca, . . .	7½
Anthoxanthum odoratum, . . .	6	nemoralis, . . .	13¾
Avena flavescens, . . .	5	pratensis, . . .	13½
Briza media, . . .	10½	trivialis, . . .	15½
Cynosurus cristatus, . . .	26	Holcus lanatus, . . .	7
Dactylis glomerata, . . .	11½	Lolium perenne, the varieties	
Elymus arenarius, . . .	9½	vary from	18 to 30
Festuca duriuscula, . . .	9½	italicum, . . .	16½
elator, . . .	20	Phalaris arundinacea, . . .	48
heterophylla, . . .	12½	Phleum pratense, . . .	44
loliacea, . . .	15	Poa annua, . . .	14
ovina, . . .	13½	aquatica, . . .	13½

Clovers and other Plants.

Achillea Millefolium, . . .	28½ lb.	Trifolium pratense, . . .	62 lb.
Hedysarum Onobrychis, . . .	26	cow-grass, . . .	62
Lotus major, . . .	64	procumbens, . . .	64
Medicago lupulina, . . .	63¾	repens, . . .	65
Plantago lanceolata, . . .	51½	Vicia sepum, . . .	65
Poterium Sanguisorba, . . .	24½	cracca, . . .	66
Trifolium minus, . . .	64½	sylvatica, . . .	64

Climate, altitude, and particular circumstances influencing the locality, produce marked differences on the vegetation of countries. But the sphere within which plants are cultivated in a single country such as Britain, is comparatively limited ; and the pasture grasses have, it is conceived, a wider range of cultivation than the cereal grains. Where land is under the plough, therefore, and can produce the cereal grains and other cultivated plants, the natural grasses will grow with vigour. In elevated moors, and similar situations, indeed, the case is different, but the tables embrace such situations.

The herbage is influenced by the different kinds of soils, and especially with relation to their states of dryness or wetness. Soils have, therefore, as a convenient arrangement, and adapted to practical purposes, been classed under three divisions,—light, medium, and heavy. The light embrace soils more or less of a sandy and gravelly nature ; the heavy soils embrace clays and heavy loams, and the medium soils are to be regarded as an intermediate class between these two extremes ;—a light wet soil with respect to the grasses suited to it, approaching towards the heavy soils, and a dry heavy soil approaching towards the light soils.—*Mr Lawson on Grasses, Quarterly Journal of Agriculture*, vol. iv.

In sowing down grass lands *without a crop*, the benefit in hay or pasture is sooner acquired, without the soil being in any degree exhausted by a corn crop. In most cases, however, a greater quantity of seed is necessary, than where the young grass enjoys the protection and shelter afforded by a cereal crop. These advantages may in a great measure be gained in sowing down grass lands without a crop, and with a considerable saving of grass seeds, by sowing along with the mixture, a bushel of rye or of winter barley per acre, in autumn sowing, for shelter in winter ; and a bushel of barley per acre for protecting the young plants from the scorching drought of summer, when sown in spring ; observing that the barley or rye shall be eaten or cut down while in a green state,

QUANTITY OF GRASS SEED PER IMPERIAL ACRE.

I. *For Alternate Husbandry.*

	LIGHT AND MEDIUM SOIL.			HEAVY SOILS.		
	1 Year's Hay.	1 Year's Hay and 1 year's Pasture.	1 Year's Hay and 2 years' Pasture.	1 Year's Hay.	1 Year's Hay and 1 year's Pasture.	1 Year's Hay and 2 years' Pasture.
<i>Lolium perenne</i> . . .	18 lb.	18 lb.	18 lb.	18 lb.	18 lb.	18 lb.
<i>Phleum pratense</i> . . .	..	..	..	1	1	1
<i>Trifolium pratense</i> . . .	8	6	3	8	6	3
<i>perenne</i> . . .	..	..	3	..	..	3
<i>repens</i> . . .	2	4	4	2	4	4
<i>Medicago lupulina</i> . . .	..	2	2	..	2	2
	28	30	30	29	31	31

Although *Lolium italicum*, when sown in too great a proportion, from its strong habit of growth is apt to choke or weaken the clovers, yet by substituting 5 lb. of it for 8 lb. *Lolium perenne* in the above table, the produce will be materially improved.

In proportion to the tenacity and retentiveness of very heavy soils, *Phleum pratense* should be increased from $\frac{1}{2}$ lb. to $1\frac{1}{2}$ lb. additional, and in many cases, for one and two years' pasture, *Arrhenatherum avenaceum*, *Dactylis glomerata*, *Poa trivialis*, and some others, might be partly substituted for *Lolium perenne*, varying the kinds and quantities according to circumstances.

II.—1. *For Permanent Pasture.*

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
<i>Alopecurus pratensis</i> , . . .	1 lb.	$1\frac{1}{2}$ lb.	$1\frac{1}{2}$ lb.	2 lb.	2 lb.	2 lb.
<i>Avena flavescens</i> , . . .	$\frac{1}{2}$	$\frac{1}{2}$	..	..	..	..
<i>Dactylis glomerata</i> , . . .	4	5	4	5	4	5
<i>Festuca duriuscula</i> , . . .	2	2	2	2	1	1
<i>heterophylla</i>, . . .	..	..	1	1	1	1
<i>lohiacea</i>, . . .	..	..	..	..	1	2
<i>pratensis</i> , . . .	1	2	2	3	2	3
<i>rubra</i> , . . .	2	2	..	..	..	..
<i>Lolium perenne</i> , . . .	10	12	10	12	10	12
<i>Phleum pratense</i>, . . .	..	..	1	$1\frac{1}{2}$	2	3
<i>Poa pratensis</i> , . . .	1	1	..	..	..	..
<i>trivialis</i>, . . .	..	..	2	2	2	3
<i>Medicago lupulina</i> , . . .	1	1	1	1	1	1
<i>Trifolium pratense perenne</i> , . . .	3	4	3	4	3	4
<i>repens</i> , . . .	4	5	4	5	4	5
And Common Barley or Rye, about one bushel additional to such as are sown without a Crop.	$29\frac{1}{2}$	36	$31\frac{1}{2}$	$38\frac{1}{2}$	33	42

The foregoing table is drawn out with a view to the strictest economy as regards the original outlay ; yet by introducing 4 lb. *Lolium italicum* for 5 lb. *Lolium perenne*, the bulk of pasture will be increased, and the quality improved ; and where the value of the seeds of *Lolium italicum* does not exceed three or four times those of *Lolium perenne*, a more profitable return upon the whole will be yielded by its introduction.

The following table contains a greater proportion of the more rare and valuable sorts of seeds, although these will add considerably to the first expense, yet the improved produce will annually give a greater return ; and to the mixture in both tables may be introduced with advantage, on dry and elevated sheep pastures, 2 lb. to 4 lb. of *Festuca ovina* ; on dry light lands, $\frac{1}{2}$ lb. *Achillea Millefolium* ; on dry calcareous soils, 6 lb. to 10 lb. *Onobrychis sativus* ; in some cases 1 lb. to 2 lb. of *Cichorium Intybus* ; and 2 lb. *Apium Petroselinum* on lands where sheep are subject to liver-rot ; and in all cases when a crop of hay is intended to be taken the first year, 2 lb. *Lolium perenne*, 1 lb. *Lolium italicum*, and 2 lb. *Trifolium pratense* should be added.

II.—2. For Permanent Pasture.

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
<i>Aira cæspitosa lutescens</i>, . .	.. lb.	.. lb.	1 lb.	1 lb.	1 lb.	1 lb.
<i>Alopecurus pratensis</i> , . .	1	1 $\frac{1}{2}$	1 $\frac{1}{2}$	2	2	3
<i>Arrhenatherum avenaceum</i>, .	..	..	1	1 $\frac{1}{2}$	2	2
<i>Avena flavescens</i> ,	1	1 $\frac{1}{2}$	$\frac{1}{2}$	1	..	..
<i>Dactylis glomerata</i> , . . .	2	2	2	2	3	3
<i>Festuca duriuscula</i> , . . .	2	3	3	3	2	2
<i>heterophylla</i> ,	1	1	1	1	2	2
<i>elatior</i>, . . . .	..	..	..	..	2	2
<i>loliacea</i>, . . . .	..	..	1	1	2	3
<i>pratensis</i>, . . . .	..	..	2	2	2	2
<i>rubra</i> ,	2	3	..	..	..	..
<i>Lolium italicum</i> ,	3	3	3	3	3	3
<i>perenne</i> ,	5	5	5	5	5	5
<i>Phleum pratense</i>, . . . .	..	..	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$
<i>Poa nemoralis</i> ,	2	3	3	4	2	3
<i>pratensis</i> ,	1	1	..	..	..	..
<i>trivialis</i>, . . . .	..	..	1	1 $\frac{1}{2}$	2	2 $\frac{1}{2}$
<i>Medicago lupulina</i> , . . .	1	1	..	..	..	..
<i>Trifolium pratense perenne</i> ,	3	4	3	4	3	4
<i>repens</i> ,	4	5	4	5	4	5
Also barley, or rye, as in the last table.	28	34	33	38 $\frac{1}{2}$	39	45

III.—1. *For Permanent Pasture in Ornamental Parks.*

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
<i>Alopecurus pratensis</i> , . . .	1 lb.	1½	1½ lb.	1 lb.	2 lb.	3 lb.
<i>Anthoxanthum odoratum</i> , . . .	½	½	½	½	½	½
<i>Avena flavescens</i> , . . .	1	1½	..	..	..	..
<i>Dactylis glomerata</i> , . . .	2	2	2	2	3	3
<i>Festuca duriuscula</i> , . . .	2	3	3	3	3	3
<i>loliacea</i>, . . .	..	..	..	..	1	2
<i>pratensis</i> , . . .	2	2	3	3	2	2
<i>rubra</i> , . . .	2	3	1	2	..	..
<i>Lolium perenne</i> , . . .	10	10	10	10	10	10
<i>Phleum pratense</i>, . . .	..	..	1	1½	2	3
<i>Poa nemoralis</i> , . . .	1	2	1	3	1	2
<i>trivialis</i>, . . .	..	..	2	3	2	3
<i>Trifolium pratense perenne</i> , . . .	2	3	2	3	2	3
<i>repens</i> , . . .	4	5	4	5	4	5
With a bushel of Barley or Rye, when sown without a crop.	27½	33½	31	38	32½	39½

III.—2. *For Permanent Pasture in Ornamental Parks.*

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
<i>Aira caespitosa lutescens</i> , . . .	0 lb.	0 lb.	1½ lb.	2 lb.	½ lb.	2 lb.
<i>Alopecurus pratensis</i> , . . .	1	1½	1½	2	1	3
<i>Anthoxanthum odoratum</i> , . . .	½	½	½	½	2½	½
<i>Avena flavescens</i> , . . .	1	1½	½	1	..	..
<i>Festuca duriuscula</i> , . . .	3	4	3	3	3	3
<i>heterophylla</i> , . . .	1	1½	1½	2	2	2
<i>loliacea</i>, . . .	..	..	..	..	2	2
<i>pratensis</i> , . . .	2	2	2	2	2	3
<i>rubra</i> , . . .	4	4	1	1	..	..
<i>Lolium italicum</i> , . . .	3	3	3	3	3	3
<i>perenne</i> , . . .	5	5	5	5	5	5
<i>Phleum pratense</i>, . . .	..	..	1	1½	2	3
<i>Poa nemoralis</i> , . . .	3	3	4	4	3	3
<i>trivialis</i>, . . .	..	..	1	2	2	3
<i>Lotus corniculatus</i> , . . .	0½	0½	0¼	0¼	..	..
<i>major</i>, . . .	..	..	0¼	0¼	0½	0½
<i>Trifolium pratense perenne</i> , . . .	2	3	2	3	2	3
<i>repens</i> , . . .	4	5	4	5	4	5
Barley or rye, 1 bushel, as in Table III. 1.	30	34½	32	37½	34½	41

The remarks attached to Tables II. 1. and II. 2. are applicable to the two *for permanent pasture in ornamental parks*, with the exception of the *Cichorium Intybus* and *Onobrychis sativus*, the foliage of which are rather unsightly in such grounds.

IV.—*For Lawns, Bowling-greens, &c. kept constantly under the scythe.*

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a crop.	Without a crop.	With a crop.	Without a crop.	With a crop.	Without a crop.
<i>Avena flavescens</i> , . . .	1 lb.	1½ lb.	0½ lb.	1 lb.	.. lb.	.. lb.
<i>Cynosurus cristatus</i> , . .	6	6	6	6	6	6
<i>Festuca pratensis</i> , . . .	3	4	4	5	5	6
<i>tenuifolia</i> , . . .	2	3	2	3	2	3
<i>Lolium perenne</i> (fine leaved } var.), }	10	10	10	10	10	10
<i>Phleum pratense</i>, . . .	..	..	..	..	1	1½
<i>Poa nemoralis</i> ,	2	2½	3	3½	4	4
<i>Trifolium repens</i> , . . .	4	4	4	5	4	5
Add one bushel Barley or Rye, when sown without a crop.	28	31	29½	33½	32	35½

Where the ground is shaded by trees, the above Table will be materially improved by increasing the quantity of *Poa nemoralis* 2 lb. or 3 lb. additional, and on very light dry soils *Festuca tenuifolia* 2 lb. and *Avena flavescens* 1 lb.

In walks, bowling-greens, &c., which are wished to be kept as dry as possible (particularly in the end of the season), *Trifolium repens* should be sparingly if at all introduced; for although its presence may be desirable for facilitating the operations of mowing, yet its foliage is found to retain, or considerably to retard, the evaporation of dew and other moisture.

V. *For Grounds much Shaded with Trees.*

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a Crop.	Without a Crop.	With a Crop.	Without a Crop.	With a Crop.	Without a Crop.
<i>Agrostis vulgaris</i> , . . .	1 lb.	.. lb.	1 lb.	2 lb.	.. lb.	.. lb.
<i>Anthoxanthum odoratum</i> ,	1	1	1	1	1	1
<i>Dactylis glomerata</i> , . .	5	6	6	7	6	7
<i>Festuca elatior</i>, . . . .	..	..	..	..	2	3
<i>sylvatica</i>, . . . .	..	..	1	1½	1	2
<i>Lolium perenne</i> ,	8	8	8	8	8	8
<i>Poa nemoralis</i> ,	4	4	3	4	3	4
<i>trivialis</i> ,	2	3	3	4	3	4
<i>Trifolium repens</i> , . . .	3	3	3	3	3	3
Barley or Rye when sown without a crop, 1 bushel.	24	27	27	32	29	35

When the trees form too dense a shade to admit of corn crops under them, a greater proportion of *Poa nemoralis*, *Festuca sylvatica*, and *Festuca elatior*, may be introduced, and the total quantities will require to be increased from 6 to 10 lb. from the statements given in the previous table; and in any case may be added when convenient. *Lotus major*, *Vicia sepium*, *V. sylvatica*, and *V. Cracca*, regulating the kinds and quantities, according to soil and degree of shade.

VI. For Land in preparation for Irrigation.

	LIGHT SOILS.		MEDIUM SOILS.		HEAVY SOILS.	
	With a Crop.	Without a Crop.	With a Crop.	Without a Crop.	With a Crop.	Without a Crop.
<i>Agrostis stolonifera</i> , . . .	2 lb.	3 lb.	2 lb.	3 lb.	2 lb.	3 lb.
<i>Alopecurus pratensis</i> , . .	1	2	2	3	2	3
<i>Festuca loliacea</i> ,	3	4	4	5	4	5
<i>pratensis</i> ,	2	2	2	2	2	2
<i>Glyceria fluitans</i> ,	1	1½	2	3	3	3
<i>Lolium perenne</i> ,	10	10	10	10	10	10
<i>Poa trivialis</i> ,	2	3	2	3	3	4
<i>Phleum pratense</i> ,	1	1	1½	2	2	3
Barley or Rye 1 bush. when sown without a crop.	22	26½	25½	31	28	33

By introducing 3 lb. of *Lolium italicum* into the above mixture, 5 lb. of *L. perenne* will be sufficient.

VII. For Heathy and Moory Lands, which have been pared and burned, or otherwise improved, with a view to their producing better pasturage.

	With a crop.	Without a crop.	OR,	With a crop.	Without a crop.
Mixed hay seeds,	24lb.	30lb.		18lb.	21lb.
<i>Lolium italicum</i>, . . . .	..	..		3	4
<i>Trifolium repens</i> ,	5	6		5	6
Rye (when sown without a crop) one bushel.	29	36		26	31

These will rarely afford any thing more than a very cheap mixture of seeds, and the above are adapted for such lands. When lands of this description are of a damp nature, the following may be introduced as part of the hay seeds:—*Phleum pratense*, 1 to 3 lb., *Poa trivialis*, 2 to 3 lb., *Holcus lanatus* 1 to 2 lb., and *Agrostis stolonifera*,

1 to 2 lb. When they are of high altitude, as 500 feet and upwards above the level of the sea, and especially if the soil is dry, and intended to be depastured with sheep, the following may be introduced as being naturally adapted for mountain pastures :—*Festuca ovina*, 2 lb.; *F. duriuscula*, 2 lb.; *Aira flexuosa*, 1 lb.; *Poa glauca*, 1 lb.; and *Trifolium pratense perenne*, 2 lb.

VIII. *For improved deep Mossy ground, intended to lie in Grass.*

	With a crop.	Without a crop.		With a crop.	Without a crop.
<i>Agrostis stolonifera</i> , . . .	1 lb.	2 lb.	OR,	2 lb.	2 lb.
<i>Alopecurus pratensis</i> , . . .	1½	2		1½	2
<i>Festuca duriuscula</i> , . . .	2	2		2	2
<i>Lolium perenne</i> , . . .	10	10		6	6
.. <i>italicum</i>, . . .	..	..		3	3
<i>Phleum pratense</i> , . . .	2	2½		2	2½
<i>Poa trivialis</i> , . . .	2	2½		2	2½
<i>Trifolium repens</i> , . . .	5	6		5	6
<i>Lotus major</i>, . . .	..	..		1	1½
Rye (when sown without a crop) one bushel.	23½	27		24½	27½

IX. *For Marshy grounds, and such as are occasionally overflowed by fresh water.*

	Alluvial soils.	Peaty soils.
<i>Agrostis stolonifera</i> , . .	2 lb.	4 lb.
<i>Festuca loliacea</i> , . . .	3	3
<i>Glyceria aquatica</i> , . .	5	2
.. <i>fluitans</i> , . . .	5	6
<i>Phalaris arundinacea</i> , . .	2	..
<i>Phleum pratense</i> , . . .	2	2
<i>Poa trivialis</i> , . . .	2	4
<i>Lotus major</i> , . . .	1	1
	22	22

For sowing down lands occasionally subject to be overflowed, and on which the water may not be liable to become stagnant, (particularly in the winter and spring months,) it will be found advantageous to add to the quantities above stated a mixture of *Lolium perenne* and *L. italicum*, to the extent of from 3 lb. to 6 lb.

X. *For Warrens or Light Sandy Links.*

Lolium perenne,	12 lb.
Festuca rubra,	4
Agrostis vulgaris,	2
Alopecurus agrestis,	1
Cynosurus cristatus,	2
Poa pratensis,	2
Poterium sanguisorba,	2
Onobrychis sativa,	3
Achillea millefolium,	0½
Trifolium repens,	3
Medicago lupulina,	3
	<hr/>
	34½

Rye or Barley one bushel.

XI. *For Drifting Sands, which may be fixed and have a Sward produced upon them.*

By sowing *Elymus arenarius* 6 lb. and *Ammophilla arundinacea* 4 lb., which should be mixed with clay and straw ropes cut in small pieces and dibbled into the sand. After the sands have become consolidated, the mixture recommended for warrens or light sandy links may then be sown.

XII. *For dry gravelly situations, which resist a sward from all ordinary means.*

Agrostis vulgaris,	6 lb.
Festuca rubra,	3
Poa pratensis,	6
	<hr/>
	15

The number of these tables for sowing down lands to grass, might have been extended so as to suit a considerably greater variety of such circumstances as frequently present themselves in practice; but as they embrace what may be termed the most distinct classes of soil, and the different purposes for which lands are generally sown down with grasses, they have been deemed sufficient, particularly as judgment and discrimination must in many cases be exercised both regarding the kinds and quantities of seeds to be sown. Thus it may be expedient, in particular cases, to withdraw, either

wholly or partly, certain grasses, and to substitute others ; and this is more especially to be kept in view where lands have a tendency naturally to produce any particular grass, which although desirable to a certain extent may, when too predominant, be but secondary with reference to the special object desired. And it is also very material to keep in view the altitude, exposure, and any other peculiarities which may present themselves in the constitution of the lands ; as whether the soil or subsoil be naturally moist or dry, and whether these same be of a calcareous, ferruginous, or other nature at all likely to affect the growth of certain species or varieties, of the grasses, clovers, and other plants, which it may be desirable to grow on such.

PLANTS CULTIVATED CHIEFLY FOR THEIR ROOTS.

I. PLANTS HAVING TUBEROUS ROOTS.

* Belonging to the class and order *Pentandria Monogynia* of Linnæus, and to the natural order *Solaneæ* of Jussieu.

SOLANUM—POTATO.

To give the generic and specific characteristics of such a well-known plant as the *SOLANUM TUBEROSUM*—COMMON POTATO, would be considered useless and uncalled for in this place, and is therefore dispensed with.

The vast importance of the *Potato* in the agriculture of this country, the liability to disease in some varieties, from which others are in a great measure exempted, the adaptation of some varieties to particular soils, with the difference in quality and produce, induced the continuation of farther attention to the acquisition of superior varieties, since the result of former experiments, as contained in the Tables by Mr Lawson, which appeared in the ninth volume of the Prize Essays and Transactions of the Highland Society of Scotland. These, combined with farther observations, are now expressed in Tables considerably extended and improved in classification. To these Tables are added notices of specimens received in the Museum, from different cultivators, with the judicious accompanying remarks of the donors, forming upon the whole, it is presumed, a list from which the cultivator may easily select suitable varieties, and reject such as to him may appear either unadapted to his soil, or which for other reasons may seem unworthy of culture.

Remarks Explanatory of the following Tables.

1st COLUMN.—*No.* Those marked thus * are good, and likely, under certain circumstances, to be deserving of cultivation; thus **, sorts which either receive or are deserving of extensive cultivation; thus *** sorts of first-rate quality and deserving of cultivation under the greatest variety of circumstances.

2d,—*Name.* In this column the varieties in the first four classes and their divisions are inserted progressively, according to their time of ripening.

3d,—The statements in this and the following columns are all derived from specimens grown in the nursery at Meadowbank (with a few exceptions, which are noticed in course;) soil black loam of medium texture, and of a medium degree of fertility.

8th,—*Colour, and other peculiarities of the skin.* The results in this column must, in some instances, be rather vague, particularly in the case of the various coloured varieties, from the circumstance that red, blackish, or other coloured sorts often become interspersed with white blotches, by being (as is supposed) cultivated too long without change of seed, also from the effects of disease or other causes. As a proof of which, in the first report of Messrs Dickson and Turnbull's Agricultural Museum at Perth, a remarkable instance is given of a *white* variety of the *Perthshire red potato*, being obtained by Miss Bishop, New Scone, from a red potato with a white eye, which she

CLASS I.—*Earliest Garden Sorts adapted for forcing*

+ *Roundish-shaped Whitish Tubers.*

No.	Name.	Height of Stem.	Habit of Growth.	Foliage.	Flower.
*** 1	Fox's Early Delight,	<i>Feet.</i> 1½	Upright.	Dark green, rough, and crowded.	None.
** 2	--- Early Globe,	1	Slender, reclining.	Light green, long, and drooping.	do.
** 3	Williamson's Favourite,	1½	do.	Light green.	do.
* 4	Dwarf Early Frame,	1	Slightly reclined.	Light green, close, rough ¹ and wrinkled.	do.
* 5	Common ditto, .	1¼	do.	Medium, smooth, and light green.	do.
6	Foxly,	1¼	Spreading.	Light green.	do.
** 7	Ross's Early, . .	1½	do.	Light green, dense, and rough.	do.
++ <i>Oblong, or Kidney-shaped Whitish Tubers.</i>					
** 8	London Dwarf Kidney,	1	Slender, reclining.	Loose, long, light green, recurved at edges.	do.
*** 9	Fox's John Bull, or Early Kidney, .	1¼	do.	do.	do.

CLASS II.—*Earliest Garden Potatoes not so well adapted for*

+ *Roundish-shaped Whitish Tubers*

*** 10	Early Seedling, . .	2	Slender, straggling,	Light, green, smooth, and shining.	None.
* 11	London Early Round	2	Rather upright and compact.	Dark green, very rough and wrinkled-like.	do.
** 12	Musgrove's Snow-White,	2	do.	Roughish.	do.
* 13	London Particular,	2	do.	Light green, roughish.	do.
** 14	Ash-leaved Early,	1¾	Upright and loose.	Long, smooth, shining and drooping.	do.
*** 15	Hopetoun Early, .	2	Stems strong, upright.	Roughish & wrinkled.	do.
** 16	Invermay Early, .	1¾	Spreading.	Small, and recurved at the edges.	do.
* 17	Manly,	1¾	do.	Rather small.	do.
++ <i>Oblong or Kidney-shaped Whitish Tubers.</i>					
* 18	Magnificent Kidney,	1¾	Rather upright, and compact.	Small, light green, and rather rough.	do.
*** 19	New Elm-leaved do.	1¾	Do. do. do.	Broad and rough.	do.
** 20	Dryden Early do.	1¾	Pretty upright.	Roughish, dark green.	do.
+++ <i>Coloured Tubers.</i>					
** 21	Kay's Early American,	1½	Slender, spreading.	Light green, smoothish, and slightly shining.	do.

carefully cut out and planted by itself—the result of which is, that the produce has for several years retained the same colour as the original eye without the slightest appearance of change.

11th,—*Grains Troy of starch in 1 lb. Troy of clean tubers.* Those marked * are presented by Andrew Howden, Esq. Lawhead, and have been grown in the nursery only one year; their produce of starch per pound is extracted from his interesting Essay on the comparative value of different varieties of the potato, published in the Transactions of the Highland and Agricultural Society of Scotland, vol. xi.

on account of their dwarf habit of growth.

No.	Shape of Tubers.	Colour, and other peculiarities, of the skin.	Fold of Increase.	General Remarks.	Starch in 1 lb. of Tubers
					<i>Grss. Troy.</i>
1	Slightly hollow at the ends.	Slightly rough, nett-like.	13	Mealy, superior flavour, healthy.	610
2	Round, few eyed.	do.	8	Mealy, good flav., healthy.	575
3	Slightly elongated.	Smooth.	6	Do. do. do.	678
4	Small, round.	do.	5	Waxy, inferior flavour, rather unhealthy.	418
5	Medium sized, round.	Roughish.	7	Mealy, good flav., healthy.	393
6	Irregularly round, and small.	Very smooth.	6	Waxy, inferior flavour, unhealthy.	393
7	Round, medium sized.	Smooth.	16	Mealy, good flavour, very unhealthy.	591
8	Flat, thickest near the point, eyes prominent.	Smooth.	15	Waxy at small end, indifferent flav., pretty healthy.	350
9	Long, of nearly uniform thickness.	do.	13	Pretty mealy, good flavour, and healthy.	543

forcing as the preceding, on account of their taller habit of growth.

10	Round, few eyed,	Very white, smooth.	10	Mealy, superior flav. very healthy.	615
11	Large, round, with small deep eyes.	Roughish.	9	Mealy, good flavour, rather liable to curl.	584
12	Round, or hollow at the point.	Remarkably white, rough, and netted.	8	Medium, good flavour, very healthy.	592
13	Round, or slightly elongated.	Roughish.	8	Do. do. do.	575
14	Roundish.	do.	9	Do. medium flavour, do.	547
15	Large, round, with few eyes.	Dull, white, rough, nett-like.	13	Mealy, good flavour, do.	592
16	Round.	Very white, smooth,	10	Do. do. do.	610
17	Round, pretty large.	White and smooth.	12	Do. do. not very healthy.	450
18	Small, not very oblong,	White and smooth.	6	Mealy, good flav. apt to curl.	613
19	Smallest towards the stalk.	do.	7	Medium, medium flavour, pretty healthy.	403
20	Large, with few and prominent eyes.	Slightly rough.	8	Do. do. do.	506
21	Slightly oblong, flat-fish.	Light red, roughish.	10	Mealy, medium flav., very healthy.	590

CLASS III.—*Second Early*† *Roundish-shaped Whitish Tubers.*

No.	Name.	Height of Stem.	Habit of Growth.	Foliage.	Flower.
* 22	Early Champion,	<i>Feet.</i> 2	Rather upright, and compact.	Dark green, short, and wrinkled-like.	Light purp. tipped grn.
** 23	Dwarf Amer. Early,	1	Pretty upright.	Light green, roughish.	None.
24	Dutch Early, . .	1½	Very upright, compact.	Darkish green, rough.	Various,—white, light purple, and reddish.
** 25	Early Wellington,	1¼	Slender, spreading.	Slightly recurved.	None.
* 26	Early Cluster, . .	1¼	do.	Light green, large, close.	do.
* 27	Seek no Farther, .	1½	Compact, bushy.	Light green, largest, rough.	do.
*** 28	Prince of Wales Early,	2	Strong, upright.	Lightish green, dense, and rough.	do.
*** 29	Tall American Early,	2	Strong, and pretty upright.	Loose & lightish green.	Whitish.
* 30	Early Prolific, . .	1½	Slender, spreading.	Large, lightish green.	None.
* 31	Lawhead Early White,	1½	Rather do. do.	Light, green, and loose.	do.
** 32	New Early Windsor Seedling,	1¼	do.	Long and loose.	do.
*** 33	Shaw's Early, . .	2	Rather strong, upright.	Roughish and large.	Seldom flowers.

†† *Oblong or Kidney-shaped Whitish Tubers.*

** 34	Matchless Kidney,	1¼	Upright, compact.	Short, and dark green,	None.
* 35	Ross's Pigmy do.	1	Spreading.	Dark green.	Light purp.
36	Musgrove's Giant do.	1½	Rather upright.	Rough, and light green.	White.
37	Cape of Good Hope do.	1¼	do.	do.	Seldom flowers.
** 38	White Sutherland do.	1¾	Very upright, compact.	Dark green, short, and reflexed.	White.

††† *Roundish-shaped Coloured Tubers.*

* 39	Painted Lady, Early.	1½	Upright, compact.	Short, small, and rough	None.
40	Purple-skinned, do.	1	Dwarf and bushy.	Small and rough.	Seldom flowers.
*** 41	Taylor's Forty-fold.	1½	Slender spreading.	Light green.	do.
** 42	Lawhead Early Red.	2	do.	Dark green.	do.

CLASS IV.—*Early Field Potatoes, the leaves and stems of which, (under taken up, and the tubers of*† *Roundish-shaped Whitish Tubers.*

43	Dickson's Early, .	2½	Rather upright.	Very light green.	Light purple.
* 44	Aberdeen Favourite, or Possie's, . . .	2	Stout and bushy.	Large and close.	White.
* 45	Late Prolific, . .	1¾	Loose and straggling.	Thinner, scattered-like.	Very light purple.
* 46	Paterson's White,	1¾	Rather upright.	Darkish green.	do.
** 47	Gamekeeper's Round White,	2½	Spreading.	Large, rough, and light green.	Whitish.
48	Quebec Profit, . .	2¾	Upright, compact.	do.	Very light purple.
*** 49	Old Flat White, .	2½	Strong, and slightly spreading.	Large, lightish green.	Whitish.
* 50	Leather-coat, . .	2½	do.	do.	do.
* 51	Walls of Great Britain,	2½	Stiff and upright.	Reflexed and compact.	do.

Garden Potatoes.

No.	Shape of Tubers.	Colour, and other Peculiarities of the Skin.	Fold of Increase.	General Remark.	Starch in 1 lb. of Tubers.
22	Round, eyes few, small, and deep.	Very rough, netted-like.	<i>Feet.</i> 12	Mealy, medium flavour, pretty healthy.	459
23	Slightly flattened.	White and rough.	13	Mealy, good flavour, do.	594
24	Small, with large eyes, often pointed.	White and smooth.	12	Rather waxy, indifferent flavour, very healthy.	487
25	Round.	Yellowish white, and very rough.	10	Mealy, good flavour, very healthy.	492
26	do.	Rough, apt to crack.	8	Do. rather unhealthy.	486
27	do.	White, rough, and slightly netted.	14	Mealy, good flav. healthy.	540
28	Large, slightly oblong, and flat.	White and smooth.	15	Rather mealy, good flavour, very healthy.	520
29	Flattened.	Very white & rough.	12	Mealy, good flavour, do.	577
30	Very small and round.	Roughish and netted.	14	Do. do. pretty healthy.	498
31	Rather large.	Very rough & netted.	14	Do. do. do.	519
32	Round.	White & smoothish.	12	Do. do. do.	484
33	Large, irregular, round.	Dullwhite, very rough.	11	Rather waxy, medium flav. pretty healthy.	562
34	Eyes few & prominent.	White and smooth.	9	Mealy, superior flav., medium healthy.	603
35	Small, long, and crooked, and few eyed.	Roughish.	10	Do. do. do.	457
36	Large, long, and thick.	White and roughish.	7	Mealy, good flavour, very subject to curl.	585
37	Large, crooked, and slightly flattened.	do.	8	Do. superior flavour, do.	592
38	Curved, flat, and smallest towards the stalk.	Rough and netted.	11	Do. good flavour, healthy.	532
39	Irregularly round.	White and reddish.	8	Rather waxy, medium flavour, healthy.	484
40	Small and round.	Purplish.	7	Medium, medium flavour, very subject to curl.	570
41	Oval, much flattened.	Rough & dull reddish.	20	Mealy, super. flav., healthy.	502
42	Very round.	Dark red, & roughish.	15	Mealy, good flavour, do.	490

ordinary circumstances) are decayed by the time when they are usually which are then fit for use.

43	Flattened, with pretty deep eyes.	Dull white.	13	Rather waxy, indiff. flav. a healthy and free grower.	587
44	Flattened and oval.	Rather smooth, and white.	13	Medium mealy, good flav. very healthy.	762
45	Small and round.	Very white.	15	Mealy, good flav. subject to curl.	495
46	Rather hollowed at the ends.	Medium white, and smooth.	13	Mealy, goodish flav. very subject to curl.	560
47	Slightly flattened.	Dull white, rough, and netted-like.	18	Mealy, good flavour, pretty healthy.	608
48	Rather large, oblong, slightly flattened.	Roughish.	18	Waxy, indifferent flavour, healthy.	487
49	Slightly oblong, much flattened.	Very white, smooth.	16	Mealy, very superior flav. healthy.	830
50	do.	Yellowish white, and remarkably rough.	13	Mealy, superior flav., do.	790
51	Broadish, slightly flattened, near the point.	Pretty smooth.	15	Do do. very healthy.	684

No.	Name.	Height of Stem.	Habit of Growth.	Foliage.	Flower.
52	Yellow Round, .	<i>Feet.</i> 2½	Rather upright and compact.	Very light green.	Purplish.
53	Lark,	2	Spreading.	Large, loose, and light green.	Light purple.
54	Peruvian, . . .	2	Rather upright and compact.	Smooth, and slightly shining.	do.
* 55	Dodd's Seedling, .	2½	Slender, spreading.	Light green.	do.
* 56	Late Champion, .	1½	Rather upright and compact.	Rough.	Whitish.
57	Roasting, . . .	2	Slightly spreading.	Slightly reflexed.	Very light purple.
* 58	Late White, . . .	2¾	Stems upright.	Light, green, and loose.	Whitish.
* 59	White Breadfruit,	2¾	do.	Do. close and roughish.	Reddish purple.
60	Fife White, . . .	2½	Stems spreading.	Round, lightish, green, and reflexed.	Purple.
** 61	Saunderson's Dunbar,	2	do.	Dense, and very light green.	Whitish.
* 62	Late White American	2¼	Stems pretty upright.	Lightish green.	Purplish.
* 63	Aberdeen White,	2½	Strong, upright, and compact.	Light green, large, and rough.	Whitish.
* 64	Fill Basket, . . .	2	Loose and straggling.	Lightish green.	do.
++ <i>Oblong or Kidney-shaped Whitish Tubers.</i>					
** 65	Albany Kidney, .	2½	Strong, and rather upright.	Large, crowded, and reflexed.	Whitish.
66	Rafford do. . . .	1½	Straggling,	Smoothish, light green.	None,
* 67	Early Field do. .	2	Upright & compact.	Dark, green, & reflexed.	Whitish.
68	Variable Shaped do.	2	Weak and spreading.	Loose and drooping.	Light purple.
* 69	Imperial do. . .	2½	Strong, upright, and rather close.	Rather small.	Whitish.
** 70	Bevisford do. . .	2	Pretty upright.	Loose, and light green.	Light purple.
71	Barbadoes do. . .	2½	Rather upright.	do.	do.
+++ <i>Roundish-shaped distinctly various coloured Tubers.</i>					
** 72	Fife Blues, . . .	2	Spreading.	Compact, rough, light green, and slightly reflexed.	Light purple, white.
* 73	Red Parroquet, . .	1¼	Rather straggling.	Darkish green.	Whitish.
*** 74	Common or Edinburgh Dons,	2½	Strong spreading.	Lightish green.	do.
** 75	Blue Dons, . . .	2½	do.	Rather darkish green.	do.
** 76	Irish Apple, . . .	2	do.	Dark green, rough, and crowded.	Reddish purple.
* 77	Plough-boy, . . .	2	Loose, and rather straggling.	Rough, lightish green.	Light purple.
* 78	Onion Potato, . .	2	Upright.	Small and crowded.	Purple.
79	Farmer's Black Seedling,	2½	Upright, strong, and compact.	Light green, large, and rough.	Very light purple.
* 80	Shetland Blacks, .	2½	do.	do.	do.

No.	Shape of Tubers.	Colour and other Peculiarities of the Skin.	Fold of Increase.	General Remarks.	Starch in 1 lb of Tubers.
					<i>Grav. Troy.</i>
52	Often smallest towards the stalk, eyes deep.	Yellowish, and very smooth.	13	Rather waxy, indifferent flavour, very healthy.	503
53	Do. do. more flattened.	do.	12	Rather mealy, indifferent flavour, very healthy.	687
54	Round, rather small.	Dull white, rough, and liable to crack.	10	Medium, indifferent flavour, rather unhealthy.	656
55	Slightly oblong, with deep eyes.	White and smooth.	12	Medium, good flavour, healthy.	573
56	Roundish, rather large.	Dull and white.	11	Do. do. rather subject to curl.	745
57	Slightly oblong, with many eyes.	Roughish.	18	Waxy, bad flavour, pretty healthy.	480
58	Slightly oblong and flattened.	do.	13	Mealy, good flavour, do.	513
59	Round, or slightly oblong and flattened.	do.	17	Mealy, superior flavour, do.	592
60	do.	do.	13	Waxy, medium flavour, do.	405
61	Round.	Do. apt to crack.	16	Mealy, very sup. flav. do.	674
62	A little oblong, flattened, with many eyes.	Smooth skinned.	15	Mealy, good flavour, do.	581
63	Slightly elongated, and flattened.	do.	13	Medium, goodish flav. do.	540
64	Round.	Slightly rough.	14	Mealy, do. do.	660
65	Large, slightly curved. flat & broadest near the point.	White, and roughish.	16	Do. superior flavour, very healthy.	498
66	Straight, and about equal in breadth, throughout small.	Smooth.	10	Do. do. rather subject to curl.	633
67	Small towards the stalk, and flattened.	Very rough skinned.	15	Medium flavour, good, very healthy.	442
68	Variable, nearly round and long.	Very white, smooth.	14	Do. do. medium healthy.	480
69	Straight, and slightly flattened.	Roughish.	18	Rather mealy, medium flavour, pretty healthy.	408
70	Straight, and much flattened.	do.	13	Mealy, superior flavour, do.	368
71	Do. do. rather small.	Sometimes slightly tinged with red near the point.	10	Rather waxy, goodish, do.	672
72	Large, and roundish.	Darkish blue, with white blotches near the stalk.	16	Mealy, good flavour, pretty healthy.	529
73	Large, and much hollowed at the stalk.	Irregularly blotched with white and reddish purple.	15	do. do. do.	483
74	Round, hollow at stalk.	White, reddish purple about the eyes.	16	do. do. do.	576
75	do.	Dark bluish purple, with small whitish blotches.	15	Mealy, very good flavour,	547
76	Much hollowed at both ends.	Bright light red about the eyes.	10	Do. do. pretty healthy.	458
77	do.	Whitish, slightly interspersed with reddish purple about the eyes.	12	Mealy, good flavour, do.	536
78	Round, or very slightly oblong.	Purplish red, whitish towards the stalk.	13	Very mealy, good flavour, rather subject to curl.	456
79	Roundish.	Dark purple, with whitish eyes.	12	Waxy, bad, very subject to curl.	849
80	do.	Bright purple, with whitish eyes.	11	Mealy, very fine flavour, do.	819

No.	Name.	Height of Stem.	Habit of Growth.	Follage.	Flower.
81	Lady Mary, . . .	<i>Feet.</i> 2	Spreading.	Lightish green.	Purplish.
82	American Blacks,	2½	Strong, and upright.	Darkish green, and slightly hoary.	do.
* 83	Calico,	2¾	Rather upright.	Lightish green.	Pale purple.
** 84	Farmer,	3	do.	Small and compact.	Purplish and white.
85	Marbled,	2½	do.	do.	do.
* 86	Saunderson's Red Rose,	2¾	Upright, compact.	Short, wrinkled, reflexed, and hoary.	Light red-dish purple.
++++ Roundish-shaped One-coloured Tubers.					
87	Black Seedling, . .	2½	Upright, compact.	Small, and dark green.	Almost white
88	Flamingo, or Red Early,	2½	do.	do.	Purplish.
89	Shetland Red, . . .	2¼	do.	do.	White.
90	Irish Seedling, . .	2½	Spreading.	Compact, rough, reflexed, and light green.	Purple.
** 91	Cork Red,	2	do.	Darkish green.	Flowers seldom.
92	Early Pale Red, . .	2½	Upright, compact.	Short, and reflexed.	Light purple
** 93	Kilspindie Bloom,	2½	Pretty strong, and upright.	Light green, and slightly hoary.	Whitish.
94	Dudgeon's Early Red,	2	Spreading.	Dark green.	Flowers seldom.
95	Dunlop's Red, . . .	2	Stems upright, but slender-like.	Dark green, roughish, and reflexed.	Light purple.
* 96	Dudgeon's Black,	2	Slightly spreading.	Long, light green, and roughish.	Whitish.
*** 97	Perthshire Red, True or Oblong Flat variety,	2	do.	Rather lightish green.	Purple.
*** 98	Do. Small-eyed variety,	2¼	do.	do.	do.
*** 99	Do. Large-eyed variety,	2½	Pretty upright.	do.	do.
* 100	Buff,	2½	Straggling.	Rough, and light green.	Whitish.
* 101	Biscuit,	2¼	Spreading.	Roughish, large, and light green.	do.
* 102	Poor Man's Profit,	2	Rather upright.	Pretty compact.	Light purple
* 103	Red Bread Fruit,	2¾	do.	Lightish green.	do. & white.
+++++ Oblong or Kidney-shaped Coloured Tubers.					
* 104	Long Red Kidney,	2	Rather upright and compact.	Dark green, short, and rough.	Purplish.
** 106	Douglas's Irish Kidney,	2	Spreading.	Light green, long and rough.	Light purple
* 106	Miller's Thumb, . .	2½	Upright, strong, and compact.	Light green, large and rough.	Very light purple.
* 107	Captain Fraser's seedling,	2	Pretty upright.	Rather large and loose.	Light red-dish purp.

No.	Shape of Tubers.	Colour, and other Peculiarities of the Skin.	Fold of Increase.	General Remarks.	Starch in 1 lb. of Tubers.
81	Often slightly oblong.	Reddish, small white and purplish streaks.	10	Mealy, superior flav., very subject to curl.	<i>Grs. Troy.</i> 565
82	Irregularly round.	Dark bluish purple, with a few small white streaks.	13	Medium, good flavour, do.	546
83	Round, or slightly flattened.	Rough, light brownish red, with small portions of white near the stalk.	12	Mealy, medium flavour healthy.	410
84	Hollowed at both ends, with large deep eyes.	Red, and white about the hollowed point, rough.	11	Mealy, very good flav., very healthy.	596
85	Round.	Marbled; purplish, red and white, smooth.	10	Rather waxy, indifferent flavour, very subject to curl.	423
86	Flattened or hollow towards the stalk.	Light brownish red, darkish towards the point, blotched with white.	13	Mealy, good flav., healthy.	* 706
87	Round.	Smooth, dark reddish purple.	10	Rather mealy, goodish flav., very subject to curl.	* 480
88	do.	Reddish purple.	9	Mealy, very good flavour, do.	657
89	do.	do.	11	Waxy, indifferent flav., do.	* 439
90	do.	do.	10	Mealy, good flavour, do.	648
91	Flattened, slightly oblong, and pointed.	Roughish, and reddish brown.	15	Mealy, good flav., healthy.	534
92	Small, round, or slightly oblong.	Rough, and pale red.	15	Very mealy, superior flav. rather unhealthy.	534
93	Oval and flattened.	Dark bluish purple.	13	Do. do. healthy.	759
94	Slightly oblong, flattened.	Rough, and deep reddish purple.	12	Medium, medium flavour, healthy.	481
95	Round.	Dark red.	12	Mealy, good flavour, a little subject to curl.	524
96	Slightly oblong.	Dark reddish purple.	13	Mealy, very good flavour, do.	530
97	do. medium sized, and flattened.	Pretty smooth, red.	15	Mealy, good flav., healthy.	777
98	Small, round, slightly flattened, small eyes.	do.	14	Do. do. do.	708
99	Large, oblong, with large eyes.	Rough, rather netted like, bright red.	18	Rather waxy, medium flav., very healthy.	693
100	Large and round.	Roughish, and light brownish red.	15	Mealy, superior flavour, do.	466
101	Rather small, round.	Smooth, and light brownish.	13	Mealy, good flavour, do.	474
102	Round.	Dark reddish purple.	14	Mealy, superior flav. rather subject to curl.	477
103	Slightly oblong, and flattened.	Dull red, roughish towards the point.	16	Mealy, good flavour, very healthy.	* 762
104	Equal in thickness, long, and bent.	Dark, red, and rough.	13	Medium, medium flavour, very healthy.	* 594
105	Long and thickest towards the point.	Dark bluish purple.	16	Mealy, good flav., healthy.	560
106	Curved, and thickest towards the point, rather small.	Reddish.	13	Do. superior flavour, medium healthy.	549
107	Rather straight, and equal in thickness.	Whitish, with a few reddish streaks about the point.	11	Do. superior flavour, do.	474

No.	Name.	Height of Stem.	Habit of Growth.	Follage.	Flower.
* 103	Red Nosed Kidney,	<i>Fect.</i> 1½	Spreading.	Light green & smoothish.	Seldom flowers.
* 109	Bedfordshire do. . .	2¾	Rather upright.	Lightish green, rough.	Light purp.
110	Falconer's do. . .	2½	do.	Do. and small.	White.
111	Blue Horn do. . .	2	Upright & compact.	Short, rough, and light green.	do.
* 112	Lord Lauderdale's do.	2¾	Pretty upright.	Light green, roughish.	Purplish.

CLASS V.—*Late Field Potatoes, the foliage of which in ordinary seasons does be kept for some time before being*

+ *Whitish or Various Coloured Tubers.*

** 113	St Helena Potato,	2½	Rather upright and bushy.	Lightish green.	Light red-dish purp.
* 114	Pink-eyed Irish Round,	2¾	Strong, and upright.	Large, smooth, and rather narrow.	Purple,
115	Lancash. Pink-eyed,	2½	do.	do.	Very light purple.
116	Tartar,	2½	do.	Large, and light green.	do.
117	White-eyed Blue or Black,	2¾	Pretty upright.	Small, thin, rough, and thin.	Dark purp.
++ <i>One-coloured Tubers.</i>					
*** 118	Staffald Hall, . . .	2¼	Pretty upright, and bushy.	Large, & vivid green.	Light purp.
119	Sawyer's Red, . . .	2½	Rather straggling.	Rough, lightish green.	do.
120	Late Jersey, . . .	2¾	Upright & compact.	Rough, large, and dark green.	do.
* 121	Entire Black, . . .	3	Strong, upright, and compact.	Short, dark green, and hoary-like.	Whitish.
* 122	Scotch black, . . .	3	do.	do.	Very light purple.
* 123	Esslebach,	2¼	Pretty upright and compact.	Dark green, roughish.	Whitish.
124	Orchards,	2	Bushy.	Darkish green.	Light purp.
** 125	London Blues, . . .	2½	do.	Do. and slightly hoary.	Very light purple.
126	Welch Field, . . .	2	Rather upright and compact.	Short and rough.	Purplish.
* 127	Robertson's Giant Kidney,	2½	Strong and bushy.	Lightish green.	White.

CLASS VI.—*Late, large, prolific sorts more*

*** 128	Pink-eyed Dairy-maid,	2½	Rather bushy.	Lightish green, and roughish.	Light purple.
*** 129	Irish Lumpers, . . .	2½	Pretty upright, close.	Darkish green.	do.
*** 130	Cups,	2¼	do.	do.	do.
** 131	Connaught Cups, . .	2¾	do.	Large, and smoothish.	Purple.
** 132	Daly's Wonder, . . .	2½	Strong, do.	Large, and dark green.	Very light purple.
** 133	Brown's Fancy, . . .	2½	Rather bushy.	Lightish green, and roughish.	Light purple.

No.	Shape of Tubers.	Colour and other Peculiarities of the Skin.	Fold of Increase.	General Remarks.	Starch in 1 lb. of Tubers.
108	Long, often slightly curved.	Whitish, with a reddish point, and about the eyes.	16	Mealy, good flavour, and healthy.	<i>Grs. Troy.</i> 441
109	Long, thick, & straight.	Reddish.	51	Medium, good flavour, do.	483
110	Much elongated.	Whitish, light red towards the point.	12	Mealy, good flavour, rather unhealthy.	432
111	Very small next the stalk, and slightly curved.	Very dark bluish purple.	13	Medium, medium flavour, healthy.	500
112	Very long, and straight with many eyes.	Bright red.	16	Medium, good flav. healthy.	486

not decay until injured by frost, and the tubers of which generally require to fit for using to the greatest advantage.

113	Irregularly roundish.	Whitish, often slightly tinged with red, and pretty smooth.	18	Rather mealy, good flavour, very healthy.	684
114	Roundish.	Whitish, with pink eyes.	15	Do. do. do.	650
115	do.	do.	14	Rather waxy, indifferent flavour, do.	661
116	do.	Whitish, with irregular, reddish purple streaks.	13	Do. do. rather subject to curl.	603
117	Small, and irregularly oblong.	Dark bluish purple, with whitish eyes.	12	Do. do. healthy.	523
118	Rather flattened, round, or a little oblong.	Dull red, approaching to purple.	22	Very mealy, very superior flavour, very healthy.	813
119	Slightly oblong, flattened, and pointed-like.	do.	17	Rather waxy, indifferent do.	* 903
120	Slightly oblong and flattened.	Rdugh, and dark red.	16	Do. do. do.	* 903
121	Round.	Dull, dark purple, roughish.	15	Medium, medium flavour, do.	429
122	Round, and much hollowed at the stalk.	Shining, dull leaden colour very rough and netted.	16	Do. do. do.	522
123	Oblong and flattened, often slightly curved.	Roughish, and dull red.	14	Do. good flavour, healthy.	589
124	Roundish, and slightly flattened.	Dull red.	13	Do. medium flavour, very healthy.	456
125	Round.	Dark bluish purple, and rough.	16	Mealy, good flavour, do.	* 687
126	Irregularly round.	Dull, pink, and smoothish.	15	Rather waxy, indifferent very healthy.	706
127	Thickish, kidney-shaped.	Dull, reddish purple, rough.	16	Rather waxy, medium flavour, do.	457

particularly adapted for feeding cattle.

128	Large, roundish, and deep-eyed.	Whitish, and pink or purplish.	26	Rather waxy, indifferent flavour, very healthy.	506
129	Large, slightly oblong, and much flattened.	Whitish.	23	Waxy, bad flavour, do.	661
130	Large, oblong, often irregularly shaped.	Dull pink.	20	Mealy, good flavour, do.	* 667
131	Large, slightly oblong.	Dull reddish pink.	19	Mealy, good flavour, do.	630
132	Do. with large deep eyes.	Whitish.	21	Medium, medium flavour, do.	560
133	Slightly oblong and flattened.	do.	18	Do. do. do.	498

No.	Name.	Height of Stem.	Habit of Growth.	Foliage.	Flower.
** 134	Common Yam, .	<i>Feet.</i> 2 $\frac{3}{4}$	Strong, and rather spreading.	Large and light green.	Whitish.
** 135	Red do. . . .	2 $\frac{1}{2}$	Upright, and bushy.	Large, smoothish, and dark green.	Light purple
* 136	Ox-Noble, . . .	2 $\frac{1}{2}$	Rather spreading.	Roughish.	Whitish.
* 137	Wild Potato, . .	2 $\frac{1}{4}$	Compact, and bushy.	Very large, smooth, and light green.	do.
138	Emperor,	2 $\frac{1}{4}$	Strong, and bushy.	Darkish green.	Purple.

CLASS VII.—*Late unprolific*

* 139	Red Pine-Apple Potato,	2	Bushy.	Darkish green.	Purple.
* 140	Long White do. do.	1 $\frac{1}{2}$	do.	Lightish green.	Purplish.
* 141	Short do. do. do.	1 $\frac{1}{2}$	do.	do.	do.
* 142	German Long, .	2	Rather upright.	do.	Almost white.
** 143	Fairy Potato, . .	1	Weak, and pretty upright.	Very close.	Purple.
* 144	Little Nut, . . .	1 $\frac{1}{4}$	do.	do.	Light purple
* 145	Chesnut,	1 $\frac{1}{2}$	Bushy.	Darkish green.	do.
* 146	Everlasting. . .	2	Pretty upright, bushy.	do.	Purplish,

Farther particulars concerning some of the varieties of Potato in the foregoing Table ; Donors' names, &c.

** Sorts in the preceding Tables.*

15. HOPETOUN EARLY.—Originally received from Mr J. Spring, wood-forester to the Earl of Hopetoun, and is perhaps the most superior variety in the class to which it belongs.

16. INVERMAY EARLY.—This is also a very superior variety, originally introduced and presented to the Museum by Mr Alexander Muirhead, gardener to Alex. H. Murray Belshes, Esq. of Invermay, Perthshire.

NEW ELM-LEAVED KIDNEY.—Specimens by Messrs Gordon, Thomson, and Basket, seedsmen, Fenchurch Street, London, by whom it was first introduced.

32. NEW EARLY WINDSOR SEEDLING.—Presented by Mr Sieve-wright, 13 Abercrombie Place, who had it from Windsor, under the name of "*A New Seedling Early Potato*, of excellent quality, being dry, mealy, of an agreeable flavour, and very prolific."

49. OLD FLAT WHITE, or OLD PERTHSHIRE WHITE.—This variety was formerly much esteemed, and cultivated almost exclusively in some districts of Perth and Forfar shires ; but although it is ge-

No.	Shape of Tubers.	Colour and other Peculiarities of the Skin.	Fold of Increase.	General Remarks.	Starch in 1 lb. of Tubers.
134	Large, and oblong.	Dull pink.	18	Waxy, indifferent flavour, very healthy.	<i>Grs. Troy.</i> 393
135	do.	Bright reddish.	17	Do. do. do.	440
136	Slightly oblong and flattened.	Whitish.	17	Rather waxy, do. do.	442
137	Slightly oblong, and tapering to the point.	Very light pinkish.	18	Waxy, bad flavour, do.	492
133	Large, and roundish.	Rough, and reddish purple.	16	Rather mealy, good flavour, but subject to curl.	457

curious Garden Sorts.

139	Small, oblong, with numerous deep eyes.	Smooth, & deep red.	10	Waxy, medium flavour, healthy.	474
140	do.	Smooth and white.	10	Do. do. do.	367
141	Small, roundish, with many deep eyes.	do.	8	Do. do. do.	510
142	Very long, with many eyes.	Smooth, and reddish.	9	Do. do. do.	486
143	Very small and long.	Smooth, and whitish.	5	Do. do. rather delicate.	396
144	Small and roundish.	Whitish.	9	Rather mealy, goodish flav. rather delicate.	580
145	do.	Purple, reddish eyes.	10	Do. do. do.	595
146	Small, rather oblong.	Dull, reddish pink.	8	Waxy, medium flav. do.	480

nerally allowed to be superior to the Perthshire Reds, its culture has been almost entirely superseded by them, so much so, that the Old White is scarcely to be met with. Specimens by Mr A. Gorrie, Annat Gardens.

50. LEATHER COAT or RUSSET POTATO.—This is also an esteemed variety, which was formerly grown pretty extensively, and is still in cultivation in some of the middle districts of Scotland, but considered as being less prolific than the last. Specimens by Mr John Low, Halliburton House, Cupar-Angus, Forfarshire.

70. BEVISFORD KIDNEY.—Specimens by Mr David Reid, nurseryman, Easter Road, Edinburgh, who has grown this variety for many years with much success.

74. COMMON or EDINBURGH DON.—As a field potato this variety is more extensively cultivated in Mid-Lothian, and adjacent districts, than any other. When cooked, its tubers are much whiter fleshed than those of the Perthshire Red, and some others of the more famed field sorts; they are also mealy, and of an agreeable flavour, but, when grown to a large size, often hollow, or hard and waxy, in the centre. Specimens by Mr Robert Dale, Libberton West Mains.

76, 91. IRISH APPLE, and CORK RED.—Are much esteemed in

some parts of Ireland. Specimens of the latter by T. White, Esq. Gayfield Square.

93. KILSPINDIE BLOOM.—So named from having been originally raised from seed by the late Rev. A. Dow, minister in the parish of Kilspindie, Carse of Gowrie. A much and deservedly esteemed sort, reckoned, however, less prolific than the Perthshire Reds, except when grown on moorish or peaty soils, for which it seems admirably adapted. Specimens by Mr A. Gorrie.

97, 98, 99. PERTSHIRE RED, TRUE OR OBLONG FLAT VARIETY, SMALL-EYED ROUND VARIETY, and LARGE DEEP-EYED VARIETY.—The oblong flat variety was formerly distinguished by the names of Shanual or Red Coventry, from having been first sent to Perthshire, in 1805, by the late Dr Coventry, to Mr Gorrie, then at Meiklour House. The origin of the Small-eyed Round variety is not known; it is about equal to the first in quality, but rather deficient in produce. The Large Deep-eyed variety, which, although rather deficient in quality, is the strongest grower, and most productive of either, may probably have been introduced from Fife, as it seems the same with a specimen in the Museum, presented by Mrs Donaldson, Cupar-Fife, under the name of Fife Red, weight $2\frac{1}{4}$ lb. In Perthshire these three are now cultivated promiscuously, under the names of Common, Scotch, or Perthshire Reds, the latter of which has been applied since they became so much esteemed in the London markets. Specimens of each of these varieties by Mr A. Gorrie. One tuber of the Large Deep-eyed sort, under the name of Perthshire Red, by Mr Bell, Winterfield Mains, Dunbar, weighing $3\frac{1}{4}$ lb. By J. H. Colt, Esq. of Gartsherrie, two of the same variety, weighing 2 lb. 3 oz., and 2 lb. $1\frac{1}{2}$ oz., grown on a peaty soil. And several specimens of the same variety from General Durham, Largo, communicated by Mr Wm. Horn, land-steward at that place, under the name of Scotch Reds; produce of the crop from which they were selected, 80 bolls per acre.

100. BUFF.—By Mr William Henderson, Whim, Peeblesshire, average specimens of this variety, grown on newly improved peat; produce 22 bolls to one planted. Also, specimens of the Common and Blue Dons (74 and 75), grown on the same soil, which, although inferior in produce to the Buff, were nevertheless good crops.

112. LORD LAUDERDALE'S KIDNEY.—By Andrew Howden, Esq. Lawhead. A remarkably long straight sort, with numerous and regularly placed eyes.

113. **ST HELENA POTATO.**—Specimens by Mr Morison, Bellfield, near Dalkeith, who having, in 1833, procured two tubers of this variety, planted them whole, and the produce amounted to sixty of medium, besides a number of a smaller size ; these were again planted the following year, and yielded an abundant increase. Mr Morison considers this a superior variety, and deserving of general cultivation.

118. **STAFFOLD HALL.**—Specimens of this valuable variety presented to the Museum at various periods, by Richard Lowthian Ross, Esq. of Staffold Hall, Cumberland, who obtained the Highland Society's medal in 1827, for its introduction. Mr Ross has grown this sort successively on a deep rich soil, approaching to clay, for a long period, and has never found it to present the least symptom of curl or disease of any kind, either in its foliage or tubers, and its produce per imperial acre he has found in several instances to exceed 30 tons. Mr Lowthian Ross farther states, that the Staffold Hall potato does not attain its greatest perfection for using until about the end of November, or until it has been pitted for a month or two, and that it remains good until the earlier sorts are ready in the following season ; and that also, from its possessing great solidity, in cooking, it is better adapted for steaming than boiling. Also, specimens of tubers by Andrew Howden, Esq. Lawhead, East Lothian, crop 1834, averaging from $3\frac{1}{2}$ to 4 lb. imperial each, under the names of Wellington or Provost ; and besides its use as a table potato, he recommends its culture for feeding cattle, from the great return which it yields, and which, by referring to his important “ Essay on the comparative value of different varieties of the potato,” published in the Transactions of the Highland and Agricultural Society of Scotland, vol. xi., will be found in this respect surpassed by few in his collection, amounting in all to one hundred and thirty varieties. Also, specimens by Robert Downie, Esq. of Appin, grown in Argyllshire, where this variety is found to succeed remarkably well, and to keep till June.

It is worthy of remark, that from the experiments forming the subject of Mr Lawson's paper on the Principal Varieties of the Potato cultivated in this country (*Highland Society's Transactions*, vol. ix.), the Staffold Hall, or Late Wellington, as it is sometimes termed, was found superior in specific gravity and quantity of starch contained in a given weight of tubers, to any of the other varieties there enumerated, amounting to seventy-three.

121. ENTIRE BLACK.—This variety is easily distinguished from all others, by its flesh presenting, on being cut, a dark purple or blackish marbled-like appearance (from which it derives its name.) By Mark Sprot, Esq. of Garnkirk, tubers weighing about 12 oz., being an average specimen of a crop grown on a peaty soil. Although possessing rather a disagreeable appearance when cooked, Mr Sprot finds this sort very good as a table potato, when kept over the winter, before any of the early sorts are fit for using. Also, a tuber grown in Peeblesshire, weight 18 oz., by Mr Grieve, merchant, South Bridge Street, Edinburgh.

122. SCOTCH or OLD BLACK.—The dark colour from which this sort derives its name, is confined to its stems, and the skins of its tubers. It has been long in partial cultivation, and is, like the last, chiefly valuable from being in season for using between the periods of planting and taking up the new crop.

128. PINK-EYED DAIRY-MAID.—Six tubers of this variety, crop 1834, weight of the largest 68 oz., by Andrew Howden, Esq. Lawhead, who introduced it from Ireland in 1833. Mr H. considers this a very coarse and indifferent sort for the table, but, from the astonishing produce which he finds it to yield, likely to become very useful for feeding cattle.

129. LUMPER, or IRISH LUMPER.—By Mr Howden ; half a bushel of this sort, in weight averaging from 30 to 50 ounces each tuber, crop 1834, like the last. Mr H. considers this as only valuable for cattle.

130. CUP.—By Charles Guthrie, Esq. of Lay Bank, Dundee, and also by Mr Howden, Lawhead, several specimens, these last averaging from 30 to 44 ounce in weight, crop 1836. Of all those in Mr Howden's collection, formerly referred to at No. 118, he recommends the Stafford Hall, as there noticed, the Lumpers (129), and this, as being what he considers the three sorts deserving most attention for growing as cattle's food, and of these three the Lumpers seem entitled to the preference for weight of produce ; but the other two are far superior in quality ; the Cup, like the Stafford-Hall, being a superior kind of potato for eating (when not grown to too great a size). From its tubers, however, being often of rather an irregular or monstrous-like habit of growth, they are more difficult to wash or clean than the other two, which, as well as the Pink-eyed Dairy-maid, No. 128, are almost always of a regular shape. In recommending these three, it must however be observed, that Mr Howden does not ex-

clude many of the others from that place which they may deservedly hold in the estimation of cultivators, and which when grown in different soils from that in which his experiments were conducted, (a good rather free soil), and, under different circumstances, may be found equal, if not superior, to any of these; and more especially the Pink-eyed Dairy-maid, with regard to which, although it seems possessed of uncommon merits, yet from the short period elapsed since its introduction, he considers a more extensive experience necessary before venturing to give it a decided character.

133. BROWN'S FANCY.—By Thomas White, Esq. Gayfield Square, introduced by him in February 1833 from Ireland, and by Mr William Stavert, Greenhead, average specimens of a crop grown on a strong wheat soil, of medium quality. The produce was prodigious, being fully double that of Dons and London Blues, grown under similar circumstances; seed originally brought from Ireland. They are excellent keepers, and well adapted for feeding horses and cattle, but rather inferior for the table.

134 and 137. COMMON YAM, and WILD POTATO.—These two are distinguished from all the others, on being cut, by having a ring similar to the colour of their skin, a little within, and about parallel to the same. The Common Yam is extensively grown in some parts of Scotland, particularly in the middle counties for cattle. Specimens by Mr Airth, Forfarshire.

135. RED OR AMERICAN YAM.—By J. H. Colt, Esq. of Gartsherrie, ten tubers, weighing from 32 to 38½ ounces, grown on a peaty soil. And by Mark Sprot, Esq. of Garnkirk, several specimens averaging about 34½ ounces, also grown on peat, a kind of soil for which this variety seems particularly well suited. By George Baker, Esq. of Elemese Hall, Durham, half a bushel averaging each from 20 to 36 oz. Mr B. finds this a very excellent cattle potato, and its cultivation is rapidly increasing in that neighbourhood. Also by Mr Walter Ogilvie, Gifford, East Lothian, one tuber of a branching or compound shape; weight 34 oz.

136. OX-NOBLE.—Several specimens of this sort from General Durham, Largo, communicated by Mr William Horn, produce of the crop from which they were selected, 80 bolls per acre. Also by Captain James Hay, from a stock cultivated at Belton, by William Turnbull, Esq. for thirty-six years, without change of seed, and Mr Turnbull has never found it to present the slightest appearance of curl or other disease.

138. **EMPEROR, or APPLE OF THE EARTH.**—This variety, which is much prized in some districts, has, in the course of its cultivation (for the last few years) in the nursery at Meadowbank become almost entirely destroyed by curl.

139. **RED PINE-APPLE POTATO.**—This, and the next two varieties, 140 and 141, are remarkable for their numerous, large, deep, and regularly placed eyes, which give them a somewhat curious appearance after being cooked, and their skins carefully taken off. Specimens of Red and White-long varieties, by the Rev. J. M. Robertson, Livingston Manse ; and a red variety, shorter than, and apparently distinct from, the above, by Charles Guthrie, Esq. Tay Bank, Dundee.

ASPARAGUS POTATO.—Tubers smaller than those of any other sort in the collection, except the following, of an oblong somewhat crooked kidney-shape, about the size of, and in shape not unlike, asparagus tops, hence its name. Specimens by Dr Nicol, Inverness Academy.

143. **FAIRY POTATO.**—In size and shape similar to the last, but of a very light pink or reddish colour, and of good quality. Specimens by Mrs Crichton of Dabton.

146. **EVERLASTING POTATO.**—Is a late unproductive sort, so named from its tubers possessing a delicate waxy flavour, like that of young potatoes, to preserve which in its original delicacy the ground is covered over with straw or litter when the stems are killed down in the beginning of winter, so that the tubers may not be injured by frost ; they are afterwards taken up as wanted for use. Specimen by Mr John Kinment, Murie, Carse of Gowrie, Perthshire.

Several of the other late waxy varieties might no doubt be found to answer as substitutes for young potatoes equally well with the Everlasting. And when young potatoes are required in winter, they may be had of any variety, by retarding the growth of tubers of the previous year, by burying them at such a depth as to prevent their vegetating until the beginning of autumn, or until the season be so far advanced that they may, after being planted, have time to arrive at the required stage of advancement before winter ; they are then to be covered with litter, and otherwise treated as the Everlasting Potato.

*** Sorts not included in the preceding Tables.*

By Mr William Turner, Gardener, Denham Green.

Two very distinct oblong-shaped varieties, raised from the same

apple or plum of a common Don in 1832; and five potatoes, unnamed, the produce of the shaw or plant from whence they were taken, weighed 22 lb. 2 ounces.

By Captain Loch, Darnhall, Melrose.

Five tubers, unnamed; weight of the largest 26 ounces, and of the whole $6\frac{1}{2}$ lb.

By Alex. Clapperton, Esq. of Spylaw.

One potato, unnamed; weight $2\frac{1}{4}$ lbs.

*By Mr Waugh, of Messrs Waugh and Innes, Booksellers,
2 Hunter Square, Edinburgh.*

A long blackish-coloured kidney-shaped potato, from Van Diemen's Land.

*By Admiral Sir Philip Durham, Bart. Fordel, communicated by
Mr P. Hume, Land-steward there.*

Specimens of several kinds grown on a field, the produce of which was 90 bolls per acre.

By the Rev. J. M. Robertson, Livingston Manse.

Specimens of a red potato, originally from Aberdeenshire, and of a variety introduced by him from the north of Ireland two years ago; they were all grown on a field which had been in lea for the previous six years, without manure of any kind; average weight $2\frac{1}{2}$ lb.

By Sir Alex. Maitland Gibson, Bart.

Early garden potatoes, cultivated at Clifton Hall, and generally in the same part of the garden for sixty years, without change of seed, and which are still healthy, without appearance of curl or other disease.

*By Sir James Miles Riddel, Bart. Strontian, Argyleshire, communicated
by Mr J. Carmichael.*

Specimens of *Second Early*, an excellent eating and very prolific variety. *Black Kidney*, medium prolific, and good to eat, but does not keep long. *Argyleshire Red*, prolific, mealy, and keeps till July, and a *Pink-eyed potato* equal to the last.

By the late Thos. Sivwright, Esq. of Meggetland.

Specimens of a medium early potato raised from tubers brought from Bristol, and which were a year and a half out of the ground from the period when they were taken up to that in which they were planted.

And in December, young potatoes grown in a cellar from tubers of the preceding year, which had their stems pinched off always as they

began to shoot, in the beginning of winter, were covered with a little moist earth and kept free from frost ; a system by which a supply of young potatoes can be obtained at any period required.

By James Stewart, Esq. Wellhall, Lanarkshire.

Eight potatoes under the name of *Early Don*, planted 18th June, (the first planting having failed), and taken up on the 15th and 16th of October 1835 ; produce 80 bolls per acre.

By Mr George Hay, Newington, Edinburgh.

Specimens of a round whitish potato with pink eyes, of excellent quality, imported from America.

By Mr John Low, Halliburton House, Cupar Angus.

Specimens of Lancashire kidney potatoes, a very early and superior variety.

By G. L. Graham, Esq. 33 Gilmore Place, Edinburgh.

Pink-eyed kidney, crop 1835, from New York, North America ; they were grown in the Otsega district, considerably inland, on medium dry lightish soil, planted in June, and taken up in November ; they are of good quality, and the average price in New York is about equivalent to one shilling and tenpence sterling per bushel. Also by Mr G. a letter, in which he states that when he was in Italy in 1817–18–19, the introduction of the potato was obstinately resisted by the agricultural inhabitants ; and at present both in that country and in France they are very deficient in good varieties, as well as in their modes of cooking.

By Mr James Moyes, Rait, Carse of Gowrie.

Specimens of a new medium early round whitish potato, under the name of *Moyes' Early Prolific*, and which was raised from seed by him in 1834 ; it is of superior quality, and seems a very healthy and free grower.

By Charles Guthrie, Esq. Tay Bank, Dundee.

Specimens of a long White Kidney Potato from Paris, in season in the months of February and March, of excellent quality, but rather an indifferent bearer.

By Robert Johnston, Esq. Edinburgh, and by Dr Neill, Canonmills.

Specimens of a medium early, very mealy, white-fleshed kidney potato, of first-rate quality, received about two years ago from Egypt by the Right Hon. Sir Robert Liston, Millburn Tower.

CONVOLVULUS—BINDWEED.

GENERIC CHARACTERS.—Flowers monopetalous, widely bell-shaped, arising from under the two-celled two-seeded capsule or seed-vessel; stigma two-cleft; stems slender, creeping, or trailing on the ground, or twining round other plants for support.

CONVOLVULUS BATATUS—SPANISH OR SWEET-POTATO.

SPECIFIC CHARACTERS.—Leaves cordate, irregularly angular lobed, and smoothish; flowers in bundles, on upright foot-stalks; stems long, round, and creeping on the ground, putting out bundles of thick tubers or roots at the joints, of an oblong shape, and tapering to both ends; perennial. A native of both Indies, and said to have been first introduced into Britain about the year 1597.

The sweet potato is cultivated extensively in all tropical climates. In Europe its culture in the open air is confined to the southern countries, as Spain, South of France, and Italy; but in Britain it cannot be grown without the aid of artificial heat.

Specimens of the following varieties by M. Vilmorin and Co., Paris :—

1. LARGE WHITE SWEET-POTATO, *Pataté blanche*, Fr.—Weight of tubers from six to fourteen ounces.

2. RED-SKINNED SWEET-POTATO, *Pataté rouge*, Fr.—Weight of tubers from three to ten ounces.

3. YELLOW-SKINNED SWEET-POTATO, *Pataté jaune*, Fr.—Weight of tubers from three to eight ounces.

* * Belonging to the class and order *Syngenesia Frustranea* of Linnaeus, and to the natural order *Compositæ* of Jussieu.

HELIANTHUS—SUNFLOWER.

GENERIC CHARACTERS.—Involucrum imbricated, spreading horizontally; receptacle flat and chaffy; crown of the fruit with two leaf-like appendages.

HELIANTHUS TUBEROSUS—TUBEROUS-ROOTED SUNFLOWER, OR JERUSALEM ARTICHOKE.

SPECIFIC CHARACTERS.—Leaves rough; stem six to ten feet in height; root tuberous; perennial; native of Brazil; introduced in

1617. Seldom or never produces its flowers (which are yellow) in this country, except the tubers be carefully removed when they begin to form.

1. COMMON JERUSALEM ARTICHOKE.—Before the introduction of the potato into this country this variety was held in much esteem, as it is even yet in some parts of the Continent. Fowls, and particularly pheasants, are remarkably fond of the tubers, as are also swine, and cattle, hares, rabbits, &c. These are produced in considerable quantities, and as they are not liable to be injured by slight frosts, their limited cultivation, instead of potatoes for feeding these kinds of live stock, has been recommended. They might also be planted in woods and waste places, on good lightish soil, not too much shaded, as winter food for game; the tubers, as is well known, are also eaten cooked in various ways.

2. YELLOW JERUSALEM ARTICHOKE, *Topinambour jaune*, Fr.—The tubers of this variety are of a yellowish colour, and generally smaller and more irregularly shaped than the common sort; they are also said to be superior in quality, and of a more agreeable taste when cooked.

Specimens by M. Vilmorin and Co., Paris.

III. Belonging to the class and order *Decandria Pentagynia* of Linnæus, and to the natural order *Oxalideæ* of Jussieu.

OXALIS—WOOD-SORREL.

GENERIC CHARACTERS.—Segments of the calyx five, distinct or united at the base; petals five; five exterior stamens shorter than the five interior; seed-vessels oblong or cylindrical.

I. OXALIS CRENATA—CRENATE-FLOWERED OR TUBEROUS-ROOTED WOOD-SORREL.

SPECIFIC CHARACTERS.—Stems succulent, branching, prostrate, or trailing on the ground, upright towards the point of the shoots; leaves slightly hairy, trifoliate; leaflets inversely heart-shaped; petals bright yellow, and crenate or notched on the edges; roots tuberous.

First introduced in 1829 by the late Mr David Douglas, bota-

nical collector to the London Horticultural Society, from Peru, where it is cultivated for its tubers, which are used in the same way as potatoes, and also for its tender juicy stalks and foliage, which are used as sallad. In this country it seems to thrive best when planted two or three feet apart on dry light medium fertile soils, in warm situations. Its tubers do not begin to form until towards the end of autumn; they are of a yellowish colour when cooked, very mealy, and in taste somewhat like the common potato, with a very slight addition of an agreeable acid.

Specimens by Mr M. Smith, gardener, Ayton House, Berwickshire, average weight about two ounces; and specimens grown in the Nursery at Meadowbank, average weight of tubers at each plant half a pound.

II. OXALIS TETRAPHYLLA—FOUR-LEAVED WOOD-SORREL.

SPECIFIC CHARACTERS.—Stemless; flowers light purple, one or four together on an upright foot-stalk, about half a foot in height; leaflets inversely heart-shaped, four on each leaf; roots thick and fusiform, with many spreading filaments from their crown, to which are attached small scaly bulbs, producing new plants the following season; native of Mexico; quite hardy.

Specimens by Mr A. Gorrie, Annat Garden. Both the bulbs and fleshy fusiform roots are eaten when cooked, the leaves are also used in sallad as those of the last.

“Plants of this genus contain a valuable vegetable acid in their stems and leaves, which is sold under the name of *The Essential Salt of Lemons*, but is seldom to be had genuine,” (Loudon’s *Encyclopædia of Plants*), for which *Oxalis crenata*, from the great bulk of its juicy leaves and stems, might be profitably grown. The acid is obtained by expressing the juice, which is then put through a fine cloth to free it from dregs, and when properly evaporated and set in a cool place, a crystalline acid salt is formed.

IV. Belonging to the class and order *Hexandria Monogynia* of Linnæus, and to the natural order *Amaryllideæ* of Jussieu.

ALSTRÆMERIA—BARON C. ALSTRÆMER’S LILY.

GENERIC CHARACTERS.—Flower (perianth or coloured calyx) with

the orifice naked, composed of six segments, the two lower of which are somewhat tubular at the base ; seed-vessels round or oval, three or six angular, three-valved or pulpy within, not opening.

ALSTRÆMERIA OVATA—EATABLE-ROOTED ALSTRÆMER'S LILY.

SPECIFIC CHARACTERS.—Stems slender, tall, and twining on other plants for support ; leaves ovate ; flowers of a reddish colour, interspersed with green and yellow ; tubers oval, not furnished with eyes or buds ; perennial ; introduced in 1824 from Chili, where its tubers are cooked and used as food by the inhabitants. Weight of tubers from three to six ounces.

V. Belonging to the class and order *Diadelphia Octandria* of Linnaeus, and to the natural order *Leguminosæ* of Jussieu.

LATHYRUS—VETCHLING.

GENERIC CHARACTERS.—See Plants cultivated for Herbage and Forage, page 178.

LATHYRUS TUBEROSUS—TUBEROUS OR EATABLE ROOTED PEA OR VETCHLING.

SPECIFIC CHARACTERS.—Flowers many together on a common foot-stalk, of a bright red colour ; tendrils two-leaved ; leaflets ovate ; roots spreading, with numerous irregularly shaped blackish coloured tubers attached, which are generally from one to three ounces in weight. Native of Holland, introduced in 1596.

These tubers are sold in the Dutch markets, and when cooked are highly esteemed, being in taste somewhat resembling roasted sweet chestnuts.

Seeds by M. C. A. Fischer, Gottingen ; and tubers by Mr James Smith, Hopetoun Gardens.

VI. Belonging to the class and order *Triandria Monogynia* of Linnaeus, and to the natural order *Cyperaceæ* of Jussieu.

CYPERUS—RUSH.

GENERIC CHARACTERS.—Flowers glumaceous as in the grasses ;

leaves with an entire sheath ; spikelets imbricated in two rows ; style deciduous ; no bristles under the ovarium.

CYPERUS ESCULENTUS—RUSH-NUT, OR EATABLE-ROOTED SEDGE.

Souchet comestible.—Fr.

SPECIFIC CHARACTERS.—Spikelets elongated, pointed, rather distant ; involucre three to five leaved ; rays of the umbel about seven ; terminal shorter than the leaves of the involucre ; roots tuberous, about the size of peas. Native of the south of Europe, where it is cultivated for its tubers, which are eaten either raw or boiled ; in the former state they somewhat resemble filberts in taste, but are rather more sweet and heating. They are easily grown on rich light soils, which should be kept rather moist.

Specimen of tubers by Vilmorin and Co. Paris.

II. PLANTS HAVING THICK-FLESHY FUSIFORM ROOTS.*

I. Belonging to the class *Tetradynamia* of Linnæus, and to the natural order *Cruciferae* of Jussieu.

BRASSICA—TURNIPS, &c.

GENERIC CHARACTERS.—See Plants cultivated for Forage and Herbage, page 184.

I. BRASSICA CAMPESTRIS RUTABAGA—RUTABAGA OR SWEDISH TURNIP.

In its specific characters the Rutabaga, or Swedish Turnip, differs from those of the Summer Rape (page 189), of which it is only a variety, in having larger fleshy swollen globular or subrotund roots, while those of the Rape are small, fusiform, and hard.

The Swedish Turnip is hardier than any of the common sorts (varieties of *B. rapa*), and in addition to its being more esteemed as food for horses throughout the turnip season, is better adapted for spring feeding generally. It, however, requires a somewhat stronger and superior class of soils, together with a greater allowance of ma-

* The term *subrotund-rooted plants* is perhaps more descriptive of most of the commonly cultivated turnips, but in consideration of the plants from which they have all originated being *fusiform*, a shape to which some of those cultivated also approximates, that term, with the epithet *thick-fleshy*, as appended above, is still applied.

nure, but may, upon the whole, be considered equally if not more deserving of attention than the others, notwithstanding which its cultivation has hitherto been comparatively little attended to in some districts of Scotland. Swedish Turnips are generally sown from about the middle to the end of May, and 2 to $2\frac{1}{2}$ lb. of seed per imperial acre, is, under ordinary circumstances, considered sufficient. They possess an advantage over the others in being easily transplanted, so that blanks in the rows either of the Swedes or other sorts (when they occur), are by that means easily filled up.

The varieties are as follow :—

1. RED OR PURPLE-TOP YELLOW SWEDE.—Upper part of the root of a dull reddish colour ; under yellowish. This is held in great esteem by the generality of cultivators. Of it there are several sub-varieties, which have been obtained by a repeated judicious selection of the roots from which the seed-stock has been saved, of these the next two may be mentioned.

2. BALLANTYNE'S NEW IMPROVED PURPLE-TOP.—So named from being originally brought into notice by Mr Ballantyne, nursery and seedsman, Dalkeith. This is an improved stock of the last, and is more remarkable for its smallness of neck, uniform deep purple colour, and symmetry of shape and equality, than for the size of its roots.

3. COX'S NEW IMPERIAL.—This variety may be considered intermediate in colour between the purple and green-top sorts ; its roots often acquire a large size, but are rather irregular, and of a somewhat coarse-like quality. Such sub-varieties are frequently of short duration, being liable to degenerate when the careful selection of the roots to be grown for seed is not attended to, and they often only retain the name for such time as their seed-stocks are grown by the parties with whom they originated, and it occasionally happens that stocks procured in different parts by the same means, and known under different names, may yet be the same in other respects.

4. GREEN-TOP SWEDE.—Upper part of root dull green ; under yellow.

This variety is of longer standing than the Purple-top (No. 1.), since the introduction of which less attention has been bestowed by

cultivators (in Scotland at least) towards procuring improved stocks of the Green-top Swede, which has on that account fallen somewhat in the estimation of growers. But when the same care is taken in selecting the roots grown for seed, the Green-top may be considered as being equal in merit to the Purple.

5. WHITE SWEDE.—Roots irregularly shaped, being often divided or branched ; white under the surface of the ground, and greenish above.

The White Swede may be considered as the most inferior and unimproved variety ; it is at present scarcely in cultivation, and when it appears amongst others, is considered as the effects of degeneracy, or as arising from a bad stock of seed. With the White Swede, the following generally admitted distinct species may, from its apparent unimportance be compared.*

6. BRASSICA OLERACEA RAPA, BRASSICA NAPO-BRASSICA, TURNIP-ROOTED CABBAGE.—Continental writers seem generally to agree in recommending the cultivation of the Turnip-rooted Cabbage, from its roots, in addition to their being naturally hardy, growing under, or almost under, the surface of the ground, whereby they are enabled to resist the severest winters ; but it does not seem to deserve the attention of British agriculturists, as the Swedish Turnip, which is evidently much superior, is sufficiently hardy to withstand the generality of the most rigorous winters to which this country is subjected ; and as on those parts of the Continent where the other is generally cultivated, the Swedish Turnip has not yet, or is only recently fairly introduced, it is very probable that, when the superior merits of the latter become more fully known and appreciated, the culture of the Turnip-rooted Cabbage may by it be entirely superseded.

Several varieties of Turnip-rooted Cabbage which were grown in the Nursery at Meadowbank, from seeds procured from various parts of the Continent, differed little from the White, or what is generally termed Very Bad Swedish Turnip, except in their leaves, which very much resembled those of some common varieties of Kale.

* A variety of Swede which was introduced a few years since to England from Sweden by Mr Hillyard, to which he has given the name of Thorpland Swede, is said to be superior to any of the above, but as neither seeds nor roots have as yet been obtained for the museum, an opportunity has not been afforded of comparing this sort with the others.

II. BRASSICA RAPA—var. COMMON TURNIP.

The Common Turnip bears the same relation to the Annual Turnip Rape (page 190), that the Swedish Turnip does to the Summer Rape (page 189).

The varieties of the Common Turnip are a great deal more numerous than those of the Swedish, compared with which they are also in general of much finer symmetry, as well as of a larger size, differences which may be partly accounted for from the Common Turnip having been longer in, and received a more extended cultivation. One circumstance, however, peculiar to the Swedes, is, that the larger the size to which they grow, a given weight of roots is found to contain a greater portion of nutritious matter, while the Common Turnips, on the contrary, after attaining to beyond a certain size, lose a proportionate quantity of that most valuable part of their composition (see *Hortus Gramineus Woburnensis*); which circumstances tend to shew the necessity for, and the advantages to be derived from, devoting more attention to the procuring of large and well-formed varieties of Swedes, and also to the procuring of hybridal varieties between the Swedes and Common Turnip, which may be found to combine the size and symmetry of the best varieties of the latter, with the above-mentioned valuable properties peculiar to the Swedes. Common Turnips are divided into two important classes, viz. the White and the Yellow rooted. The former, comprehending those which are most tender, and arrive soonest at maturity, and which are best fitted for using during the earlier part of the season; and the latter, with very trifling exceptions, such as, from their hardness, and period of arriving at perfection, are intermediate between the White sorts and the Swedes. The period of sowing Common Turnip should be regulated according to the length of time that the variety to be grown requires to arrive at maturity; for when allowed to remain on the ground in what may be termed growing weather, or before winter sets in, after they attain to full size, they become soft, spongy, and inferior in quality; a general rule, however, is to commence sowing the Yellow sorts about a fortnight after the Swedes, or about the beginning of June, and to follow with the White sorts from the middle till towards the end of that month. The same quantity of seed will suffice as in the case of the Swedes (2 to $2\frac{1}{2}$ lb. per imperial acre), under ordinary circumstances, but some cultivators recommend sowing about $\frac{1}{2}$ lb. more, to provide against the attacks of the turnip-fly, and other casualties, to which

they are more liable than the others, while at the same time the advantage of filling up the blanks by transplanting, is in the case of Common Turnips scarcely practicable.

* *Yellow Turnips, varieties of BRASSICA RAPA, which are more particularly suited for Field culture. Those marked thus * are also grown as Garden Turnips for the table.*

7. DALE'S TURNIP, OR DALE'S HYBRID TURNIP.—From the circumstance of this variety being a mule or hybrid between the Green-top Swede and White Globe, procured by repeated impregnation, it may be presumed that it might with equal propriety have been included amongst the varieties of *Brassica campestris rutabaga*, or Swedish Turnip. It, however, bears a much greater affinity to those of *B. rapa*, inasmuch as its leaves are also rough, and of a vivid green (not glaucous) colour, and in its roots being somewhat similar in form and texture. It has received the name of Dale's Hybrid, from being first raised and brought into notice by Mr Robert Dale, an intelligent farmer at Libberton West Mains, near Edinburgh, who having, in 1822 or 1823, received a few ounces of seed of a new hybridal variety of turnip from the late James Shirreff, Esq. of Bastleridge, Berwickshire, sowed the same, the produce he found very much to resemble the Swedish in shape, and from which, by repeated selection and impregnation, he at length obtained this esteemed variety, the distinguishing characteristics of which are—foliage strong and luxuriant; roots of a large size, oblong shape, and of a lightish yellow colour, with light green top, having also a small neck and tap-root. The shape of the root, however, although generally oblong, is rather apt to vary, being sometimes almost globular, but its more material characteristics of large size and luxuriance of growth are uniformly the same. Compared with any other of the common yellow field sorts, it is found to arrive sooner at maturity, and consequently may be sown at a later period of the season; while at the same time it is equally hardy, or at least has been found sufficiently so to withstand the severest winters which have occurred since its introduction. (For farther information concerning this variety, see a paper by Mr C. Lawson, in the *Quarterly Journal of Agriculture*, vol. ii.)

8. NEW PURPLE-TOP HYBRID TURNIP.—In its general appear-

ance this variety seems nearer in relation to the Swede than Dale's Hybrid ; like it, however, it has the rough vivid green root foliage by which the varieties of *B. rapa* are so easily distinguished. Judging from specimens of roots sent to the Museum by Andrew Longmore, Esq. Ratter, and which were raised by him from seed grown by Grant Duff, Esq. of Eden, Banff, this seems likely to become a very useful turnip for using in the spring months. Most of these roots were of a slightly oblong shape, of a greenish-purple colour on the top, and light yellow or almost white on the under surface. They were all remarkably firm in texture, and rather late in beginning to shoot.

9 LARGE LAURENECKIRK YELLOW TANKARD.*—So named from having been originally selected and brought into the notice of cultivators by Mr Robert Scott, Laureneekirk. At first sight this may be mistaken for Dale's Hybrid, like which it grows a good deal out of the ground, but is distinguished by its more oblong and more uniformly shaped roots. It is a valuable acquisition, being also, like that variety, early in arriving at maturity, but generally considered rather less hardy, and like it also yields a bulky crop.

10. LONG CAMBRIDGESHIRE YELLOW TANKARD.—This variety, which is scarcely known in Scotland, is grown to a pretty considerable extent in Cambridgeshire and Suffolk, where it is also sometimes known by the name of Pudding Swede, which name it seems to have acquired more on account of its hardness of texture than from any other resemblance which it bears to any of the true Swedish turnips. Its roots are much longer in shape than those of any other yellow field turnip, of a lightish yellow colour with green top, and in general grow more than half under ground.

11. PURPLE-TOP YELLOW TANKARD —Root bright yellow with a purple top, of a somewhat irregular long or tankard shape. This variety was formerly grown in some districts chiefly in England, but is now nearly out of cultivation ; nor does it seem entitled to any particular share of attention, being altogether a coarse-like inferior

* Tankard is a name applied to such common field turnips as are of an oblong shape, and the roots of which in general grow a good deal above the surface of the ground. Such oblong varieties, however, as approach nearest to a round or globular form are sometimes termed Decanter, or Decanter-shaped turnips.

sort, and not capable of yielding near such a bulky crop as either of the three last.

12. COMMON OR OLD RED, OR PURPLE-TOP YELLOW BULLOCK, PURPLE-TOP ABERDEEN.—Leaves comparatively short, spreading, of a dark colour, and collected into a small neck at their base; root globular or somewhat flattened, of a reddish purple colour above, and deep yellow under the surface of the ground, of medium size; tap-root very small. This is an old and very deservedly esteemed variety, and of those commonly cultivated is considered by some to come nearest the Swedes in hardiness and solidity of texture.

13. BERWICKSHIRE BORDER IMPERIAL PURPLE-TOP YELLOW.—This, which may be considered as a superior or improved variety of the last, was first introduced by Mr R. Hogg, Nursery and Seedsman, Dunse, Berwickshire; its principal distinguishing characters are, roots somewhat large, flesh and under part of the skin deep yellow, and top of a bright red or purple colour, firmer in texture and hardier than the last.

14. SKIRVING'S IMPROVED PURPLE-TOP YELLOW.—This is also an improved variety of the old purple-top yellow bullock, and grown to a considerable extent in some of the north-west districts of England. It acquires its name from having been first brought into notice by Mr Wm. Skirving, nursery and seedsman, Liverpool.

15. YELLOW ABERDEEN BULLOCK, OR GREEN-TOP YELLOW BULLOCK.—In the size and shape of its roots this old and deservedly esteemed sort resembles the Purple-top Yellow Bullock (No. 12), but differs in the colour of its top, which is bright green.

16. OLD SCOTCH YELLOW.—In size and quality is about equal to the last variety, but its roots are considerably more flattened, and grow deeper, or seem more buried in the ground, and have, from that circumstance, a smaller proportion of green-coloured top, which is also of a lighter shade.

17. HOOD'S NEW LARGE YELLOW is a very superior large globular-shaped hardy turnip, remarkably perfect in symmetry, and has rather a lightish-green top. Introduced by Charles Hood, Esq., an eminent

farmer at Inverbrora, Sutherlandshire, a gentleman who has devoted much attention to the cultivation and improvement of field turnips generally.

18. GORDON'S YELLOW, is a name under which a very superior variety is known in some of the north-eastern districts of Scotland, and which was originally introduced by Mr Gordon, an eminent cultivator in Aberdeenshire. It is of a rather oblong shape, deep green colour on the top, generally very slightly tinged with red, and appears about equal in merit to the last.

19. * ALTRINGHAM YELLOW.—Compared with the generality of yellow field turnips, this is rather under the medium size, the root however, is of a fine globular shape, and possessed of considerable solidity, with a light greenish top, very small neck, and tap-root.

20. JONES' YELLOW.—This variety originated in the neighbourhood of Stirling, where it is still cultivated to some extent; it bears a considerable resemblance to the last, but grows to a larger size, and the yellow colour both of the skin and flesh is deeper.

21. * YELLOW GLOBE.—Roots of medium size; globular, and always nearly under the surface of the ground; top greenish, leaves rather small and spreading. This is a superior turnip both for field and garden culture.

22. * YELLOW STONE.—This variety differs from the last in growing more out of the ground, and having a greener top; in other respects they are pretty similar. As a garden turnip, this is one of the most esteemed sorts.

*** Yellow sorts more particularly suited for garden culture.*

23. YELLOW MALTA, or MALTESE GOLDEN TURNIP.—Roots very small, slightly flattened above, and concave or much hollowed on the under side towards the tap-root, which, as well as the neck, is remarkably small, skin very smooth, and of a bright orange-yellow colour; leaves also very small. For summer and autumn crops this is the most esteemed of all the yellows, but is rather tender and incapable of withstanding frost.

24. **YELLOW PRESTON, OR LIVERPOOL YELLOW.**—This is also an early sort, and bears a considerable resemblance to the last, but grows to a larger size, has stronger foliage, and is less hollowed towards the tap-root.

25. **YELLOW DUTCH.**—Roots small and globular, of a pale yellow colour throughout, or very slightly tinged with green on the top, particularly when much exposed to the sun and weather. This is a much esteemed early sort, being of excellent flavour, and very well adapted for using in summer and autumn.

26. **LARGE LONG GARDEN YELLOW.**—Roots about one-fourth part above ground, which is of a greenish colour, while that below the surface is of a deep yellow. This is a hardy and rather superior sort, hitherto little known in this country, but grown pretty extensively on the Continent.

27. **SMALL LONG YELLOW, *Le Navet de Meaux Jaune*, Fr.**—Leaves very small and spreading; root generally entirely under ground, small, and of an oblong or carrot shape, terminating abruptly at the point; colour light yellow.

At present this variety is little known in Britain. About a century ago, however, either it or the white (No. 45) was more in esteem; they are both of excellent flavour and grown to a considerable extent in some parts of the Continent, particularly in France and Holland, from whence they used to be imported for the London market, their under ground habit of growth protects them in a great measure from frost, and they succeed best on sandy soils.

*** *White Varieties adapted to Field Culture.*

28. **LAWTON HYBRID.**—This variety, which was raised by James Wright, Esq. of Lawton, Strathmore, may be considered as bearing the same relation to the Swede as *Dale's Hybrid* (No. 7). Its leaves are darkish green, rather small and smoothish; roots roundish, or somewhat heart-shaped, being often tapered on the under side; white below, and green above the surface of the ground. They are possessed of more solidity and firmness of texture than most of the white sorts. From its being first brought into notice so lately as 1834, a more ex-

tensive cultivation is yet necessary before any thing definite can be said of its merits.

29. LEWISHAM GREEN-TOP OX-HEART.—This is an excellent variety, grown in some of the southern districts of England and in Scotland, has acquired this name from having been first introduced by Messrs Willmott and Co., Seedsmen, Lewisham; in colour and shape it very much resembles the Lawton Hybrid, but is somewhat softer in texture, and has larger and lighter green coloured leaves.

29. GREEN GLOBE, OR GREEN-TOP WHITE GLOBE.—Roots of a fine globular shape, with a small neck, and tap-root; very white under, and green above the surface of the ground; of medium size, hardy, and firm in texture, but scarcely so much so as the Green Round (No. 36), than which it arrives at maturity rather earlier. A very fine sub-variety of this is known in some parts under the name of HUNGARIAN GREEN-TOP GLOBE; it is larger and softer than the common sort; also of a fine regular shape, and was first introduced by Adam Ferguson, Esq. of Woodhill, who received its seeds from Hungary.

31. WHITE GLOBE, COMMON WHITE GLOBE.—Roots globular; skin smooth and perfectly white; neck and tap-root small. Although the above description embraces the principal characters of the White Globe Turnip, yet there is a considerable variety in those to which this name is applied, arising from the degree of care and attention bestowed by growers in selecting their seed roots; and the shape is often not a little affected by the kind and state of the soil in which they are grown. Thus Globes of any kind, and particularly the variety here mentioned, when grown on a very superior rich soil, may be said to be forced beyond their natural size, and thereby acquire somewhat of a monstrous or overgrown appearance, losing in a great measure their natural symmetry of shape.

32. POMERANIAN GLOBE.—This variety was introduced some years since from Pomerania, and may be considered as the most perfect globe turnip in shape, as well as the most regular or uniform grower. Its skin is of a smooth white and somewhat shining or transparent-like appearance; leaves smoothish, of a dark green colour, with whitish nerves.

In the Perthshire Agricultural Report for October 1834, the Pome-

ranian globe is mentioned as being less affected by mildew than most others, a disease which was very prevalent in some districts that season. A rather smaller variety, but in other respects resembling the Pomeranian, is known in some places under the name of CRYSTAL GLOBE.

33. **STONE GLOBE.**—This is considered as being the hardiest of all the entire White Globe Turnips. It grows naturally deeper in the soil than the others, and has stronger darker green foliage.

34. **RED GLOBE.**—Roots medium sized, globular shaped, and firm in texture. This is an old, and in some districts pretty extensively cultivated variety. It is medium early, and generally allowed to be particularly well suited for light soils, and exposed elevated situations.

35. **AUTUMN STUBBLE, or SIX WEEKS TURNIP.**—Roots much above ground; rather large, of an irregular globular shape, or in form somewhat between the White Globe (No. 31) and White Norfolk (No. 37), and rather soft. This sort arrives sooner at maturity than any of the others, the Tankard Turnips (Nos. 39, 40, 41) excepted, and from its natural softness of texture should always be sown late, and used before the severe frosts set in. As descriptive of its earliness, it has received the above names, it being suited for sowing in early situations in autumn after the corn crop has been removed, and is also valuable for making up blanks in turnip fields, where the first sowing may have partially failed.

36. **GREEN NORFOLK*, GREEN ROUND or COMMON GREENTOP WHITE.**—The Norfolk Turnips are all of a peculiar flattish shape, rather hollowed towards their neck, as also on their under side, and when grown to a large size they become more or less of an irregular round or somewhat cornered shape.

The Green Top variety possesses these characters in a less de-

* Norfolk being the county into which the culture of Field Turnips was first introduced, the original and consequently unimproved sorts, when grown in other places, were known by the name of Norfolk Turnips. This name is still retained and applied to a class of turnips which, as far as regards symmetry of shape, are to be considered inferior, and apparently only slightly improved from the first cultivated varieties. The name has no reference to the sorts at present cultivated in Norfolk, which are at least equal to those in any other district of Britain.

gree than the next; and is generally of a pretty regular round shape, flattened, but not much hollowed on the upper and under surface; the former of which is of a green colour and the latter white. It is also hardier than the next two.

37. **WHITE NORFOLK** or **WHITE ROUND**.—This is the largest rooted variety of Norfolk, and at the same time softest and most irregular in shape. It is generally hollowed towards the neck, and being so, it is apt to be injured by retaining moisture, which renders it unfit for using except in the beginning of the winter season.

38. **RED NORFOLK**.—In size this sort is inferior to the last, but rather firmer in texture, and more regular in shape. It should also be used in the early part of the season, and is at once distinguished from all the other round flattened varieties by its bright reddish top, and from the Red Globe (No. 34) by its flat shape.

39. **GREEN TANKARD**.—Roots more than half above ground; oblong or tankard shaped; of a greenish colour, except on the under surface which is white.

The Tankards, like the Norfolks, are unsuitable for winter feeding, not so much on account of their softness as from their standing mostly above ground, and being thereby much exposed to frost. They are also generally earlier in arriving at maturity than the others.

40. **WHITE TANKARD**.—Roots longer, and in general larger, also softer in texture than those of the Green Tankard; often bent or crooked; leaves large and luxuriant; the earliest maturing of any, but will not stand the frost.

41. **RED TANKARD**.—In size, shape, and texture, this variety may be considered as occupying an intermediate place between the Green and White Tankard. It is of a bright red colour on the upper surface, and white on the under.

*** *White Sorts more particularly suited for Garden Culture.*

42. **WHITE DUTCH**.—This is the most esteemed sort for early crops. It is juicy and of excellent quality when young, but soft, spongy, and inferior when full grown, at which period it becomes of

an irregular round and much flattened shape. Its culture in the field has been recommended when late sowing is necessary, but in such a case the Autumn or Six weeks (No. 35), and the Tankards (Nos. 39, 40, and 41), are decidedly preferable.

43. RED DUTCH or EARLY GARDEN RED.—The roots of this are very similar in shape to those of the last variety, but differ in colour, being bright red above ground, and also in having smaller and darker coloured foliage. This is a very excellent variety, but little known in this country.

44. WHITE GARDEN or EARLY STONE TURNIP.—This is a common and well known Garden Turnip, of a rounder shape, firmer texture, with stronger foliage than the White Dutch; it is not, however, so well adapted for early spring sowing, being more apt to run to seed, and has acquired the name of Early from the circumstance of its arriving soon at maturity when sown at a later period of the season. A carefully selected and improved variety of this is known in some parts of England by the name of Mouse-tail Turnip.

45. SMALL LONG WHITE, *Le Navet de Meaux blanc*, Fr.—This variety differs from the Small Long Yellow, which see (No. 27), in little except in colour.

46. SMALL VERY LONG, or MALTESE LONG WHITE, *Le Navet de Clair Fontain*, Fr.—This differs from the preceding in being generally partly above ground, which part is of a greenish colour; also much longer and tapering more gradually towards the point.

***** *Sorts not included in any of the preceding divisions.*

47. ROUND BLACK TURNIP.—Leaves small, few and smoothish; roots almost or altogether under ground, of an irregular roundish shape, often divided or terminating in thick branches at its lower extremity; skins very rough and of a black colour; flesh white.

This and the next three sorts have a hottish somewhat radish-like taste, for which they are esteemed and cultivated in some parts of the Continent.

48. **ROUND BROWN TURNIP.**—This differs from the last in little except in colour, which is dull brown or earthy like.

49. **LONG BLACK TURNIP.**—This differs from the Round Black (No. 47) in little except the form of its root, which is of a long carrot shape, and also mostly under ground.

50. **LONG BROWN TURNIP.**—This variety bears the same relation to the Round Brown, as the last does to the Round Black Turnip.

51. **SMALL BERLIN or TELTAU TURNIP.**—This is remarkable as being the smallest of all the Turnips. It is of an oblong or carrot shape, about three inches in length, and at the thickest part seldom above an inch in diameter; of a dull transparent-like white, or very light lead colour, and is possessed of a peculiar slightly hot taste.

Specimens of Turnips, with Notices regarding their Culture, &c. presented to the Museum.

CROP 1834.

By Mr William Henderson, Whim, Peeblesshire.

One root, weight 8 lb., variety No. 1.

Do. do. do. $7\frac{1}{2}$ lb. do. No. 4.

Do. do. do. $8\frac{1}{2}$ lb. do. No. 12.

Do. do. do. $9\frac{1}{4}$ lb. do. No. 15.

These specimens were grown on newly improved soil, composed almost entirely of peat to the depth of ten feet, and which formerly produced nothing but such weeds as are peculiar to peaty marshes, being occasionally overflowed in wet weather. The above turnips were sown on the 26th of May, being manured with a compost of earth and dung.

By the Hon. Captain Maitland. Communicated by Mr Jamieson, Lauder.

Three specimens, weight of largest $8\frac{1}{2}$ lb. variety No. 1.

Four do. do. $10\frac{1}{2}$ lb. do. No. 7.

Two do. do. 9 lb. do. No. 35.

Do. do. do. 9 lb. 2 oz. do. No. 36.

By Mr Dudgeon, Falkland.

Two specimens, weight of largest $9\frac{1}{2}$ lb. variety No. 2.

These were both of the most perfect symmetry, and the produce of seed grown by Mr Dudgeon.

By Mr Morris, Overseer, Invermay, Perthshire.

One specimen, weight	9 lb.	variety No. 1.
Nine do. average weight	$8\frac{3}{4}$ lb.	do. No. 4.
One do. weight	$11\frac{1}{2}$ lb.	do. No. 7.
Do. do. do.	$10\frac{1}{2}$ lb.	do. No. 32.

These were all selected more for their fineness of shape than large size.

By Andrew Howden, Esq. Lawhead, East Lothian.

Six specimens, weight of largest	$10\frac{1}{4}$ lb.	variety No. 1.
Do. do. do.	10 lb.	do. No. 15.

By Mr Cockburn, Land-steward, Hopetoun House.

Four specimens, weight of largest $10\frac{3}{4}$ lb. variety No. 4.
Manured with twenty-five tons farm-yard dung per acre.

By Mr P. Hume, Land-steward, Fordel, Fifeshire.

Two specimens, weight of largest	11 lb.	variety No. 7.
Do. do. do.	$10\frac{1}{2}$ lb.	do. No. 31.

By Mr J. Kirk, Preston Mains.

Two specimens, weight of largest	$10\frac{1}{2}$ lb.	variety No. 1.
Do. do do.	12 lb.	do. No. 7.

These were grown on a light gravelly soil, property of Sir J. B. Hepburn of Smeaton, Bart.

By Mr M'Naughton, Gardener, Edmonstone.

Four specimens, weight of largest	$23\frac{1}{2}$ lb.	variety No. 4.
Do. of smallest	$15\frac{3}{4}$ lb.	

These sprung up spontaneously in spring, on a piece of garden ground which was trenched during the preceding winter, and which was trenched five years before that period, after being cropped with the above variety (No. 4,) of Swedish Turnips, so that the seed had lain in the ground, from the period when first sown, about six years.

By Mr R. Hogg, Nursery and Seedsman, Dunse.

Several specimens, average weight 12 lb. of variety, No. 13. (Berwickshire Border Imperial Purple Top Yellow), with the following particulars :—" This turnip possesses all the qualities of the Swedish, with the advantage of being a much freer grower. It succeeds well on every variety of turnip soil, produces a larger crop than the White Globe, is a fine feeder, and stands the winter better than any of the Common Yellows. It is in full perfection for using in February, and

continues for as long a period as the Swedes ; and should the latter fail, the Border Imperial being sown as late as the month of June, will yield a crop equal if not superior to what might have been expected from the Swedes had they succeeded. This variety has been grown by me (since I first raised it) for ten years with great advantage.

ROBT. HOGG."

By Matthew Buist, Esq. Dunglass.

Three specimens, average weight $10\frac{1}{2}$ lb., variety No. 1.

Do. do. do. 10 lb. 6 oz. do. No. 2.

By the Editor of the Scotsman.

One root, weight 24 lb. 10 oz., variety No. 31.

The above was the largest specimen in the Museum, of crop 1834, and was grown on the farm of Mr Robb, Gorgie Mains.

By Charles Hood, Esq. Invergordon, Inverness-shire.

Six specimens, average weight, $10\frac{1}{4}$ lb., variety No. 7.

Three do. do. $9\frac{2}{3}$ lb. do. No. 15.

Do. do. do. $10\frac{1}{2}$ lb. do. No. 17.

Do. do. do. $8\frac{1}{2}$ lb. do. No. 22.

Do. do. do. $10\frac{3}{4}$ lb. do. No. 28.

By Mr J. Smeal, Millburn Tower.

Two specimens, weight of largest $9\frac{1}{2}$ lb., variety No. 1.

Do. do. do. $9\frac{1}{2}$ lb. do. No. 4.

Grown on a clay loam with a gravelly subsoil, and manured with twenty-seven tons farm-yard dung per acre ; produce of clean roots, forty-four tons ; and

Two specimens, weight of largest $8\frac{1}{2}$ lb., variety No. 1.

Do. do. do. $8\frac{1}{2}$ lb. do. No. 4.

Grown on a light sandy soil, manured with twenty-seven tons farm-yard dung and tree leaves, in the proportion of three to one ; produce per acre forty tons.

Also grown on the same kind of soil with the same kind of manure,

Two specimens, weight of largest $12\frac{1}{2}$ lb., variety No. 7.

Do. do. do. $10\frac{1}{2}$ lb. do. No. 12.

Do. do. do. 11 lb. do. No. 15.

By Mr James Meiklejohn, Tranent Mains.

Eight specimens, average weight $8\frac{1}{2}$ lb., varieties Nos. 1 and 4.

Grown on improved peaty soil ; cropped with oats the preceding year, which were sown in drills, and hoed to get quit of annual weeds ; stubble cross-ploughed in November 1833 ; and ploughed

again in March 1834, and previous to sowing, which was on the 26th and 27th of May, the whole was subjected to a course of Finlayson's Harrow, to destroy weeds, by which means the soil was better able to retain its moisture than if ploughed; farm manure applied (to the extent of ten tons per acre) in the drills, which were made $27\frac{1}{2}$ inches apart, and the plants were afterwards thinned out to the distance of twelve inches in the row.

By Mr John Proudfoot, Pinkie Hill, Inveresk.

Six specimens, average weight $9\frac{1}{2}$ lb. variety No. 1.

Grown on a strong clay soil.

By Mr Alexander Temple, Gadener, Falkland Palace.

Two specimens, weight of largest 3 lb., variety No. 23.

By Mr Robertson, Gardener, Kinfauns Castle, Perthshire.

Two specimens, weight of largest $2\frac{1}{4}$ lb., variety No. 47.

Do. do. do. 2 lb. do. No. 48.

CROP 1835.

By Jas. Stewart, Esq. Woodhall, Lanarkshire.

Four specimens, weight of the largest 12 lb., variety No. 1, grown in the orchard at Woodhall, on a strong soil which was under grass until the previous season, when it was broke up, limed, and cropped with oats, and next season manured with stable dung for the turnip crop. The trees in the orchard before the grass was broken up bore a stunted-like appearance, but are now considerably improved, their foliage having acquired a deeper and more healthy green colour.

By Mr Samuel Girdwood, Kerry-lamont, Isle of Bute.

Two specimens, weight of largest 14 lb., variety No. 1.

Do. do. do. $17\frac{3}{4}$ lb. do. No. 7.

Do. do. do. $15\frac{1}{4}$ lb. do. No. 12.

Do. do. do. 15 lb. do. No. 15.

Do. do. do. $16\frac{1}{4}$ lb. do. No. 28.

Do. do. do. $18\frac{1}{2}$ lb. do. No. 31.

The above specimens, by Mr Girdwood, were selected from amongst a number of others exhibited at an Agricultural Society's Show at Rothesay, Isle of Bute, and were all grown on that island.

By the Rev. J. M. Robertson, Livingston Manse.

Three specimens, aggregate weight $29\frac{1}{4}$ lb., variety No. 1

Two do. do. do. $21\frac{1}{2}$ lb. do. No. 7.

Grown on a light loamy soil of medium quality.

By Messrs Wm. Davidson and Co. Seedsmen, Aberdeen.

Two specimens, aggregate weight $19\frac{3}{4}$ lb., variety No. 15.

By James Johnston, Esq. of Straiton, communicated by Mr Robert Bell, Champfleurie.

Four specimens, weight of the largest 14 lb. variety No. 7.

Do. do. do. 23 lb. do. No. 31.

By Mr J. Smcal, Millburn Tower.

Two specimens, weight of the largest 9 lb., variety No. 1.

Two do. do. do. 11 lb. do. No. 3.

Three do. do. do. $10\frac{1}{4}$ lb. do. No. 12.

Do. do. do. $10\frac{1}{2}$ lb. do. No. 15.

All grown in the same field, on what is generally termed a medium good black loam, which had 25 tons of manure (farm-yard dung, and about one-fourth of decomposed tree leaves) applied per acre in the drills before sowing.

By Mr James Stenhouse Jun. Colterwell, Ormiston.

One specimen of variety No. 7, weight $12\frac{1}{2}$ lb., and circumference 30 inches, grown on a light gravelly soil.

By Messrs W. and J. Noble, Seedsmen, Fleet Street, London.

One specimen, weight $11\frac{1}{4}$ lb., variety No. 12.

Do. do. do. $10\frac{1}{4}$ lb. do. No. 39.

Do. do. do. $12\frac{1}{2}$ lb. do. No. 40.

Do. do. do. 10 lb. do. No. 41.

By Andrew Longmore, Esq. Ratter, Banff.

Six specimens, average weight $8\frac{3}{4}$ lb., variety No. 8.

For farther particulars, see page 241-2.

By the Right Hon. The Earl of Lauderdale, communicated by Mr Thomas Fair, Woodhead, Lauder.

Four specimens, average weight $8\frac{3}{4}$ lb., variety No. 1.

Five do. do. do. 9 lb. do. No. 7.

Four do. do. do. $9\frac{3}{4}$ lb. do. No. 31.

The above were grown on land of a high elevation, which until the year 1833 was a peat marsh, producing nothing but weeds. It was twice cropped with oats (in 1833 and 1834), and in 1835 had sixteen single horse cart-loads of lime applied to the acre. The Swedish turnips (No. 1) were sown on the 23d of May, with $2\frac{1}{2}$ quarters of bone-dust per acre, and the produce of clean roots was about 28 tons 2 cwt. The Dale's Hybrid and White Globes were sown on the 18th and 20th of June, and manured with eighteen single-horse carts of

farm-yard dung. Produce of the former 25 tons, and of the latter 27 tons 3 cwt. per acre.

By Charles Hood, Esq. Invergordon, Ross-shire.

Three specimens, average weight 9 lb.,				variety No. 1.
Four	do.	do.	10½ lb.	do. No. 7.
Two	do.	do.	9 lb.	do. No. 15.
Do.	do.	do.	10¾ lb.	do. No. 17.

These were all selected on account of their fineness of shape, and from their possessing the true characteristics peculiar to the varieties known under their respective names.

By Mr J. Smart, Kingside, Peeblesshire.

Two specimens weighing 13 lb. and 14½ lb., variety No. 7.

By George Baker, Esq. Elemese Hall, Durham.

Six specimens of variety No. 31, average weight 4 lb., which were sown on stubble in August, after the corn crop was removed.

By Mr Jamieson, Lauder.

One specimen, weight 1 lb.,				variety No. 1.
Do.	do.	do.	2¼ lb.	do. No. 7.
Do.	do.	do.	1¾ lb.	do. No. 15.
Do.	do.	do.	1½ lb.	do. No. 21.
Do.	do.	do.	3½ lb.	do. No. 35.

These were all raised from seed grown the same season (1835) were sown on the 15th of August, and pulled in the first week of December.

By Mr Black, Land-steward to His Grace the Duke of Buccleugh, Dalkeith.

The following specimens, grown in the Agricultural Garden there :—

One root, weight 8 lb. 2 oz.				variety No. 1.
Do.	do.	7 lb. 12 oz.	do.	No. 2.
Do.	do.	8 lb. 13 oz.	do.	No. 3.
Do.	do.	8 lb.	do.	No. 4.
Do.	do.	5 lb. 3 oz.	do.	No. 5.
Do.	do.	4 lb. 10 oz.	do.	No. 6.
Do.	do.	10 lb. 3 oz.	do.	No. 7.
Do.	do.	9 lb. 3 oz.	do.	No. 15.
Do.	do.	9 lb. 6 oz.	do.	No. 16.
Do.	do.	8 lb. 14 oz.	do.	No. 20.
Do.	do.	3 lb. 9 oz.	do.	No. 23.
Do.	do.	5 lb. 3 oz.	do.	No. 24.

One root, weight	5 lb. 12 oz.	variety	No. 26.
Do.	do. 3 lb. 2 oz.	do.	No. 27.
Do.	do. 10 lb.	do.	No. 28.
Do.	do. 10 lb. 2 oz.	do.	No. 29.
Do.	do. 9 lb. 12 oz.	do.	No. 30.
Do.	do. 11 lb. 3 oz.	do.	No. 31.
Do.	do. 10 lb. 6 oz.	do.	No. 32.
Do.	do. 5 lb. 2 oz.	do.	No. 42.
Do.	do. 5 lb.	do.	No. 43.
Do.	do. 3 lb.	do.	No. 45.
Do.	do. 3 lb. 8 oz.	do.	No. 46.
Do.	do. 2 lb. 12 oz.	do.	No. 47.
Do.	do. 2 lb. 10 oz.	do.	No. 48.
Do.	do. 3 lb. 6 oz.	do.	No. 49.
Do.	do. 3 lb. 12 oz.	do.	No. 50.
Do.	do. 2½ oz.	do.	No. 51.

These turnips, from the Agricultural Garden, Dalkeith, being all grown on a medium light, rich, black loam, sown at the same time, and having all received the same sort of management, the above serves in some measure to shew the relative weight or size that the sorts there enumerated bear to one another.

Seeds of Turnips presented to the Museum.

By Mr Ballantyne, Nursery and Seedsman, Dalkeith.
Variety No. 2.

By Messrs Beck, Henderson, & Co., Seedsmen, London.
Variety No. 3.

By Mr Robert Scott, Laurencekirk.
Variety No. 9.

By Mr Wm. Skirving, Nursery and Seedsman, Liverpool.
Variety No. 14.

By Charles Hood, Esq. Inverbrora, Sutherland.
Variety No. 17. Raised on his farm of Invergordon, Ross-shire.

By Messrs Drummond and Sons, Nursery and Seedsmen, Stirling.
Variety No. 14.

By Messrs Wilhmott & Co., Seedsmen, Lewisham.
Variety No. 29.

By M. Vilmorin & Co., Nursery and Seedsmen, Paris.

Nos. 26, 27, 43, 45, 46, 47, 48, 49, 50, 51.

By Dr L. Edmonston, Shetland.

Seeds of a particular turnip, which were sown at Meadowbank Nursery, and turned out to be the same as, or at least to resemble, No. 51.

By Mr John Gow, Fettercairn.

The following account of an experiment conducted by him to ascertain the comparative values of Dale's Hybrid Turnip (Var. No. 7.), and Lawton Hybrid (Var. No. 28):—"The field in which he grew Dale's Hybrid and Lawton Hybrid Turnips, contained about twelve Scotch acres, composed of a deep black sharp soil, on a gravelly subsoil, which was deep ploughed in autumn 1834, after a crop of oats; twice ploughed in spring 1835, and afterwards cleared of weeds previous to its being drilled up for sowing on the 4th of June. The manure, consisting of 20 tons per acre of well decomposed farm-yard dung, was applied in the drills 28 inches apart, and these sown alternately with the above sorts of turnip.

The Dale's Hybrid turned out the most regular in size; the largest were about 28 inches in circumference, and the average weight per drill, of 412 yards long, on the 4th of January when they were pulled, was 255 stones imperial, equal to 4590 stones, or nearly 29 tons per Scotch acre.

The Lawton Hybrids were more irregular in size, the largest being about 32 inches in girth; and, on being taken up on the 9th of January, weighed on an average 305 stones per drill, or 34 tons and 50 stones per acre.

In France other varieties known by the following names are cultivated:—*Le Navet de Sablons*; *Le Navet Rose du Palatinat*; *Le Gros long d'Alsace*, together with several varieties of the Swedish Turnip, seeds of which have not as yet been received.

II. Belonging to the class and order *Pentandria Digynia* of Linnæus, and to the natural order *Chenopodeæ* of Jussieu.

BETA—BEET.

GENERIC CHARACTERS.—Calyx when green, soft, and fleshy, but

when ripe of a hard or somewhat woody-like texture, into which the kidney-like shaped seeds are deeply imbedded.

BETA VULGARIS.—COMMON BEET.

SPECIFIC CHARACTERS.—Stems branching ; flowers greenish, without or with very short footstalks ; leaves all smooth, lower ones ovate ; root fleshy ; biennial ; native of the south of Europe, introduced to Britain in 1548.

The varieties of *Beta vulgaris* may be divided into two important classes, viz. : *B. vulgaris campestris*, Field Beet, and *B. vulgaris hortensis*, Garden Beet. In the former are included all those of greatest importance to the agriculturist, and in the latter, such as are chiefly confined to garden culture, and some of which are well known as valuable esculent vegetables.

In this country the varieties of *Beta vulgaris campestris* have hitherto received a rather limited share of cultivation ; not so, however, in some counties of England, where their qualities are more justly appreciated. One reason why they may not have hitherto received a greater share of attention is from an opinion being prevalent, that however well Field Beet may succeed in England, the climate of Scotland is, to a certain degree, unsuited for their growth. Judging, however, from specimens of the growth of this country, with the accompanying remarks, which have been presented to the Museum at various times, and from different districts, there seems every reason to conclude that a more general knowledge of its merits, and perhaps the removal of a little prejudice on the part of cultivators, is only necessary to insure its more extended cultivation. Both roots and leaves are particularly valuable, as food for live-stock and for milch cows in particular, as they are found to impart a rich and agreeable flavour to their produce. In France the cultivation of Mangel Wurzel has long been carried on to a great extent for the manufacture of sugar, and both on the Continent and in Britain it has been used in the distillery.

Mangel Wurzel succeeds best on rather strong rich soils, but will thrive well on such as have a considerable portion of decayed peat in their composition, as also on strong clays, provided they can be got sufficiently pulverised to insure a fair braird, the ground being in all cases previously deep ploughed. From five to seven pounds of seed are sufficient for sowing an imperial acre, in rows about two feet apart.

Besides the use of the garden sorts for pickles, &c. as is well known

in this country, in France some of them are used as a substitute for coffee after having been cut into slices and sufficiently dried.

* *BETA VULGARIS CAMPESTRIS*, *Field Beet or Mangel Wurzel*.

1. COMMON OR MARBLED FIELD BEET, OR MANGEL WURZEL.—Leaves reddish or reddish green ; roots thickly fusiform or spindle-shaped, of a dullish red colour on the outer surface, and marbled, or of a mixed white and reddish colour of various shades in the interior. This variety is the most esteemed, and generally cultivated for feeding cattle, from its being a free grower, and also from its producing a much greater weight of roots per acre than any other. The marbled, or mixed-like colour of its flesh, seems particularly liable to vary, being in some specimens of a nearly uniform red colour, while in others the red is scarcely and often not at all perceptible. These variations in colour are, however, of no importance in regard to the quality of the roots.

2. RED SKINNED MANGEL WURZEL WITH WHITE FLESH.—Leaves somewhat lighter in colour than those of the last ; roots also thicker in proportion to their length or more approaching to what is generally termed a turnip shape ; skin of a bright-lightish red colour and flesh very white. This variety is to be particularly distinguished by cultivators, from the whiter or almost white-fleshed specimens of the last, and is easily recognised by its more globular and also smaller root. It is cultivated in some parts of Germany, but not being superior to the last for any purpose whatever, while at the same time it is considerably inferior in bulk of produce, it is at present scarcely known in Britain.

3. YELLOW OR GOLDEN MANGEL WURZEL.—Leaves green with yellowish or orange-coloured ribs ; root pretty regularly and thickly fusiform, with a deep yellowish coloured skin, and light yellow, or almost whitish coloured flesh. Compared with (No. 1) the roots of this variety are in general much smaller, but they are considered finer in texture, to contain more saccharine matter, and, therefore, more esteemed for feeding horses, as well as (on the Continent, particularly in Germany) for the manufacture of sugar, and also in the distillery.

4. **WHITE MANGEL WURZEL.**—Leaves green with very light green coloured ribs ; skin and flesh of the thickly fusiform roots ; white. This variety is like the last, chiefly esteemed on the Continent (but more particularly in France) for the manufacture of sugar and for the distillery.

5. **TURNIP-ROOTED MANGEL WURZEL.**—Roots globular or heart-shaped, being generally slightly tapered towards the bottom, with reddish coloured skin and slightly marbled red and white, or entire white flesh. This variety, compared with the others, is of recent introduction, and, from the shape of its roots, admirably adapted for shallow soils, in addition to which it is also said to be particularly suited for such as are of a light sandy or siliceous nature.

**** BETA VULGARIS HORTENSIS—*Garden Beet.***

6. **COMMON or LARGE RED GARDEN BEET.**—Leaves reddish ; roots generally entirely under ground, pretty long, of a regularly tapered or fusiform shape, and of a uniform red colour throughout.

7. **SMALL DEEP RED BEET, SUPERB DEEP BLOOD RED BEET, &c.**—Leaves rather small and spreading, of a very deep red colour ; roots growing more above ground, smaller and more bluntly tapered than those of the last ; and both in skin and flesh of a much deeper blood red colour.

8. **NEW BLACK or MULBERRY BEET.**—This seems a subvariety of the last, from which it differs chiefly in being of a much darker or almost blackish mulberry colour ; it is as yet but little known, being only recently introduced.

9. **NEW SHORT-ROOTED DEEP BLOOD-RED BEET.**—Like No. 7, this sort also grows a good deal above ground, and differs from it chiefly in having much shorter or more turnip-shaped roots.

10. **BASANNO BEET.**—Leaves reddish-green, with red coloured ribs ; roots globular or slightly depressed, with a smooth bright red coloured skin, and pure white flesh. This variety was first introduced by Sir John M. Naismyth, Bart. of Posso.

11. NEAPOLITAN TURNIP-ROOTED BEET.—This variety differs from the last chiefly in having reddish or marbled-like flesh.

In addition to the varieties above particularised, several others of minor importance, the seeds of which were received from France, were exhibited in the museum. Of these may be mentioned Yellow Small Long, and Turnip-rooted Beets, White Turnip-rooted Beet, &c.

*Specimens and accompanying remarks presented to the Museum,
Names of the Donors, &c.*

CROP 1834.

By Andrew Howden, Esq. Lawhead.

Six roots of mangel wurzel, variety No. 1, grown on rather light rich soil; weight of the largest 11 lb. 12 oz., average weight 10 lb. 4 oz.

By Mr J. Kirk, Preston Mains.

Two roots, aggregate weight 20 lb. 6 oz., variety No. 1.

*By Admiral Sir Philip Durham, Bart. Fordel, communicate by
Mr P. Hume, Landsteward there.*

Six roots, average weight 12 lb. 8 oz. variety No. 1.

Two do., weight of largest 6 lb. 5 oz. do. No. 5.

*By General Durham, Largo, communicated by Mr Horn, Land-steward
at that place.*

Two roots, weight of the largest 15 lb. 2 oz., variety No. 1.

Produce per imperial acre, as stated by Mr Horn, about 38 tons.

By Matthew Buist, Esq. Dunglass.

Six roots, average weight 10 lb. 12 oz., variety No. 1.

By Mr M'Naughton, Gardener, Edmonston.

One root, weight 14 lb., variety No. 1.

By the Rev. J. M. Robertson, Livingston Manse.

Six roots, average weight 9 lb. 12 oz., variety No. 1.

These last were grown on a piece of ground cropped with mangel wurzel the preceding season. Soil rather tenacious, trenched to the depth of two spades, and an average allowance of farm-yard dung placed between the spadings. Sown about the latter end of March, in rows two feet apart, and afterwards thinned out to the distance of ten inches in the row. The plants afforded a good supply of green food, being bladed three times. Mr R. finds that the roots of mangel wurzel are as hardy and easily preserved as those of common turnips.

Last year he had them in perfection in the beginning of May, and considers that, on a deep dry soil, they surpass every other root that can be cultivated for feeding cattle.

By D. Low, Esq. of Laws, Professor of Agriculture in the Edinburgh University.

One root, weight	12 lb., 3 oz.	variety	No. 1.
Do. do. do.	8 lb. 6 oz.	do.	No. 2.
Do. do. do.	10 lb. 12 oz.	do.	No. 3.
Do. do. do.	8 lb.	do.	No. 4.

By Mr J. Smeal, Millburn Tower.

Six roots, average weight, 9 lb. 13 oz. variety No. 1.

Grown on a light sandy soil, manured with twenty-seven tons (per acre) of farm-yard dung, mixed with about one-third of tree leaves; weight of roots per acre about thirty-six tons.

By Messrs Ronalds and Son, Nursery and Seedsmen, Brentford, London.

One root, weight	16 lb. 10 oz.,	variety	No. 1.
Do. do. do.	13 lb. 3 oz.	do.	No. 3.
Do. do. do.	12 lb. 4 oz.	do.	No. 4.

By Messrs Jacob Wrench and Sons, Seedsmen, London.

One root, weight	16 lb.	variety	No. 1.
Do. do. do.	13 lb. 3 oz.	do.	No. 3.
Do. do. do.	12 lb. 13 oz.	do.	No. 4.

By Mr Robertson, Kinfuuns Gardens, Perthshire.

Three roots, average weight 3 lb. 3 oz., variety No. 7.

By Mr Alex. Temple, Falkland.

Two roots, average weight	4 lb. 6 oz.,	variety	No. 6.
Do. do. do.	3 lb. 4 oz.	do.	No. 7.

Mr Temple recommends the following method of cultivation for the red and dark rooted garden varieties of beet:—"They succeed best in a deep sandy loam, which should be well manured for the preceding crop (cauliflower, celery, or other green crop), afterwards trenched in autumn to the depth of about eighteen inches, and in the beginning of April the whole is to be smoothed over with a rake, but by no means dug, and the seed sown in drills two inches deep, and fourteen inches apart. The plants are afterwards to be thinned out to about eight inches in the rows, and kept free from weeds till November, when the roots are to be taken up with great care (observing not to break or wound them with the spade, else the red coloured juice will escape), their leaves are then to be taken off, except a few of the smaller ones in the centre, and the roots stored amongst dry sand in

a cellar for use. Mr T. asserts, that although dung applied at the time of sowing may cause the roots to grow larger, yet they are always coarser in quality ; therefore, when the fineness of quality is to be kept in view, manure should never be directly applied, either to beet, carrots, or turnips."

*By Mr James Barnett, Superintendent of the Experimental Garden,
Inverleith Row.*

Two roots, average weight 2 lb. 13 oz., variety No. 8.

By Mr Caldwell, Gardener, Holylee.

Two roots, weight of the largest 5 lb. 3 oz., variety No. 6.

By Mr John Finlayson, Kincardine.

One root, weight 7 lb. 6 oz., variety No. 6.

Grown by Mr James Chrystal, gardener to Mr Walker.

By P. Young, Esq. London.

Spirits made from mangel wurzel, and a specimen of packing paper, made from the refuse or pulp of the same, with the following copy of a letter from Mr R. Dickson, now residing at Kidbrooke, Blackheath, but formerly at Bangholm near Edinburgh, on their culture :—

DEAR SIR,

KIDBROOKE, BLACKHEATH,
14th November 1831.

IN reply to your letter of the 12th inst., requesting my opinion, as an agriculturist, of the beneficial effects of a large growth of Mangel Wurzel, cultivated in the United Kingdom, I beg to state, from my practical knowledge of the soil in England and Scotland adapted for the production of that valuable root, a very large quantity could be raised, provided sufficient encouragement were given.

The soil best adapted for this purpose is the rich alluvial loam upon a dry subsoil.

This root has been cultivated to a limited extent in some of the counties round London, and also in some of the central ones, but owing-to the low price that it has produced within the last two years from the large cow-keepers in London, they being the only consumers, a remunerating return has not been got for it. Those agriculturists who have cultivated this root in a proper manner, for the purpose of feeding their own stock, must have been amply repaid.

I have found from experience, that the cultivation of this root is not so liable to the risk of a failure by adverse seasons as Swedish Turnips ; and I consider it a more valuable root in the feeding of all kinds of stock, if properly applied.

Were the agriculturists of the United Kingdom more generally in

possession of the knowledge of the value of this root, I have no hesitation in stating, that they would find it for their interest to produce 1000 tons for one that is now raised, as it has been proved to me by practical experience to be a good preparation for all white crops. I have had a return, upon an average of five years, of from thirty-two to forty bushels of wheat of the finest quality, per acre, after mangel wurzel; and I am quite confident, were encouragement given in Ireland, where the soil is so congenial to its growth, that it would be a source of great value to that country, as the same cultivation that is used for potatoes will suit it, and which the agriculturists there are so well acquainted with; I must also state, that the extension of the growth of this root in that country will be the means of bringing a great quantity of waste land into cultivation.

If you have any thing in view that would promote a great consumption of this root at a remunerating price (say 10s. per ton), I have no doubt in a few years you might procure any quantity. I remain, dear Sir, yours truly,

(Signed) R. DICKSON.

CROP 1835.

By the Rev. J. M. Robertson, Livingston Manse.

Three roots, average weight 8 lb., variety No. 1.

By Mr Alex. Temple, Falkland Palace.

Three roots, average weight 2 lb. 14 oz., variety No. 7.

Do. do. do. do. 3 lb. do. No. 8.

By Captain Watson, Drylaw.

Two specimens, aggregate weight 17 lb. 4 oz., variety No. 1.

By Mr J. Smeal, Millburn Tower.

Three roots, aggregate weight 15 lb., variety No. 6.

By Mr Geo. Charlwood, Seedsman, London.

Two specimens, aggregate weight 24 lb., 6 oz. variety No. 1.

Do. do. do. do. 16 lb. do. No. 5.

By Messrs Beck Henderson & Co., Seedsmen, London.

One specimen, weight 8 lb., 3 oz. variety No. 5.

By Messrs Jacob Wrench and Sons, Seedsmen, London.

Two roots, weight of the largest 16 lb. 3 oz., variety No. 2.

One do. weight 11 lb. do. No. 3.

Do. do. do. 10 lb. 6 oz. do. No. 4.

By Messrs W. and J. Noble, Seedsmen, Fleet Street, London.

One root,	weight	17 lb.	8 oz.,	variety	No. 1.
Do.	do.	do.	15 lb.	12 oz.	do. do.
Do.	do.	do.	15 lb.	9 oz.	do. No. 2.
Do.	do.	do.	8 lb.	do.	No. 4.

III. Belonging to the class and order *Pentandria Digynia* of Linnaeus, and to the natural order *Umbelliferae* of Jussieu.

DAUCUS—CARROT.

GENERIC CHARACTERS.—Flowers in an umbel (a roundish, flattened compound branched-like head, from which the name of the natural order is derived); flowers, of five obcordate unequal petals, superior, or above the seeds which are two together, with four rows of flat prickles, intermediate ribs, and unbeaked; calyx obsolete.

DAUCUS CAROTA—WILD CARROT.

SPECIFIC CHARACTERS.—Flowers white, with a solitary red or purplish coloured barren one in the centre of each umbel; bristles of the seed slender, and as the same becomes ripe the umbel acquires a contracted and concave form; leaves tripinnate; leaflets pinnatifid; segment lines lanceolate and acute; stems rough and furrowed; root hard and fusiform, biennial, grows naturally on dry waste places.

The true *Daucus Carota* is a common poisonous plant of no importance, except as being the origin from which all the cultivated varieties of carrot are derived, and which in appearance differ from the original in little except having thick fleshy fusiform roots. As an agricultural plant, it is only advisable to cultivate the carrot on light, dry, rather rich soils, and on such as are a little peaty, which should be previously subjected to a very deep ploughing; and the purpose to which its roots may be most beneficially applied, is the feeding of horses, although they may also be given as food to other kinds of live-stock, as milch-cows, &c. Its roots, like those of Mangel Wurzel, contain a large portion of saccharine matter, and have also been used in the manufacture of sugar, and in the distillery, but chiefly so in France, Germany, and some other parts of the Continent, where the field culture of the carrot has been hitherto much more extensively practised than in Britain. Carrot seed is peculiarly liable to variation

in quality, and therefore the quantity required to sow an acre, requires to be increased or diminished accordingly. When the seed is of a medium quality, however, about 8 lb. will be sufficient for sowing an acre, in drills fourteen inches apart, which is the system generally recommended ; and as the seeds require a rather long period to vegetate, some cultivators recommend steeping it in water for from one to four or five days previous to sowing, by which means a quicker braird is insured, and the natural annual weeds of the soil have not time to overgrow the carrots before the latter arrive at a sufficiently advanced stage to admit of hoeing or weeding. The period of sowing carrots is generally from the middle to the end of April ; some, however, defer sowing until the first or second week of May, alleging that by so doing they are not so apt to be attacked by the carrot worm, which often proves ruinous to whole crops.

The cultivated varieties of *Daucus Carota* are generally distinguished by the name *D. Carota hortensis*, or Garden Carrots ; but they may be again divided into two classes, as follows :—

* *Varieties of DAUCUS CAROTA HORTENSIS, which, in addition to being cultivated for the Table, are also suitable for Field culture, and for feeding Live Stock.*

1. ORANGE, LARGE ORANGE, LARGE FIELD OR CATTLE CARROT.—Roots entirely, or almost entirely, under ground, long, thick at the upper end, and regularly tapered to the point ; of a somewhat orange or light reddish-vermilion colour, with a rather large heart.

This variety is well adapted for feeding cattle, but from being rather coarse is not so well suited for the table as the next two sorts.

2. LONG RED, or LONG SURREY CARROT.—Roots, compared with those of the last, much longer in proportion to their thickness ; of a deep red colour ; and having a comparatively smaller heart.

3. ALTRINGHAM CARROT.—This sort is easily distinguished from the two last by its roots growing more above ground, also by their having more convex or rounded heads, tapering rather more irregularly, and terminating more abruptly at the point ; in colour most resembling No. 1, but having a smaller heart.

This variety is more difficult to procure genuine than any of the others, from its being remarkably liable to sport, even although the

roots grown for seed be selected with the utmost care. It is an excellent sort for field culture as well as for the esculent vegetable market.

4. **LARGE WHITE GREEN-TOP CARROT.**—Roots thick in proportion to their length; of a large size; white under ground, but of a green colour on the top, which rises considerably above the surface of the soil.

This variety is only recently introduced from France, where it was first brought into notice by M. Vilmorin, and is now pretty extensively cultivated. One great advantage which it possesses is, that, from the comparative shortness of its roots, and their above-ground habit of growth, it is well adapted for shallow soils, which have not depth of soil sufficient to grow the longer rooted varieties.

5. **WHITE OR COMMON WHITE CARROT.**—Roots growing entirely under ground; smaller in size, and of a longer-tapered shape than those of the last, and having also a proportionately thicker heart. This is, on the whole, an inferior sort, and not deserving of cultivation.

6. **RED, DEEP RED, or PURPLE-COLOURED CARROT.**—Roots long and under an average size; of a deep reddish-purple colour, with a large yellow heart.

This variety is sometimes cultivated in France on wet or marshy soils, for which it is reckoned better fitted than any of the others.

**** Varieties of D. CAROTA HORTENSIS exclusively suited for Garden Culture.**

7. **EARLY HORN or DUTCH CARROT.**—Roots less than in any of the former, with a very small heart; thick, short, and terminated abruptly; growing partly above the ground, and having a hollow crown, with very small neck and small foliage.

This is the earliest, and a very much esteemed garden carrot, of which there are several subvarieties in cultivation in Germany and Holland, differing in nothing except in their colour, that being of various shades between yellow and a deep red vermilion, which last is the colour of that most esteemed and exclusively cultivated in this country.

8. **SHORT ORANGE.**—In size and shape of its roots, as well as in the period of its arriving at maturity, this variety may be considered

intermediate between the last and No. 1 ; but although a superior sort, it is as yet less known than either amongst growers.

Specimens, with relative Notes, &c. presented to the Museum.

CROP 1834.

By Mr Alexander Temple, Falkland.

Two roots, aggregate weight 4 lb. 13 oz., variety No. 1.

Do. do. 5 lb. do. No. 3.

By Mr William Henderson, Whim.

Two roots, aggregate weight $2\frac{3}{4}$ lb., variety No. 3.

These were grown on newly improved land ; soil composed of peat to the depth of ten feet, and, until lately, was not worth three farthings per acre, being generally flooded with water in the wet seasons, and produced nothing but sedges and other weeds peculiar to such situations. Seed sown on the 26th of April, roots pulled on the 3d November. Manure, a compost of earth and dung applied at the time of sowing.

By Mr Thomas Stewart, Gardener, Largo House, Fifeshire.

Several roots, average weight $17\frac{1}{2}$ oz., variety No. 6.

Grown on a medium loam with a south exposure, and manured with eighteen tons of well fermented farm-yard dung to the acre ; seed sown on the 8th of April. The field from which these were taken, was partly sown with Nos. 1, 2, and 5, and the weight of produce per imperial acre amounted to about twenty tons.

By Mr James Finlayson, Kincardine.

One root, weight 5 lb. variety No. 1.

Grown by Mr James Chrystal, gardener to Mr Walker, Kincardine.

By Mr R. Hogg, Nursery and Seedsman, Dunse.

Six roots, aggregate weight 20 lb. weight of the heaviest 3 lb. 6 oz., variety No. 3.

By Mr Caldwell, Gardener, Holylee.

Three roots, weight of the largest, $2\frac{3}{4}$ lb., variety No. 3.

CROP 1835.

By Thomas Smith, Esq. Pinfillin, Thornhill.

Several roots, weight of the largest 3 lb. 3 oz. variety No. 4.

Mr Smith considers this a most productive variety, and admirably adapted for growing as cattle's food.

By Mr George Charlewood, from Covent Garden Market.

Two roots, length of longest 20 inch. weight 3 lb. variety No. 2.

Do. do. 22 inch. do. 3 lb. 6 oz. do. No. 3.

PASTINACA—PARSNIP.

GENERIC CHARACTERS.—Flowers in umbels, pentapetalous, superior, uniform, and perfect; petals involute, broadly lanceolate, equal; flower, receptacle broad, thin, and wavy, concealing the minute obsolete calyx; seeds two, nearly round, with a slight notch at the summit, almost flat, with three dorsal and two marginal ribs, border narrow, thin, smooth, and entire.

PASTINACA SATIVA—COMMON OR WILD PARSNIP.

SPECIFIC CHARACTERS.—Leaves pinnate or compound, downy beneath, and generally shining; leaflets broadly ovate, cut and serrated, terminal one three-lobed; colour of the flower yellow; root hard and fusiform; biennial. Grows naturally on light dry chalky soils in England.

The cultivated varieties of Parsnip differ from the common or wild sort, in the same manner that the cultivated carrots do from the wild one, viz. by having thick fleshy roots, instead of these being small and hard. The cultivation of the parsnip in the fields for the purpose of feeding cattle, has hitherto been most successfully practised in the Islands of Jersey and Guernsey, also some parts of France, and the South of England. The produce has been said to be greater than that of the carrot, and that the plants are also more hardy or less liable to disease, but in Scotland any experiments hitherto made (which have indeed been few) do not appear to have been attended with any marked success, more than what might have been expected from carrots under similar circumstances. The parsnip will however succeed on a somewhat stronger soil than the carrot, and the mode of cultivation which it requires is much the same as that practised for the latter (page 265), but as its seeds are longer and heavier, from 2 lb. to 3 lb. more may be allowed to the acre. The only cultivated varieties of parsnip are the following :—

1. **COMMON LONG-ROOTED PARSNIP.**—Roots fusiform, thick, fleshy, and very long, with a somewhat rounded or convex top; entirely white.

2. **LONG JERSEY PARSNIP.**—This, which is an improved variety of the last, differs from it in being larger and thicker towards the top, which is concave; and is the variety cultivated in Jersey, and more recently in some parts of France and England.

3. TURNIP-ROOTED PARSNIP.—This is a small and unimportant variety, only suited for garden culture, and at once distinguished from the others by its short and somewhat turnip-shaped roots.

Specimens presented to the Museum, &c.

By the late Rev. Wm. Stark, Dirleton.

Several roots, average weight $1\frac{3}{4}$ lb., variety No. 1.

Grown in a medium fertile light soil.

By Mr James Barnet, Experimental Garden, Inverleith Row.

Several specimens, average weight 1 lb., variety No. 1.

Do. do. 10 oz. do. No. 3.

By Mr Bernard Saunders, St Heliers, Jersey.

Seeds of variety No. 2.

By Mr Alexander Temple, Gardener, Falkland Palace.

Six specimens, average weight 1 lb. 6 oz., variety No. 1.

By Mr J. Smeal, Millburn Tower.

Six specimens, weight of the largest 2 lb., variety No. 2.

Grown on good garden soil.

By Thomas Abernethy, Esq. Willow Grove.

Two roots, weight 2 lb. 3 oz., variety No. 1.

Connected by being grown close together.

By Mr Wm. Turner, Gardener to the Earl of Caithness, Denham Green.

Three roots, weight of largest 1 lb. 3 oz., variety No. 1.

The following statements by Mr Speirs of Calereuch, the results of experiments conducted by him, shew the relative weight of different plants comprehended in this division of the report :—

	Tons.
Pink-eyed Kidney Potatoes, 120 bolls of 3 cwt. per acre, or	18
Red Top Swedish Turnip, exclusive of leaves and top roots,	38
Common Mangel Wurzel,	28
Large Field Carrot,	9

The above were all grown in one field and on the same kind of soil, which was furrow-drained at the distance of twenty feet from each other; the previous crop was Hopetoun Oats, of which the produce per acre was $13\frac{1}{2}$ bolls. The manure for the potatoes was stable-dung, and that applied to the others was night soil.

PLANTS CULTIVATED FOR THEIR USES IN THE ARTS, MANUFACTURES, AND FOR VA- RIOUS ECONOMICAL PURPOSES.

In this division is comprehended and described, in addition to such plants as are actually the subjects of the most extensive cultivation for the above purposes, such are likely to be found suitable for field culture in the climate of Britain ; together with short notices of such as are exclusively the products of, and imported from, tropical or warm climates. And for the greater facility of reference, these are arranged under the following subdivisions :—

- I. PLANTS YIELDING FIBRE, as Flax, Hemp, &c.
- II. PLANTS YIELDING OIL, as Rape, Poppy, &c.
- III. PLANTS YIELDING COLOURING MATTER or DYE, as Madder, Woad, &c.
- IV. PLANTS USED IN THE ARTS AND MANUFACTURES, NOT INCLUDED IN EITHER OF THE PRECEDING SUBDIVISIONS, as
• Clothier's Teasel, &c.
- V. PLANTS CULTIVATED FOR VARIOUS ECONOMICAL PURPOSES, as Caraway, Mustard, &c.

I. PLANTS YIELDING FIBRE.

- I. Belonging to the class and order *Pentandria Pentagynia* of Linnæus, to the natural order *Caryophylleæ* of Jussieu, and to that of *Lineæ* of Decandolle.

LINUM—FLAX.

GENERIC CHARACTERS.—Flowers five-petaled inferior or under the ten-celled capsule or seed-vessel ; segments of the calyx five, entire.

I. LINUM USITATISSIMUM—COMMON FLAX.

SPECIFIC CHARACTERS.—Segments of the calyx ovate, acute, three-ribbed ; petals crenate or slightly notched ; leaves lanceolate, alternate ; stems generally solitary, divided into numerous branches near the top ; annual. A reputed native of Britain, but generally supposed to be the offspring of cultivation.

1. COMMON FLAX.—Of this species there are several varieties distinguished by slightly different but permanent characteristics, while there are others distinguished by the names of the countries from which they are imported, as Riga Flax, Russian, Dutch, &c.; and although these may have at first an apparent difference in appearance when growing, and in the quality of their produce, yet they become completely assimilated, by being cultivated for a few years under the same circumstances, and are then known under the above name.

Specimen of seeds by Professor Fischer, St Petersburg, of the Flax generally grown in Russia; also seeds of the next three varieties. By Mr A. Gorrie, specimens of Common Flax in various stages of preparation. And by Mr George Stoddard, flax-merchant, Leith, average specimens of different sorts of prepared fibre, distinguished by the following names:—Dutch, Friesland, Irish, Archangel, Riga, Prussian, French, and St Petersburg Flax.

2. *L. USITATISSIMUM ALTISSIMUM*—TALLEST VARIETY OF COMMON FLAX.—Specimens of this variety grown in the Nursery at Meadowbank during last season, possessed a marked superiority over all the others in length, and also in the comparative slenderness of its stalks.

3. *L. USITATISSIMUM CAPSULA OVATA*—OVAL-HEADED VARIETY OF COMMON FLAX.—This sort is distinguished by its short and somewhat rigid habit of growth, and above all, by the oval pointed-like shape of its capsules.

4. *L. USITATISSIMUM FLORE-ALBO*—WHITE-FLOWERED VARIETY OF COMMON FLAX.—This variety is distinguished by its white flowers from those of the three preceding, which are blue; its habit of growth is similar to that of the common sort, No. 1, and its fibre is said to be finer and whiter.

Flax is almost the only plant at present cultivated in Britain for its fibre, nor has it for some time been grown to near the same extent as formerly, although owing to the high price of flax and the low price of grain, its culture has in some districts been rather on the increase during the last season or two. The soils best adapted for flax are those of a light nature, and such as contain a considerable portion of decayed vegetable matter in their composition; and in all cases, the land previous to sowing, which may be done from the middle of March to near the end of April, should be as free as possible from

root and annual weeds, and in a high state of pulverisation. It has been recommended (and in some instances practised with success) to sow grass seeds with the flax crop, pulling the latter when in flower, the ground being rolled immediately afterwards to prevent the young grass suffering from drought. By this practice the soil is not so much exhausted as by a ripe crop of any kind, particularly corn, and the grass plants have more time to acquire strength in autumn.

Flax seed imported from Riga is generally preferred to that of home growth; quantity per acre 2 to $2\frac{1}{2}$ bushels when grown principally for its fibre, which, when the crop is too thin, becomes rather coarse and inferior. The usual method of preparing flax is to cause it to undergo a species of rapid decomposition by steeping in water and afterwards bleaching on grass or stubble, in order to facilitate the operation of separating the fibre from the woody part of the stem; but late experiments tend to prove that such treatment materially affects the strength and durability of the fibre; and that by the aid of recently invented machinery, the work can be done in a more satisfactory and economical manner without the flax undergoing any previous preparation, except binding in sheaves, drying, and stacking in the manner of corn. For much valuable information on this subject, see Loudon's *Encyclopædia of Agriculture*.

I. LINUM PERENNE—PERENNIAL FLAX.

SPECIFIC CHARACTERS.—Segment of the calyx smooth, about five nerved, obovate, obtuse; leaves lanceolate, alternate; stems numerous, branching and spreading towards their extremities; flowers large and of a blue colour; root perennial. Grows naturally in the south of England on light chalky soils.

The culture of this species has been often tried and recommended, but was never carried to a great extent. It yields a strong and rather coarse fibre, which is difficult to separate from the woody part of the stem. Two seasons are required from the period of sowing before a crop can be obtained, but under favourable circumstances, the plants will last for a great length of time; its culture, however, does not seem advisable, except on light inferior chalky soils, such as it naturally grows upon.

Several other, and indeed all the species of the genus *Linum*, yield fibre in greater or less quantities; but none of them seem nearly

equal in value for that purpose to those previously mentioned. Seeds of the following, some of which are very interesting as ornamental flowers, were presented by Messrs Havelaar and Taylor, Rotterdam.

		Height.	
LINUM GRANDIFLORUM,	Great-flowered Flax,	2 feet ;	annual.
... STRICTUM,	Upright Flax,		
... NARBONENSE,	Narbonne Flax, . . .	2	do.
... FASCICULATUM,	Bundled-flowered Flax,	2½	do.
... HIRSUTUM,	Hairy Flax,	2	perennial.
... ALPINUM,	Alpine Flax,	1	do.
... SUFFRUTICOSUM,	Spanish Flax,	1½	do.

II. Belonging to the class and order *Diaecia Pentandria* of Linnæus, and to the natural order *Urticeæ* of Jussieu.

CANABIS—HEMP.

GENERIC CHARACTERS.—Male flowers with a five-parted calyx ; that of the female five-leaved, enveloping the nut-like seed, which is two-valved, and opening at the sides.

CANNABIS SATIVUS—COMMON HEMP.

SPECIFIC CHARACTERS.—Stem upright ; in height from five to eight feet ; strong and branching ; leaves lobed, often quinquifid ; annual ; generally supposed to be a native of the East Indies, but when first introduced to this country is uncertain.

From being a native of a warm climate, the Hemp is too tender to become naturalised in Scotland. It is, however, capable of being cultivated in most districts, and has been so to a considerable extent in the southern parts of Britain, as in Suffolk and Lincolnshire. The soils best adapted for the growth of Hemp are those of a rich damp alluvial nature. The usual method of sowing is broadcast, and the quantity of seed required per acre is from two to three bushels. The fibre, as in the case of flax, being finer when sown thick. The operation of sowing should never be gone into before the season be so far advanced as to prevent any chance of the young plants being injured by frost, or about the end of April. When the crop is intended entirely for fibre, the plants are all pulled promiscuously when in flower, but

when the seed is considered as an object of importance, those which produce only male flowers are pulled when their leaves begin to assume a yellowish hue, and the others are allowed to stand till the seed be ripened. The plants are afterwards tied in bundles, watered, bleached, &c. as in the case of flax. For farther particulars, see *Lou-don's Encyclopædia of Agriculture*.

HUMULUS—HOP.

GENERIC CHARACTERS.—Flowers of the male plants, each a single five-leaved perianth ; anthers with two pores at the extremity ; fertile flowers in a catkin, the scales of which are large, persistent, concave, entire, and single flowered ; styles two ; seed one.

HUMULUS LUPULUS—COMMON HOP.

SPECIFIC CHARACTERS.—Stems herbaceous, twining on poles or other plants for support, to the height of from ten to twenty feet ; leaves generally pretty distinctly five-lobed, rough or hispid ; perennial ; native of England, where it grows in hedges, thickets, and waste places.

Although the Hop is never cultivated for its fibre alone, yet as such may be obtained from it in considerable quantities, it is certainly entitled to a place in this division. The fibre of the Hop is so difficult to separate from the woody part, that the stems require to be soaked in water all winter until the latter be so far decomposed as to admit of that operation. In Sweden, where hitherto its manufacture to any extent has almost exclusively been confined, it is made into a white, strong, and durable cloth.

III. Belonging to the class and order *Monœcia Tetrandria* of Lin-næus, and to the natural order *Urticeæ* of Jussieu.

URTICEÆ—NETTLE.

GENERIC CHARACTERS.—Male flowers each a four-leaved single perianth, containing the cup-shaped rudiments of a germen ; fertile flowers, each a single two-leaved perianth ; seed-vessels containing each a single shining seed.

URTICA DIOICA—COMMON OR GREAT STINGING NETTLE.

SPECIFIC CHARACTERS.—Male and female flowers mostly on distinct plants, (and therefore this species belongs more properly to the class *Dicecia* of Linnæus, but is retained in *Monœcia* by botanists along with the rest of *Urtica*, from the natural affinity between them in other respects, and which are chiefly *Monœcious*); leaves ovate, acuminate, serrated, and heart-shaped at the base, having their surface thickly studded with small stinging hair-like bristles; roots creeping; perennial. Grows naturally in all countries of Europe, and most parts of Asia.

The common Nettle has been long known as affording a large proportion of fibre, which has not only been made into ropes and cordage, but also into sewing thread and beautiful white linen-like cloth of very superior quality; it does not, however, appear that its cultivation for that purpose has ever been fairly attempted. The fibre is easily separated from other parts of the stalk without their undergoing the processes of watering and bleaching, although by such the labour necessary for that purpose is considerably lessened. Like those of many other common plants, the superior merits of this generally accounted troublesome weed have hitherto been much overlooked.

II. URTICA CANNABINA—HEMP NETTLE.

SPECIFIC CHARACTERS.—Leaves smoothish, opposite; lower ones in three deeply pinnatifid segments; upper ones simple; flower clusters, cylindrical, in pairs; stems about three feet in height. Native of Siberia; introduced in 1749.

III. URTICA CANADENSIS—CANADIAN NETTLE.

SPECIFIC CHARACTERS.—Leaves alternate, ovate, somewhat hairy; flower clusters, compound, spreading, shorter than the leaves; lower ones male; upper female; stems two to three feet in height; perennial. Native of North America; introduced in 1646.

In the countries of which they are natives, the inhabitants make cordage and cloth from the fibre of the Hemp and Canadian Nettles; but it is questionable how far their cultivation should be recommended in this country until the result of farther experience is known.

Specimen of seeds of both these species by M. C. A. Fischer, Gottengen.

Most others of this genus yield strong tough fibre, and some of the taller growing sorts might be found superior to any of the above.

IV. Belonging to the class and order *Hexandria Monogynia* of Linnæus, and to the natural order *Asphodeleæ* of Jussieu.

PHORMIUM—FLAX LILY.

GENERIC CHARACTERS.—Segments of the perianth six, three inner longest and most flexible; stamens ascending; seed-vessel oblong, three-cornered; seeds compressed, monocotyledonous.

PHORMIUM TENAX—NEW ZEALAND FLAX.

SPECIFIC CHARACTERS.—Flowers of a light greenish colour, on a strong branching stalk, but are seldom produced in this country; leaves long, tapering, pointed, and equitant, or diverging alternately to two sides, and overlapping each other towards their base; evergreen; perennial. Introduced from New Zealand in 1788.

The leaves of this plant, which in this country grow to the length of three or four feet, afford the fibre imported to a considerable extent from the South Sea Islands under the name of New Zealand Flax, and which, from its strength and durability, is eminently fitted for making ropes and cordage. The plants withstand the rigour of winter in this country without the slightest protection, and hence their more extensive culture has been recommended; but the results of late experiments made in the south of Ireland tend to shew, that although the plants grow very well, yet their produce is inferior to that imported from the South Seas, and that its cultivation in any part of Britain is not likely to prove a profitable speculation.

V. Belonging to the class and order *Pentandria Digynia* of Linnæus, and to the natural order *Asclepiadeæ* of Jussieu.

ASCLEPIAS—SWALLOW-WORT.

GENERIC CHARACTERS.—Calyx five-cleft, small and persistent; flowers monopetalous, flat or reflexed, with a five-leaved crown, having a process on the inside; pollen-masses fixed by a fine-end, stigma depressed and blunt.

ASCLEPIAS SYRIACA—SYRIAN or VIRGINIAN SWALLOW-WORT, VIRGINIAN SILK, &c.

SPECIFIC CHARACTERS.—Stems herbaceous, upright, and unbranch-

ed, from four to six feet in length ; leaves opposite, oval, thick, and downy on the under side ; flowers in nodding umbels, which proceed from the joints or junctions of the leaves and stem, of a dull reddish or purple colour ; pods long and nearly upright when ripe, having a rough leathery-like skin, which opens at one side when the thin membranous edged seeds are seen to be thickly covered, and enveloped in a large quantity of white down, resembling cotton ; roots creeping ; perennial ; native of North America. Introduced in 1629.

In addition to the cottony or downy substance contained in the pods of the Syria Swallow-worts, and which is very useful for stuffing pillows, cushions, &c., as well as for making into thread and cloth, its stalks yield a large supply of fibre of superior quality, the use of which in the manufacture of thread, ropes, fishing-nets, and cloth, is well known and appreciated by the inhabitants of some parts of North America, and its culture in Europe has been much recommended ; but with the exception of some experiments in France, the results of which have been very satisfactory, it has not yet been grown to any extent from which a satisfactory conclusion can be deduced regarding its merits.

The Syria Swallow-wort is found to accommodate itself to a great variety of soils, but thrives best on those of a rather moist nature, of medium texture, and which possess a medium degree of fertility. It may be propagated by transplanting the roots, or sowing its seeds in rows about two feet apart, to admit of keeping the ground sufficiently clear for the first two years ; the third season after sowing it arrives at full maturity, and the interstices will then become completely filled up, from the creeping nature of its roots. The time which a crop will remain in vigour is uncertain, but it may be depended on for a considerable number of years. The flowers are highly fragrant, particularly in the evenings and mornings, and gathered in the latter while the dew is upon them, the Americans, make a sugar from them ; and in spring the young shoots form an excellent substitute for asparagus.

Specimen of seed of this and the next by M. Vilmorin & Co., Paris.

VI. Belonging to the class and order *Pentandria Digynia* of Linnaeus, and to the natural order *Apocynæ* of Jussieu.

APOCYNUM—DOG'S-BANE.

GENERIC CHARACTERS.—Flowers bell-shaped, containing the embryo seed-vessel ; nectaries alternate with the stamens ; style, none ; stygma broad.

APOCYNUM CANNABINUM—CANADIAN HEMP, or HEMP DOG'S-BANE.

SPECIFIC CHARACTERS.—Stems herbaceous, not branched, upright, about four or five feet in height ; leaves oblong, opposite, downy beneath ; flowers whitish-green, in lateral cymes, which are longer than the leaves ; roots creeping ; perennial. Native of North America, introduced in 1699.

The native Indians of North America use fibre prepared from the stalks of this plant, for making twine, bags, fishing-nets, and linen-like cloth for their own use ; but in Europe it has been hitherto entirely confined to botanical collections. From the results of experiments conducted at Paris by Professor Thouin, it appears that the fibre of this, as well as that obtained from the stalks of the last (*Asclepias Syriaca*), is considerably stronger than common Hemp.

VII. Belonging to the class and order *Monodelphia Polyandria* of Linnaeus, and to the natural order *Malvaceæ* of Jussieu.

GOSSYPIUM—COTTON.

GENERIC CHARACTERS.—Calyx double, outer trifold ; seed capsule five-celled, seeds enwrapped in a woolly-like substance, which forms the cotton of commerce.

The whole of this interesting and useful genus are natives of tropical climates, consequently tender, and not entitled to a place amongst the agricultural plants of Britain. In some of the southern districts of Europe, the herbaceous or common annual cotton, is cultivated pretty extensively ; but in the East and West Indies the varieties and species are pretty numerous, some of which are perennial herbaceous plants, and some shrubs on small trees.

Specimen of a ripe capsule, with seed and cotton, by Mrs Dou-

glass, Shrub Place, Leith Walk, grown at Mobile, North America ; and by M. Vilmorin and Co., Paris, seeds of a collection of species, amongst which that cultivated in the East Indies for its nankeen-coloured cotton, is particularly interesting, as it is only of recent introduction into Britain.

ALTHÆA—MARSH-MALLOW.

GENERIC CHARACTERS.—Calyx double, outer six to nine parted ; seed-capsules numerous, one-seeded.

ALTHÆA CANNABINA.—HEMP MARSH-MALLOW.

SPECIFIC CHARACTERS.—Stem rising to about six feet in height, and branching ; leaves downy or hoary beneath, lower ones palmate, upper three-parted ; lobes narrow, and coarsely toothed ; roots long, thick, branching, and mucilaginous ; perennial. Native of Austria, introduced to Britain in 1595.

By submitting the stalks of this plant to a process similar to that employed in the preparation of hemp, it has been found, in France, and other countries of the Continent, to yield a coarse but very strong fibre, which is extremely well suited for making cordage, and coarse cloth for bags, for ship sails, &c. Others of the same genus have also been found to produce fibre of considerable strength, as the *A. narbonensis* (Narbonne Marsh-Mallow), *A. officinalis* (Common Marsh-Mallow), *A. rosea* (the Hollyhock), &c. ; but farther experience is yet requisite, both in the preparation and application of the fibre which they yield, before it be ascertained whether or not they may be cultivated advantageously for that article alone.

LAVATERA—TREE MALLOW.

GENERIC CHARACTERS.—Calyx double, outer trifold ; capsules many, one-seeded.

LAVATERA ARBOREA—COMMON TREE MALLOW.

SPECIFIC CHARACTERS.—Stems upright, strong, and branching ; leaves seven-angled, plaited, downy ; foot-stalks of the flowers small, axillary one flowered, clustered, and much shorter than the foot-stalks of the leaves ; generally termed a biennial, but when not in-

jured by very severe frosts, or broken down by wind, will last for several years. Grows naturally on sea rocks or cliffs, as on the Bass Rock in the Frith of Forth.

The results of experiments conducted in France by M. Cavanilles, tend to shew that the Tree Mallow is capable of producing a very strong fibre, which may be employed for making ropes, &c. and his statements have been confirmed by farther experiments conducted at Toulon. It seems, therefore, not improbable that its cultivation on the sea-coast, where the soil will produce little else, might be attended with profitable results in this country, particularly as it is very hardy, and grows naturally in such situations.

SIDA.

GENERIC CHARACTERS.—Calyx simple, angular ; style many-parted ; capsules several, one to three seeded.

SIDA ABUTILON—ABUTILON or BROAD-LEAVED SIDA.

SPECIFIC CHARACTERS.—Stems simple, or generally so, from three to five feet in height ; leaves broadly cordate, pointed, toothed, and slightly downy ; stalks of the flowers rather shorter than those of the leaves ; flowers small, and of a pale yellow colour ; annual. Native of the West Indies and China, first introduced to Britain in 1596.

Although a considerable time has elapsed since the Abutilon was first introduced to Britain, it has hitherto only been known in Botanical collections, and considered as a stove annual of little use or beauty. In the East Indies and China it is cultivated for the fibre of its stalks, and of late has been introduced pretty extensively into the field-culture of Italy and the south of France.

Belonging to the class and order *Diadelphia Decandria* of Linnæus, and to the natural order *Leguminosæ* of Jussieu.

SPARTIUM—SPANISH BROOM.

GENERIC CHARACTERS.—Calyx lengthened at the base ; stamens ten, monodelphous ; stigma longitudinal, villous above ; shrubby.

SPARTIUM JUNCEUM—COMMON SPANISH BROOM.

SPECIFIC CHARACTERS.—Branches opposite; young twigs cylindrical, green, soft, and rush-like, producing numerous yellow flowers towards their points; leaves simple and lanceolate; grows to the height of ten or twelve feet. Native of Spain, introduced in 1548.

The Spanish Broom is grown in some parts of Spain and the south of France, for its fibre, which is made into cloth of great strength and durability, as also into cordage, &c. It is cultivated in rows three to four feet apart, and small holes being made at the distance of about two feet in the row, three or four seeds are dropped in, and covered to the depth of about an inch. When the plants have stood two, or sometimes three seasons, they are afterwards annually cut over, within an inch or two of the ground, in the end of autumn, or early in spring, and will produce yearly (for a considerable period), a crop of slender twigs, from four to five feet in length, which when cut, are beaten with mallets, steeped in water, and the fibre afterwards separated in the same manner as that of flax. The flowers of Spanish Broom appear in succession during a considerable period, and produce a rich repast for bees.

Others of the broom tribe also yield fibre, and the *Cytisus scoparium* (Common Broom, page 183), is cultivated for that purpose in the same parts as the last; as also the *C. multiflorum* (White Portugal Broom), and *C. monospermum* (One-seeded Broom); but none of these submit to be cut with the same patience as the Spanish Broom, and their fibre is produced in smaller quantities.

There are many more plants capable of yielding fibre, but which are seldom cultivated for that purpose alone, and are therefore more justly referred to other divisions; of these may be mentioned *Ammophila arundinacea* (Sea-side Reed Grass, see page 132), several species of *Tilia* (Lime Tree), which are more especially grown for their timber, and a considerable number more than is included in this section, belonging to the natural order *Malvaceæ*; but although the fibre which they yield be of good quality, yet its quantity is too small to compensate for their cultivation.

II. PLANTS YIELDING OIL.

Oliferous Plants are cultivated either for their *Fixed* or *Volatile Oils*, the former of which are obtained from the seeds by expression, and the latter from the stems, leaves, flowers, or seeds, by distillation.

* *Plants from the seeds of which Oils are obtained by bruising or expression, termed Fixed Oils.*

The plants which yield the Fixed Oils form the most important class, and of those belonging to it, the natural order *Cruciferae* contains such as form the subjects of most extensive cultivation:—

I. Belonging to the class *Tetradynamia* of Linnæus, and to the natural order *Cruciferae* of Jussieu.

I. BRASSICA CAMPESTRIS OLIFER—SUMMER RAPE, WILD NAVEW
COLSAT, or COLZA.

SPECIFIC CHARACTERS.—See page 189.

This and the Winter Rape, *B. napus* (page 189), are the only sorts cultivated to any considerable extent in Britain for the manufacture of oil, and growers generally agree that the former of these is to be preferred, from its yielding a greater proportion of seed; that being, according to experiments by M. Gaujue, to the produce of Winter Rape as 955 is to 700 (*Horticultural Transactions*, vol. 23). The seeds of *B. præcox* and *B. rapa* (page 190), are also occasionally used in the manufacture of oil; but these are not equal in their bulk of produce to the Summer and Winter sorts above mentioned. The following, which have been hitherto but little known in Britain, seem, however, more deserving of particular notice.

BRASSICA ELONGA—HUNGARIAN RAPE.

SPECIFIC CHARACTERS.—Leaves all stalked, radical ones sinuate or waved-like, pinnatifid, hispid, upper ones smooth and toothed; stems smooth, three to four feet in height; biennial. Native of Hungary.

The cultivation of this rape has been chiefly confined to its native

country. Compared with the summer and winter sorts, it produces a smaller bulk of leaves, consequently is less adapted for feeding cattle, but is said to yield a much larger quantity of seeds, for which it is exclusively cultivated.

Seeds of this, and of another species unnamed, but which is also cultivated for its oleaginous seeds, by M. C. A. Fischer, Göttingen.

The rape, when grown for its ripe seeds, has a much more exhausting effect on the soil than when eaten off or removed in a green state, and should therefore be considered as, and to occupy the place of, a white or corn crop. The common sorts may be sown from the end of May to the middle, or, in early situations, the end of August (the *B. campestris* may be sown latest), which should always be done in rows, and the after culture is the same as when intended for a green crop until the following season, in which it is cut when fully ripe, or about the month of June; and afterwards (being allowed to lie until its natural moisture is evaporated), generally thrashed out in the field, the facility with which its seeds are dispersed rendering the carting it to the barn inadvisable. The average produce in clean seed may, under favourable circumstances, be computed at from forty to fifty bushels per acre. In some parts of the Continent, where an oil-mill is considered as a necessary appendage to the farm, the seed is conveyed thither and bruised immediately after being thrashed, but in England it is generally dried by being spread thinly on a granary floor, and kept till required. The refuse, after the oil has been extracted, affords the valuable manure known by the name of Rape Cake or Rape Dust.

By the Heirs of the late J. Smith, No. 1. Blair Street, Purveyors of Oil to his Majesty.—Specimen of Oil of Rape, or as it is commonly termed Sweet or Green Oil, and which is chiefly employed for oiling machinery, and also by druggists, &c. It is seldom or never used for burning, as it gives out rather a dull light, and more smoke than some others. And by Messrs A. and J. Park, 5. Hunter Square.—Specimens of Rape Cake, and also of the same in a ground state, or Rape Dust, which forms excellent manure for clover and grass lands, turnips, &c. applied broad-cast, either along with the seed or as a top-dressing for grass lands, in the quantity of from ten to fourteen cwt. per acre, or in drills along with turnip seed, in the proportion of from four to six cwt. per acre. The application of Rape Dust as a man-

ure, is attended with the most beneficial results on rather stiff or heavy soils ; it readily attracts moisture, and becomes decomposed.

SINAPIS—MUSTARD.

GENERIC CHARACTERS.—The genus *Sinapis* differs from the last chiefly in the calyx being spread instead of closed ; the style being acute instead of obtuse ; and in the valves of the pod or silique being nerved.

SINAPIS NIGRA—BLACK, BROWN, OR RED MUSTARD.

SPECIFIC CHARACTERS.—Pods smooth, about four-cornered, almost without foot-stalks ; lower leaves lyrate-shaped, rough and light green, upper ones long-pointed, entire and smooth ; seeds of a dark brown or blackish colour ; annual ; grows naturally in corn-fields.

This and the next two species are more generally cultivated for their seeds, which are ground, and so form what is known by the name of the Flower of Mustard, than for the manufacture of oil ; but as they are also occasionally employed for the latter purpose in common with those of the rape, they are here introduced. For farther particulars see *Plants cultivated for various Economical purposes*.

Mustard may be sown any time from the beginning of March to the end of May, but the best season is about the beginning of April ; and the quantity of seed required for broad-cast sowing, which is the only system practised, is from one-third to one-half peck to the acre. The usual time of reaping is about the end of July or beginning of August, and from thirty to forty bushels per acre may be considered an average crop. It is found to succeed best on a rather rich loamy soil, which should, previously to sowing, be reduced to a fine tilth, as the seeds, if buried to the depth of about three inches, will lie in a dormant state and retain their powers of vegetation for ages ; from which circumstance, together with the liability of the seed to become shaken out in the harvesting of the crop, such lands as are once employed for the growing of mustard cannot be fairly cleaned of it for a considerable length of time, and only by judicious fallowing or fallow-cropping, with repeated hoeing and weeding.

SINAPIS ALBA—WHITE MUSTARD.

SPECIFIC CHARACTERS.—Pods hispid, spreading, with a long broad

flattened beak ; leaves all lyrate-shaped, rough, and of a vivid green colour ; seed yellowish-white ; annual ; grows in corn-fields, but rare in Scotland in a truly wild state.

This requires a longer period to ripen than the last species, and is therefore generally sown a week or a fortnight earlier. It requires a similar soil, and the quantity of seed required per acre is the same as that of the last. Its seeds are also frequently employed both in the manufacture of Oil and that of Flour of Mustard.

SINAPIS ARVENSIS—CORN MUSTARD OR CHARLOCK.

SPECIFIC CHARACTERS.—Pods about three times as long as their slender two-edged beaks, swollen-like ; the seed smooth and many-angled ; leaves sublyrate and rough ; stems also rough ; annual ; common in corn-fields.

The Charlock is never cultivated for its seeds, but as it is often very abundant in corn-fields, these are generally separated in preparing the corn for market and sold for crushing, along with those of the Rape, and others.

RAPHANUS—RADISH.

GENERIC CHARACTERS.—Pods transversely many-celled, or divided into several joints, by which this genus is easily distinguished from the last.

RAPHANUS SATIVUS—COMMON RADISH.

SPECIFIC CHARACTERS.—Seed-vessels uneven, tapering to the point, generally two-celled, about as long as their stalks ; leaves lyrate or sublyrate-shaped and rough ; flowers whitish or tinged with purple ; root fusiform ; annual. Native of China ; introduced in 1548.

There are several varieties of *R. sativus* ; but that which is more particularly adapted for the making of oil is distinguished by the name of *R. sativus Olifer* or Oil-Radish. Its stems are dwarf (from one-half to two feet in height), very much branched, spreading, and producing more seed-pods than the other. It is grown rather extensively in China for its oil, from whence it has been introduced and cultivated in some parts of the Continent, but it does not appear with any particular success, although a good deal has been

said and written in its favour. It seems best suited for the southern countries, where it may be sown in September and reaped in May, but in the north of France and in Britain it is too tender to withstand the winter, and therefore requires to be sown in spring; on account of which circumstance it is not likely ever to supersede the Rape in these places, compared with which its oil, although rather superior in quality, is more difficult to extract.

RAPHANUS RAPHANISTRUM—WILD RADISH OR JOINTED PODDED CHARLOCK.

SPECIFIC CHARACTERS.—Lower leaves lyrate, upper ones stalked, and, together with the stems, interspersed but not thickly with rigid bristles or hairs, and of a glaucous-like green colour; pods smooth, one-celled, jointed, and three to eight seeded; flowers light yellow; annual. Common in corn-fields.

Being a common and troublesome weed, this species is never cultivated for its seeds, but these are disposed of and used in the same manner as those of Common Charlock, page 286.

CAMELINA—GOLD OF PLEASURE.

GENERIC CHARACTERS.—Silicle or pod obovate or subglobose, with an elliptical dissepiment or internal partition, and many-seeded cells; seeds ovate, not margined; cotyledons flat, incumbent, contrary to the dissepiment; style filiform.

CAMELINA SATIVA OR MYAGRUM SATIVUM—GOLD OF PLEASURE.

SPECIFIC CHARACTERS.—Pods wedge or pear shaped, scarcely half so long as their footstalks, with two large and two smaller ribs; leaves lanceolate nearly entire; flowers yellow. Native of Britain, but not common in a truly wild state, being generally introduced along with flax or by other artificial means.

The Gold of Pleasure produces a finer oil for burning than the Rape or Mustard, having a brighter flame, less smoke, and scarcely any smell. It succeeds better than any of the other cruciferous oil plants on light, shallow, dry soils, and arrives so soon at maturity that in the south of Europe it produces two crops in a season. In several of the more northerly districts of the Continent, as the north

of France, Germany, and Holland, although it will not produce two crops in the season, it is found very useful for sowing in June or beginning of July when other crops may have failed; and when sown in the early part of the season, it may be removed in time to be succeeded by turnips, grass seeds, &c. Besides the use of its seeds for oil, the stems yield a coarse fibre for making sacks, sail-cloth, &c., and being small, hard, and durable, are used for thatching, temporary erections, and also for making coarse packing paper.

A superior variety has lately been introduced into France under the name of *Le Cameline Majeur*, and which differs from the common in being of stronger growth, producing more seed-pods, which contain a greater number of larger and more oily seeds.

The field culture of *Camelina sativa* has not hitherto been attempted in Britain, but there is no doubt of its succeeding perfectly well in the climate were such reckoned expedient. One circumstance deserving of attention is, that it is never found to be at all injured by insects, particularly the cabbage plant louse, '*Aphis brassica*', which occasionally proves very hurtful to the Rape and other plants of the order *Cruciferae* when they are coming in to flower.

HESPERIS—ROCKET.

GENERIC CHARACTERS.—Pod cylindrical, or slightly four-cornered, two-celled, opening lengthwise; seeds ovate or oblong; cotyledons flat, incumbent, contrary to the dissepiment or internal partition; stamens two, erect, connivent; calyx having two small bag-like appendages at the base.

HESPERIS MATRONALIS—COMMON ROCKET OR DAME'S VIOLET.

SPECIFIC CHARACTERS.—Footstalks of the flower as long as the calyx; petals obovate, of a whitish pink or purple-like colour; pod long, erect, smooth, and very slightly swollen at the seeds; leaves ovate, lanceolate, and slightly rough or hairy; roots thick and branching; biennial. A doubtful native.

The Dame's Violet is cultivated in some parts of France for its oil, which resembles that of the *Camelina sativa*. It requires a rather rich soil, and may be sown in May or June, and will produce a full crop of seed in July or August of the season following,

after which it should be ploughed up; for although many of the plants do not perish after flowering (therefore not truly biennial), yet they are so much weakened as to be unfit for producing any thing like a full crop in the next season.

Others of the natural order *Cruciferae* have been grown for their oleaginous seeds, such as *Eruca sativa* (Cabbage Rocket), *Lepidum sativum* (Garden Cress), &c.; but although crushing for oil be a very profitable and convenient method for disposing of a superabundant stock of these seeds, yet the produce which is obtained per acre is so small, compared with that of Rape, that they are not deserving of culture, for their use in the manufacture of oil only.

II. Belonging to the class and order *Pentandria Pentagynia* of Linnæus, and to the natural order *Lineæ*.

LINUM USITATISSIMUM—COMMON FLAX OR LINT.

GENERIC and SPECIFIC CHARACTERS see page 271.

When the Common Flax is cultivated for its seeds, it requires to be sown thinner, and to remain longer on the ground than when grown exclusively for its fibre; the crop not being pulled until the seed-capsules begin to acquire a brown or ripe-like colour, and these are then detached, by the points of the stalks being drawn through what is generally termed, a rippling comb; the capsules are then spread in a dry airy place, and occasionally turned, until completely dry, when the seeds are thrashed out and cleaned for the manufacturer.

By the Heirs of the late Mr J. Smith, No. 1. Blair Street, specimens of the oil of lintseed, which is used by painters, &c. And by Messrs A. and J. Park, No. 5. Hunter Square, specimens of oil-cake and oil-dust, which are formed of the refuse of lintseed after the oil has been expressed, and are extensively used for feeding cattle, particularly young calves.

III. Belonging to the class and order *Diœcia Pentandria* of Linnaeus, and to the natural order *Urticæ* of Jussieu.

CANNABIS SATIVUS—COMMON HEMP.

GENERIC and SPECIFIC CHARACTERS see page 274.

An oil is obtained from the seeds of the Hemp, which, like that from the Flax, is used by painters, and also in some parts of the Continent, particularly Russia, in cookery.

For farther particulars concerning this and the last, see plants cultivated for their fibre.

IV. Belonging to the class and order *Polyandria Monogynia* of Linnaeus, and to the natural order *Papaveracæ* of Jussieu.

PAPAVER—POPPY.

GENERIC CHARACTERS.—Calyx two-leaved ; corolla four-petalled ; capsules one-celled, but partly subdivided by the longitudinal seed receptacles ; seeds numerous, very small, and when ripe escaping by holes under the stigma, which is flat, radiate, permanent.

I. PAPAVER SOMNIFERUM—CULTIVATED GARDEN POPPY or MAW.

SPECIFIC CHARACTERS.—Stems, leaves, calyces, and capsules, all smooth ; leaves glaucous, clasping the stem, and cut or gashed ; annual ; height of the stems about three or four feet. Grows naturally in England, and various parts of the Continent.

The varieties of *P. somniferum* are very numerous, but that which is most esteemed for its oil is known by the name of,—

II. PAPAVER SOMNIFERUM OLIFER—OIL OF GREY POPPY.

Le Pavot Œillette grise.—Fr.

Which is distinguished by the dull reddish or grey-like colour of its flowers, the great size and oblong shape of its capsules, and by the large quantity of brownish coloured seeds which these contain. This variety is chiefly cultivated in Italy, the south of France, Germany, and Flanders.

III. PAPAVER SOMNIFERUM ALBUM VEL CANDIDUM—

WHITE POPPY.

Le Pavot Blanc.—Fr.

Although this variety be more esteemed for the production of opium, yet it is also occasionally grown exclusively for its oil. It differs from all the other varieties in having white flowers, very large globular-shaped capsules or heads, and white seeds.

Several other of the varieties are occasionally employed for the same purposes, and, indeed, any of the single-flowered sorts may be grown for their seeds, but those with double and semidouble flowers should always be excluded, as they produce less seed.

The soils best suited for the growth of the Poppy are such as are of medium texture, and in the highest state of fertilization. As the seeds are small, and consequently easily buried, the land should, previous to sowing, which should be done in March or April, be well pulverized by harrowing and rolling; the seed is then to be sown in drills, about an inch in depth, and about twenty inches or two feet distant one from the other, the young plants are afterwards thinned out to from six to ten inches distance in the rows, and the whole crop kept free from weeds by hoeing, &c. The period of reaping is about the month of August, when the earliest and generally the largest capsules begin to open; the plants are then cut or pulled, and tied in small bundles, taking care not to allow the heads to recline until they be carried to some place or other allotted for the reception of the seed, which is then shaken out, and the sheaves again set upon their end, to admit of the remaining capsules becoming ripe. In Germany and Flanders, a mode of obtaining the first crop is to spread sheets along by the side of the row, into which the seeds are shaken by bending over the tops of the plants; these are then pulled, tied in bundles, and removed, when the sheets are drawn forward to the next row, &c.

The oil of the Poppy is of an agreeable flavour, and on the Continent chiefly applied to domestic uses, for which it is reckoned nearly equal to that of the Olive. Its consumption in this country is comparatively trifling, being chiefly used for the finer sorts of oil-painting and by druggists.

V. Belonging to the class and order *Syngenesia Frustranea* of Linnaeus, and to the natural order *Compositae* of Jussieu.

HELIANTHUS—SUN-FLOWER.

GENERIC CHARACTERS see page 233.

I. HELIANTHUS ANNUUS—COMMON SUN-FLOWER.

SPECIFIC CHARACTERS.—Leaves all cordate, rough, and three-nerved; flowers yellow; heads large and nodding; peduncles and stalks thick, the latter from four to six feet in height; branched; annual. Native of South America; introduced in 1569.

II. HELIANTHUS INDICUS—DWARF SUN-FLOWER.

This species, which was first introduced from Egypt in 1785, differs from the last principally in being of a much dwarfer habit of growth, less branched; its flowers are generally of a lighter yellow colour, and it is smaller in all its parts.

The seeds of both the above species of sun-flower yield an oil little inferior to that of the Olive for domestic purposes, and which is also well adapted for burning. In Portugal the seeds are made into bread, and also into a kind of meal, and in America they are roasted, and used as a substitute for coffee; but the purpose for which they seem best adapted is the feeding of domestic fowls, pheasants, and other game. The greatest objection to their culture is, that they require very superior soil, and are a most impoverizing crop, particularly the taller growing sort, *H. annuus*, from which circumstance the dwarf species, *H. indicus*, has been preferred by some cultivators in France, who assert, that as its dwarf habit of growth admits of a greater number of plants being grown on a given space, it is not so much inferior to the other in quantity of produce as from its appearance one would be led to suppose. In addition to the uses above enumerated, some French authors assert that the leaves, either in a green or dried state, form excellent food for cows, and that they are greedily eaten by them; the stems also form good fuel, and yield a considerable quantity of potash.

VI. Belonging to the class and order *Dodecandria Trigynia* of Linnaeus, and to the natural order *Euphorbiaceæ* of Jussieu.

EUPHORBIA—SPURGE.

GENERIC CHARACTERS.—Involucre one-leaved, bladder-like, or ventricose, and regular ; flowers naked, aggregate, female floret surrounded by many monandrous male ones.

EUPHORBIA LATHYRUS—CAPER SPURGE.

SPECIFIC CHARACTERS.—Umbles quadrifid, dichotomous ; leaves opposite, lanceolate, entire ; stem four or five feet in height ; annual or biennial. Native of England.

From the results of experiments made by M. Schubler, the seeds of the Caper Spurge yield about thirty per cent of their actual weight of oil (being a larger proportion of oil than those of any of the commonly cultivated oliferous plants), which he found to produce a very bright flame in burning, and likely to prove as useful as that of rape for machinery, &c. Judging, however, from the qualities of the castor-oil plant, and others belonging to the same natural order, it is not likely to be at all suitable for food, but may be found available in medicine. At all events, as it is quite hardy, and produces an abundance of seed, it seems well deserving of being made the subject of farther experiment.

The *E. Lathyrus* receives the name of Caper Spurge from its seeds, resembling those of the true Caper.

There are several other herbaceous plants cultivated for their fixed oils, but as the principal of these are too tender for the climate of Britain, the following short notices are considered sufficient.

SESAMUM ORIENTALE—OILY GRAIN.

S. orientale was cultivated for its oil, which was used as that of Olives by the Romans, and is so still in the southern countries of Europe, as also in China and the East Indies. It is too tender for the climate of Britain, and can only be grown with the aid of artificial heat.

RICINUS COMMUNIS—PALMA-CHRISTI OR CASTOR-OIL PLANT.

The use of the oil obtained from this plant is well known in medicine. There are two varieties, or, as they are sometimes termed, distinct species, viz. the tall and the dwarf, both of which assume the character of shrubs or small trees in tropical countries, but in this can only be accounted tender from their being always destroyed by the first frosts, before which, however, if sown in a warm early situation, they occasionally ripen seeds, and the tall variety often attains to the height of eight or ten feet. In Europe, however, the cultivation of either is not considered expedient, except in latitudes south of Paris.

By Henry Marshall, Esq. deputy inspector-general of army hospitals, seeds of the small variety of *R. communis*, grown in the Mauritius; and by Dr Knapp, 9 Duncean Street, seeds of the tall growing sort.

ARACHAS HYPOGÆA—AMERICAN EARTH-NUT.

This is a dwarf growing plant, with small solitary yellow flowers, followed by oblong two-seeded pods, which, as they attain to full size, acquire a drooping habit of growth, till at last, when fully ripe, they are entirely buried in the soil; and are about an inch in length, with a thickish light brown cracked skin, the two seeds contained in each are about the size and shape of small field beans, and have an agreeable nut-like flavour. The oil which is obtained from these is much esteemed as food, being considered as good as that of the Olive. The *A. hypogæa* is chiefly cultivated in the warmer parts of America, and the south of Europe, particularly Spain. It is now also introduced and cultivated in the East Indies.

Fixed oils are obtained from the seeds of numerous species of trees, which, with the exception of the *Juglans regia* (Common Walnut); *Amygdalus communis* (Almond); *Corylus avellana* (Common Hazel); *Fagus sylvatica* (Common Beech), and a few others of minor importance, can only be grown in tropical climates or the warmer parts of the temperate zones. Of these may be mentioned, *Cocas nucifera* (Cocoa-nut tree); *Areca catechu* (Areca or Betal-nut or Cabbage tree); *Phoenix dactylifera* (Date Palm); and numerous others of the Palm tribe; also *Hameltonia olifera* (Oil Nut); *Bertholatia excelsa* (Brazil Nut); and the *Olea Europæa* (Olive tree); which last is cultivated to a very great extent in Spain, Italy, and other places in the south of Europe, and from its fruit the olive oil so extensively

used in some countries for food, but in this chiefly for burning and in medicine, is procured.

Of the hardy trees producing oleaginous seeds, the Walnut is peculiarly distinguished for the fine quality of the oil which it yields, and which is preferred even to that of the Olive for domestic purposes; but in Britain it can only be grown advantageously in the southern districts, for although it generally ripens its seeds in the northern counties, yet they seldom attain to that state of full maturity which would warrant the supposition of their yielding oil equal in quality to that of such as are grown in warmer latitudes. The same remarks are applicable in the case of the Almond. And with regard to the Beech and the Hazel, the former is to be considered as being more particularly cultivated for its timber, and the latter for its timber and as a dessert fruit.

Specimens of the produce of Oliferous Trees presented to the Museum:—

By the Heirs of the late Mr J. Smith, No. 1. Blair Street.

Olive Oil, and also that of the Cocoa-nut, which is chiefly used for burning, and loses its fluidity when the temperature falls below about 65° of Fahrenheit's thermometer.

By Sir P. Murray Threipland, Bart. of Fingask, Perthshire.

Remarkably large and well ripened walnuts grown at Fingask in 1834; also nuts of that variety of Hazel denominated *C. avellana grandis* or cob-nut, of an unusually large size.

By Miss Gilchrist of Ospisdale, Sutherlandshire.

Sweet almonds, perfectly ripe and grown in the open air at that place in 1834; also fruit of the *C. avellana grandis* (Cob-nut), and of the *Avellana rubra* or red filbert.

By James Robertson, Esq. of Torvie.

Cocoa-nut in the husk, and several Cashew Nuts.

By Mr T. W. Watson, Dunse.

Two Areca Nuts from the East Indies.

By Mr George Charlewood, Covent Garden, London.

Cashew Nuts, Brazil Nuts, Cob Nuts, Red Filberts, White ditto, and fruit of the Date Palm.

*** Plants from which Oils are obtained by distillation, and which are termed Volatile Oils.*

The plants included in this division are distinguished by their possessing a fragrant smell, with a peculiar pungency and warmth of taste, the existence of which is supposed to depend on the presence of their essential oils. They are seldom the objects of very extensive culture; and the following are a few of the most useful which are suited to the climate of this country.

Belonging to the class and order *Didynamia Gymnosperma* of Linnaeus, and to the natural order *Labiatae* of Jussieu.

MENTHA—MINT.

GENERIC CHARACTERS.—Flower somewhat tubular, divided into four segments, the broadest of which is notched in the centre; stamens erect and separated.

MENTHA PIPERITA—PEPPERMINT.

SPECIFIC CHARACTERS.—Leaves opposite, ovate, oblong, acute, serrated, stalked, and smoothish; calyx smooth at the base; flowers light purple, in crowded whorls, forming a blunt terminal spike, which is rather interrupted at the base; roots creeping; perennial; native of England.

Besides the essential oil of peppermint, it also yields a spirit and a simple water. It is much used in medicine, and by confectioners. It grows best on a rather rich light moist soil, and cultivators recommend renewing the plantations every three or four years, otherwise the oil becomes perceptibly impaired in flavour. Like others of the genus, when grown for its essential oil, the plants should be cut when in flower, and carefully prevented from getting rain during the time they are drying, else the produce becomes not only inferior in quality, but the quantity is materially lessened.

MENTHA VIRIDIS—SPEARMINT.

SPECIFIC CHARACTERS.—Leaves opposite, lanceolate, almost without foot-stalks, and wedge-shaped at their base, minutely serrated, smoothish; teeth of the calyx slightly hairy; flowers light purple, in whorls, which form a cylindrical-like spike, interrupted towards

the base; roots creeping; perennial; grows naturally in marshy places.

The essential oil, and other preparations from the spearmint, are more confined to medicinal purposes than those of the peppermint. Its green leaves and tops are used for flavouring in cookery; and an infusion of the leaves serves considerably to retard the coagulation of milk.

Although the peppermint and spearmint are the two species chiefly grown for their essential oils, yet similar productions may be obtained from others of the genus, particularly *M. pulegium*, Pennyroyal; *M. odorata*, Bergamot Mint; *M. crispa*, Curled-leaved Mint, &c.

LAVANDULA—LAVENDER.

GENERIC CHARACTERS.—Calyx ovate, somewhat toothed, supported by a bractea; corolla inverted in position from that of most others of the *Labiatae*; stamens contained within the tube.

LAVANDULA SPICA—COMMON LAVENDER.

SPECIFIC CHARACTERS.—Leaves linear-lanceolate, without foot-stalks, and rolled back at their edges; flowers blue, placed in leafless slightly-interrupted spikes; shrub; grows to the height of from four to six feet. Native of the South of Europe; introduced about the year 1568.

The oil of lavender is obtained in the proportion of 1 oz. to 60 of dried flowers; but this plant is more esteemed for the distilled waters which bears its name, and which, together with the oil, is obtained in greatest proportion from the dried flower-spikes which have been gathered in very dry weather, and just before the flowers are fully expanded.

The Lavender will grow very well on a great variety of soils, but thrives best on such as are rather rich, light, and dry. It forms very ornamental dwarf-hedges, where shelter more than strength is required; and if proper attention be paid to the season and manner of clipping them, this seems the most economical mode of growing the flowers, and these are also easier collected than when the bushes are allowed to grow at random.

Many other plants belonging to the natural order *Labiatae* might be particularized and included amongst such as yield essential oils,

but as these are only cultivated to a comparatively limited extent, the mere enumeration of the better known sorts may be sufficient; they are as follows:—*Rosmarinus officinalis*, Rosemary; *Thymus vulgaris*, Common Thyme, and others of the same genus; *Origanum vulgare*, Common Marjoram; *Marrubium vulgare*, Common Horehound; *Melissa officinalis*, Common Balm; *Hyssopus officinalis*, Common Hysop, &c.

Several of the natural family *Umbelliferae* also yield volatile oils, and some produce both these and fixed oils; but their cultivation for oil alone is generally a secondary object, and most of them belong more properly to the division entitled Plants cultivated for various Economical Purposes, which see. These are principally *Carum Carui*, Common Caraway; *Coriandrum sativum*, Coriander; *Cuminum cyminum*, Cumin; *Ligusticum levisticum*, Lovage; *Pimpinella anisum*, Anise; *Anethum feniculum*, Fennel; and *A. graveolens*, Dill.

Of plants yielding essential oil, and which are not included in either of the natural orders *Labiatae* or *Umbelliferae*, may be mentioned the Rose family, particularly *Rosa centifolia*, hundred-leaved Rose, *R. damascena*, Damask Rose, which are most reputed for yielding the atar or essential oil of roses, it is obtained from their dried petals, an ounce of atar being only procured from about 100 oz. of these. From the *Solidago odora*, sweet-smelling Golden Red, is also obtained a very fragrant volatile oil. Also the whole of the Fir tribe, from most of which may be extracted the essential oil of turpentine, and which are noticed more particularly as Plants cultivated for their Timber.

III. PLANTS CULTIVATED FOR THEIR COLOURING MATTER OR DYE.

Although the hardy plants, or such as grow freely in the climate of Britain, from which colouring matter may be obtained, are very numerous; yet those actually cultivated in this country are not only few, but the extent of their cultivation is very limited, arising no doubt from the facility with which vegetable dyes can be imported from countries still more favourable for their production. Therefore, in the following enumeration of dye plants, such only are described as are most likely to be grown with advantage in this climate.

* *Herbaceous Plants from which Dyes are obtained.*

I. Belonging to the class *Tetradynamia* of Linnæus, and to the natural order *Crucifera* of Jussieu.

ISATIS—WOAD.

GENERIC CHARACTERS.—Pod elliptical, flat, one-seeded, one-celled, with somewhat boat-shaped, adhesive valves; seeds ovate, oblong; cotyledons flat, incumbent, apparently in the same direction as the almost obliterated dissepiment or internal partition of the pod should be.

ISATIS TINCTORIA—DYERS' WOAD OR GLASTUM.*

SPECIFIC CHARACTERS.—Root-leaves ovate-lanceolate, notched, about a foot in length, and pretty long footstalks, those of the stem clasping, almost entire, about three inches long and $\frac{1}{2}$ inch broad; stems upright and much branched, about three feet in height; calyx and the small petals of a bright yellow colour; seed-vessels near half an inch long and two inches wide, attached by slender footstalks hanging down, chesnut coloured or dark-brown and shining when ripe; root thick, branching, and fibrous; biennial; native of Britain, but by no means common in a truly wild state.

The blue dye produced by the woad is obtained from the root leaves, and as its quality as well as quantity depends much on the size to which those are grown, it is only advisable to cultivate this plant on very rich soils, of medium texture, and to manure the same well before sowing the seeds, which is done either in rows or broadcast, the former system is preferable, in the beginning of August. In the season following four or five crops of leaves may be obtained, the last of which, however, are inferior to the first, and therefore always kept separate. The plants afterwards are to be ploughed up, except intended for seed, as they will run to flower the season following. An acre of good land will, in favourable seasons, produce from a ton to a ton and a half of leaves. Some people eat down the young leaves of the first season's growth with sheep, but this practice is supposed

* "This plant was formerly called *glastum*, from the Celtic *glas*, blue, whence Glastonbury derived its name. The ancient Britons coloured themselves with the blue preparation obtained from this plant, whence they received their appellation, *Britho* being the Celtic word for, to paint. The Picts were so called by the Romans for the same reason."—*Loudon's Encyclopedia of Plants.*

to weaken the plants and to lessen the produce of the next ; and when the seed is to be saved three cuttings only are generally taken. The common practice of procuring the dye of the woad is to reduce the leaves immediately after being cut by bruizing to a smooth paste, which is laid in heaps pressed close and smooth, taking care to fill any cracks which may appear in the blackish crust which forms on the surface. After lying for fifteen days the heaps are opened, the crust reduced to a powder and mixed through the mass, which is then formed into balls and dried in the sun. Good balls are distinguished by their being weighty, of a pretty agreeable smell, and when rubbed of a violet colour within. Before being used by the dyer, these balls undergo a farther preparation by being reduced to a gross powder, which is thrown in heaps to the depth of three or four feet, moistened with water and allowed to ferment. When it throws out a thick fetid fume, it is then turned regularly and moistened every day for a fortnight, after which it is stirred less frequently and ultimately thrown in a heap till used. When used it first imparts to wool a green colour which changes to a blue by being dried in the air.

Woad was formerly cultivated to a pretty considerable extent in Scotland, but the cheapness and consequent general use of indigo, has almost entirely superseded it.

II. Belonging to the class and order *Dodecandria Trigynia* of Linnaeus, and to the natural order *Resedaceæ* of Jussieu.

RESEDA—RESEDA OR MIGNONETTE.

GENERIC CHARACTERS.—Involucrum many-leaved, spreading ; hermaphrodite flowers without petals, and surrounded by several fringed petaloid barren or male flowers.

RESEDA LUTEOLA—DYER'S WEED, WELD, WOLD, OR UPRIGHT
WILD MIGNONETTE.

SPECIFIC CHARACTERS.—Stems three to five feet in height, upright, generally producing several branches near the top, which are also upright ; leaves lanceolate, entire, with a tooth on each side at the base ; calyx quadrifid ; flowers in long, terminal, greenish-yellow

coloured spikes ; biennial. Grows naturally on dry waste places, and more especially amongst the rubbish of quarries and coal pits.

The Dyers' Weed was formerly extensively, and is still partially, cultivated in some parts of Britain for the yellow colouring matter which it yields. Contrary to the woad, this plant yields the best dye when not grown to a very large size. It should, therefore, be sown pretty thick on dry light soils, and the usual practice is to sow the seeds in spring along with a corn crop, the plants not running to seed until the following season. These are pulled when in flower, or before the seed is fully ripe, and used either in a green or dry state, no farther preparation being necessary but boiling all parts of the plants in a linen bag amongst the water in which the wool, silk, or other stuff to be dyed is afterwards dipped, taking care to keep the same always under the surface of the water. The yellow of the dyers' weed is of little permanency, unless fixed by some mordant, for which four ounces of alum and one to two ounces of tartar to one pound of wool is generally previously employed ; and the common practice is to allow four to six lb. of the dried plant to each lb. of wool or cloth to be died.

III. Belonging to the class and order *Tetrandria Monogynia* of Linnaeus, and to the natural order *Rubiaceæ* of Jussieu.

RUBIA—MADDER.

GENERIC CHARACTERS.—Flowers monopetalous, bell-shaped, superior ; berries two together ; stamens generally four, but sometimes five, and when such is the case, the monopetalous flower is five-cleft ; calyx very small, superior.

RUBIA TINCTORIA—DYERS' MADDER.

SPECIFIC CHARACTERS.—Stems three to four feet in length, trailing or climbing ; leaves six together, in whorls, smooth above with rough edges and rough keel or mid-rib on the under side ; flowers minute and of a yellowish-green colour ; root thick, branching, three to four feet in length, and striking deep into the ground ; perennial. Native of the south of Europe.

The roots of the Madder yield the well known red or scarlet dye, distinguished by the same name, and extensively used by calico prin-

ters and dyers generally. About the end of the 17th century, the sum paid by the British to the Dutch was upwards of L.60,000 annually, being at that time worth about L.6 per cwt. The price became so much increased afterwards that several spirited individuals attempted its culture in England, amongst whom may be mentioned Mr Miller, who published a pamphlet and also a paper in his *Gardener's Dictionary* on its culture. The results of these experiments tend to prove that the climate of Britain, particularly England, is eminently fitted for the growth of this plant, and that it can be raised equal, if not superior, to the best roots which are annually imported from Holland ; but as in times of peace these can be imported from thence, and others of the continental countries, at a cheaper rate than it can be grown by the British farmer, its cultivation in this country has been almost if not entirely abandoned.

Madder may be propagated by seeds, but the usual practice is by dividing the small roots which grow near the surface, and planting the same in rows two and a half or three feet apart on rich deep soil of medium texture, the interstices during the first season being each occupied by a row of cabbages, kidney beans, &c. The whole is carefully kept free from weeds, and the young plants covered over with three or four inches of earth in the beginning of November ; sometimes the crop is taken at the end of the second season, but more frequently the third season after planting, the roots, after being lifted, are carried direct to the kiln or house heated by stoves for drying them, and they are afterwards ground for use. The finest Madder, however, which is obtained from the Levant is said to owe its peculiar excellence to the roots being dried in the sun.

In the neighbourhood of some of the extensive dyeing establishments about Glasgow, of late, considerable advantages have been derived from using the refuse of the Madder roots for top-dressing grass lands. Madder imparts a red colour to the milk and bones of such animals as feed on its shoots.

GALIUM—BED-STRAW.

GENERIC CHARACTERS.—Flowers monopetalous, flat, superior ; seeds two together, globose ; calyx very small, superior.

GALIAM VERUM—COMMON YELLOW-FLOWERED BEDSTRAW, OR
CHEESE RENNET.

SPECIFIC CHARACTERS.—Stems smooth, slender, and reclining; leaves eight together, in whorls, linear, smooth, and dark green; flowers bright yellow, in long loose terminal spikes; roots long and spreading. Grows abundantly in dry light pastures.

The flowering tops of this well-known plant, boiled in alum, dye a bright yellow colour, and its roots yield a red fully equal to that of madder, as a substitute for which its cultivation was attempted in England, at the recommendation of the Committee of Council for Trade, and found to yield about $12\frac{1}{2}$ cwt. of dried roots per acre. *G. verum* obtains the name of Cheese Rennet from being used for curdling milk; and the bruised plant is sometimes put in milk intended for cheese, to give it a flavour and colour.

The roots of others of the same genus, particularly *G. mollugo*, Great Hedge Bed-straw; *G. sylvaticum*, Wood Bed-straw; and *G. boreale*, Cross-leaved Bed-straw, possess the same qualities as those of *G. verum*, but in a less degree. And the whole genus, like the madder, are said to possess the peculiarity of colouring the bones and milk of animals feeding on them.

ASPERULA—WOODROOF.

GENERIC CHARACTERS.—Flowers monopetalous, funnel-shaped; seeds two, globose, not crowned by the obsolete four-toothed calyx.

ASPERULA TINCTORIA—DYER'S WOODROOF.

SPECIFIC CHARACTERS.—Stems reclining, about one foot in length; leaves three-nerved, linear, the lower whorls six-leaved, the middle generally four, and the upper leaves opposite; colour of the smooth trifid flowers whitish; perennial. Native of the South of Europe; introduced in 1766.

The roots of this plant are used in some parts, particularly Dalmatia, instead of madder, for dyeing wool and cloth of a reddish colour: but in bulk the crop obtained from it is inferior to that of the madder.

IV. Belonging to the class *Syngenesia* of Linnæus, and to the natural order *Compositæ* of Jussieu.

CARTHAMUS—SAFFLOWER.

GENERIC CHARACTERS.—Florets of the disk and ray all hermaprodite ; receptacle chaffy or bristly ; involucre ovate, scales of the same ovate, leafy at the end, and overlapping one another ; crown of the seed chaffy, hairy, or smooth.

CARTHAMUS TINCTORIUS—DYERS' SAFFLOWER OR BASTARD SAFFRON.

SPECIFIC CHARACTERS.—Stems about three to four feet high, branching towards the top, quite smooth, and when full grown hard or woody ; leaves ovate, slightly spiny ; flowers dark orange, or of a vermilion colour ; seed ovate, about two-tenths of an inch in length by one in breadth, whitish or very light brown, and smooth on the top ; annual. Native of Egypt ; introduced to Britain in 1551.

The colouring matter of Safflower is obtained exclusively from the flowers of the plants, which are collected when fully expanded, and dried on a kiln, under pressure, to form them into small round cakes, in which state they are sold in the shops. The *C. tinctorius* is extensively cultivated at present in the Levant, and several countries of Europe, particularly France, Spain, and Germany ; in the latter of which the first gathering of flowers is obtained in the beginning of September, and others, for six or eight weeks following, as the flowers expand. It flowers about the same time in this country, and seems sufficiently well suited to the climate. It grows best on rich soils of medium texture, and should be sown about the beginning of April in rows two feet apart, the plants afterwards being thinned out to the distance of six inches in the row.

Although the colour of the petals be of a deep orange, they are used for dyeing various shades of red, the yellow matter being easily separated from the other. The flowers of the *Carthamus* are employed in Spain and other countries for colouring dishes and confectionaries ; and from the seed a fixed oil is obtained somewhat similar to that of the sunflower (p. 292), for which purpose alone it does not however seem deserving of cultivation, at least in this climate.

Many other plants belonging to the class *Syngenesia* of Linnæus

are capable of producing dyes, particularly those having yellow flowers, the colour of most of which is easily extracted and indelibly imparted to other substances. The following are a few of such as have proved the objects of most successful experiment.

Scolymus Hispanicus, Spanish Golden Thistle, yields a saffron-like colour, and is often employed for adulterating the true colour of that name. *Serratula tinctoria*, Dyers' Saw-wort, whole plant yields a yellow colour, as does that of *Hieracium umbellatum*, Narrow-leaved Hawkweed, *Bidens tripartita*, Trifid Bidens and *Anthemis tinctoria*, Ox-eye, or Dyers' Chamomile. From the florets of *Coreopsis verticillata* and *C. tinctoria*, both natives of North America, the inhabitants extract a reddish dye; and the leaves of *Senecio Jacobæa*, Common Ragwort, have been employed in this country for dyeing wools and cloth green.

V. Belonging to the class and order *Triandria Monogynia* of Linnaeus, and to the natural order *Irideæ* of Jussieu.

CROCUS.

GENERIC CHARACTERS.—Sheath membranous, two-valved; flowers monopetalous, six-parted; perianth (corolla or coloured calyx) funnel shaped, regular, the outer three segments largest; tube very long, arising immediately from the crown of the bulb; stigma deeply trifid; roots bulbous.

CROCUS SATIVUS—SAFFRON CROCUS.

SPECIFIC CHARACTERS.—Stigma very long, reflexed; segments broad towards and notched at the point; flower large, and of a deep purple or violet colour, appearing in the months of September and October; naturalized in some parts of England, but supposed to have been first introduced in the time of Edward III.

The only part of *C. sativus* which yields the colouring matter, known by the name of *saffron*, is the trifid stigma and that part of the style above the orifice of the long funnel or tube. It was first cultivated at SAFFRON WALDEN, in Essex, which place derives its name from this circumstance, and where, in the beginning of the seventeenth century, as well as in Cambridge, Suffolk, and Herefordshire, it was grown very extensively, but at present its cultivation, except as an ornamental flower, is not practised in Britain, the present supplies

being received from the south of France and other parts of the Continent. The bulbs are planted in June, on rather rich soil of medium texture, in rows six inches apart across the ridges, and three inches bulb from bulb; and the first crop of flowers are gathered in the months of September and October following as they expand, when the stigma, together with those parts of the style yielding the dye are picked out and dried on a kiln between layers of paper or linen cloth, under a slight pressure, whereby the mass is formed into loose cakes. The average produce per acre of dried saffron is computed by Miller in his *Gardener's Dictionary* at about five pounds for the first season, and twenty-four pounds the next two, of which the greatest quantity is generally produced in the last or third year, after which the roots are taken up and the plantations renewed.

From the small quantity of saffron obtained from an acre of good ground, together with the great labour and attention requisite in cultivating and collecting it, and consequent high price at which it sells, a strong inducement is held out to the growers and dealers to adulterate it with other articles similar in colour and form, for which purpose the petals of the Bastard Saffron (*Carthamus tinctorius*, p.304), and those of the Spanish Golden Thistle (*Scolymus Hispanicus*) are used. The presence of these is, however, easily detected, by a previous knowledge of their form and size, to make them attain which when dried it is only necessary to immerse them in warm water; the petals of these two are also much lighter in colour, but this circumstance alone is not a sufficient test for detecting their presence, since their colour is easily altered by the application of some other dye.

Others of the genus *Crocus* very much resemble the autumn or saffron, but it does not appear that they are also capable of yielding dye of equal quality, or at least if they really possess such merits they have hitherto been overlooked. Of the most common of these, *C. vernus*, Large Purple-flowered Spring Crocus, and *C. versicolor*, Party-coloured Spring Crocus, bear the greatest affinity to *C. sativus*; but the difference in the period of flowering is alone sufficient to distinguish them.

Other hardy herbaceous plants which may be used by dyers, but are considered of less importance than these previously described, are as follows:—*Stachys sylvaticus*, Wood Hedge Nettle; *Polygonum persicaria*, Spotted Asmart or Bistort, *Lysimachia vulgaris*, Common Loosestrife; *Scabiosa succisa*, Devils'-Bit; *Xanthium strumarium*, Small Burdock; *Agrimonia eupatoria*, Common Agrimony; and

Anthyllus vulneraria, Kidney Vetch, (page 168), from the stems and leaves of all of which a yellow colour may be extracted, as also from the flowers of *Hypericum perforatum*, Perfoliated St John's Wort, the roots of *Thalictrum flavum*, Meadow Rue, and *Urtica dioica*, Common Nettle, (page 276). A very bright yellow colour was also extracted from the flower or anthers of the potato by that eminent patron of Agriculture, the late Sir John Sinclair, Bart. which was found eminently suited for the dyeing of shawls and woollen cloth. Besides the Madder and others of the same natural order formerly mentioned, from the roots of which *red colours* are obtained, these may also be derived from the roots of the following. *Rumex acetosa*, Sorrel; *Comarum palustre*, Marsh Cinquefoil; *Tormentilla erecta*, Upright Tormentil; *Beta vulgaris hortensis*, Red-rooted Garden Beet (page 260); and a red or purplish colour is also obtained from the tops of *Origanum vulgare*, Common Marjorum, and from the ripe berries of *Phytolaca decandria*, Virginian or American Poke-weed. Woollen stuffs are dyed green by a decoction prepared from the leaves and stems of *Cherophyllum sylvestre*, Cow-weed, the panicles of *Phragmites communis*, Common Reed (page 147), and those of *Bromus secalinus*, Rye-like Seeded Brome-grass, (page 141). A fine blue may be obtained from the flowers of *Delphinium consolida*, Common Branching Larkspur, and those of *Campanula rotundifolia*, Harebell, or Common Round-leaved Bell-flower; also from the berries of *Sambucus Ebulus* or Dwarf Elder, and a very dark or almost black colour from the stems and leaves of *Lycopus Europæus*, Water Horehound.

*** Shrubs and Trees from which Dyes are obtained.*

VI. Belonging to the class and order *Pentandria Monogynia* of Linnæus, and to the natural order *Rhamni* of Jussieu.

RHAMNUS—BUCKTHORN.

GENERIC CHARACTERS.—Calyx bell-shaped, four or five cleft; corolla four or five petalled, minute, inferior, inserted into the calyx; stigma one to five cleft; seeds one to four, enclosed in a soft pulp or berry; shrubs or dwarf trees.

RHAMNUS CATHARTICUS—COMMON BUCKTHORN.

SPECIFIC CHARACTERS.—Stems erect; leaves ovate; spines terminal; flowers greenish-coloured; male and female on different plants;

berries four-seeded, grows to the height of from fifteen to twenty feet. Native of England.

It is the fruit of this plant which is sold under the name of French Berries. The juice of these, when in an unripe state, has the colour of saffron ; when ripe the same mixed with alum forms the sap-green of the painter, and when in a very ripe state they afford a purple colour. The bark also is used for dyeing a beautiful yellow.

In England the *R. catharticus* is sometimes used for making hedges, but is, from its open and irregular habit of growth, not so well suited for that purpose as the common hawthorn. It grows freely in any common soil, and may be propagated by cuttings, layers, or seeds, which should be sown in August, immediately when the ripe berries are gathered, otherwise if deferred till spring they will not vegetate until the following season.

II. RHAMNUS FRANGULA—ALDER BUCKTHORN.

SPECIFIC CHARACTERS.—Branches unarmed ; leaves about two inches in length and one in breadth, entire and smooth ; flowers whitish, one-styled and hermaphrodite ; berries globular, two-seeded, and black when ripe. Grows naturally very abundant in woods and thickets in some parts of Britain.

The berries of this species are often substituted for those of the last, but are easily detected by the difference in the number of seeds which they contain. In a green state they dye wool green and yellow ; when ripe, bluish-grey, blue and green ; the bark also dyes yellow, and with preparations of iron, black.

The propagation and culture of this, as also of most others of the genus, is the same as in the case of the last, viz. by layers, cuttings, or seeds sown when the berries are ripe ; and the plants afterwards kept in the nursery until sufficiently strong for being planted out.

The two species (*R. catharticus* and *R. frangula*) being natives of Britain, are most likely to succeed well under cultivation in this country, and, as dye plants, they are the most important in the genus, several others of which are also quite hardy and employed in the same manner, viz. *R. saxatilis*, Rock Buckthorn, the berries of which are used to dye morocco leather yellow, and which, in common with those of *R. Clusii*, Narrow-leaved Buckthorn, are sold under the name Avignon Berries ; these, however, are more frequently obtained from the *R. infectoria*, or Yellow-berried Buckthorn. The wood of *R. erythroxylon* in a ground state is the bright red colour known to

dyers under the name of Red-wood. It is a native of Siberia, and grows freely in this climate.

VII. Belonging to the class and order *Pentandria Trigynia* of Linnaeus, and to the natural order *Terebinthaceæ* of Jussieu.

RHUS—SUMACH.

GENERIC CHARACTERS.—Calyx five-parted, and, together with the five petalled flower, inferior, or under the one-seeded berry ; shrubs or dwarf trees.

RHUS CORIARIA—COMMON SUMACH.

SPECIFIC CHARACTERS.—Leaves composed of seven or eight pair of ovate, obtuse, serrated, leaflets, terminated by an odd one, rough or scabrous above, and villose or downy beneath ; flowers whitish-green, in large compound, terminal spikes or clusters. Native of the south of Europe ; grows to the height of ten or fifteen feet.

The sumach of the dyers is the young shoots of the *R. coriaria*, reduced to a coarse powder by a mill. When used alone it imparts to wool and cloth a fawn-colour inclining to green ; and particularly to cotton stuffs, previously impregnated with acetate of alumina as a mordant, it imparts a very durable yellow. In Spain and Portugal sumach is extensively grown, much in the same manner as willows for the basket-makers are done in this country, the young shoots being cut down yearly, and bruised or ground for use. Being a native of a comparatively much warmer climate, it is questionable with what success the cultivation of *R. coriaria* might be attended to in Britain. It is however, quite hardy, and at least deserving of more trial than it has hitherto received.

Several other species of the genus are employed for dyeing, particularly *R. glabra*, the berries of which dye red ; and the same, boiled along with the young wood, afford a black ink-like colour. This plant overruns lands laid down to grass in a few years, in some parts of America, as the common whin does in this country. Several are highly poisonous, and indeed this dangerous quality in some measure seems to belong to most of them. They all contain a large portion of tannin, and some are therefore used for tanning leather instead of oak-bark.

VIII. Belonging to the class and order *Monœcia Polyandria* of Linnaeus, and to the natural order *Amentaceæ* of Jussieu.

QUERCUS—OAK.

GENERIC CHARACTERS.—Barren or male flowers in loose catkins ; perianth single, slightly five-cleft ; stamens from five to ten in each ; involucre of the fertile or female flowers, cup-shaped and scaly, perianth single, incorporated with the germen, six-lobed ; germen three-celled, two of which are abortive ; style one ; stigmas three ; nut or acorn one-celled, one-seeded, surrounded at the base by the enlarged cup-shaped scaly involucre.

I. QUERCUS TINCTORIA—DYERS' QUERCITRON, or AMERICAN OAK.

SPECIFIC CHARACTERS.—Leaves oblong-obovate, widely-waved, or not flat, and downy beneath, with deep somewhat bristle-pointed toothed lobes ; involucre flattened beneath ; acorn globose. Grows to the height of seventy or eighty feet.

The inner bark of this tree, which is one of the tallest growing American oaks, forms the dye known by the same name, and which affords a yellowish colour ; and the only preparatory operations it undergoes previous to using, after being separated from the wood and outer bark, is drying and grinding. Although there are specimens of *Quercitron* growing in collections in this country, as yet no fair attempts have been made to cultivate the same for either its bark or wood.

II. QUERCUS INFECTORIA—DYERS' OAK.

SPECIFIC CHARACTERS.—Leaves waved, oblong, regularly but not deeply toothed or notched, smooth on both sides. Native of the Levant, and some other parts of the south of Europe, where it attains the height of from forty to fifty feet.

The *Quercus infectoria* is said to have been introduced to Britain in 1822, but it is doubtful whether there are yet any growing plants in this country. Its inner bark is said to produce a brighter yellow colour than that of the last species, for which its culture has been much recommended, it being supposed sufficiently hardy for this climate.

III. GENISTA TINCTORIA—DYERS' BROOM or GREENWEED.

GENERIC and SPECIFIC CHARACTERS see page 183.

From the flowers of this dwarf shrub a bright yellow colour is obtained, which, for dyeing green with woad, is said to be preferred by dyers to all other yellows.

Besides the preceding described hardy shrubs and trees, the dyes of which form articles of commerce, there are several others of more common occurrence, from the bark leaves and other parts of which colouring matter of good quality has been extracted in considerable quantities; the most common of which are as follows:—*Prunus domestica*, Common Plum; *Pyrus Malus*, Apple-tree; *Carpinus betulus*, Common Hornbeam; *Juglans regia*, Common Walnut; and *Berberis vulgaris*, Common Barberry; from the bark of all of which a yellow colour may be obtained; as well as from the young twigs, bark, and leaves of the following:—*Betula alba*, Common Birch; *Myrica Gale*, Scotch Myrtle or Sweet Gale; *Salix pentandria*, Sweet Willow (one of the few willows found to thrive well on marsh peaty soils); and others of the same genus. The bark of *Fraxinus excelsior*, Common Ash, as also the fruit of *Vaccinium Myrtillus*, Blaeberry, and that of *Empetrum nigrum*, yield a blue colour; and from the bark of the *Quercus Robur*, Common Oak, a black dye may be obtained.

* * * *Cryptogamic Plants, or Plants with inconspicuous flowers, from which Dyes are obtained.*

IX. Belonging to the class and order *Cryptogamia Lichenes* of Linnæus.

LECANORA.

GENERIC CHARACTERS.—Plants crustaceous, spreading, adhering closely to whatever they grow upon, plane and uniform; apothecia or fructification shield-like, thick, and pressing on the crust, with a plain convex coloured disk, and thickish border, somewhat free from the crust, of which it is formed, and of the same colour.

LECANORA TARTARFA—CUDBEAR.

SPECIFIC CHARACTERS.—Crust covered with greyish-white tartar-like granules; fructification scattered; disk a little wrinkled, and of a flesh colour, margin inflexed and becoming slightly waved. Found

at all seasons growing naturally on rocks, and to about the height of two inches.

The Cudbear is so called from the colouring properties which it possesses having been first discovered by a gentleman of the name of Mr Cuthbert. It is employed for dyeing a purplish colour, and to a very considerable extent, in some of the establishments of Glasgow. The greatest supply is imported from Norway, but a large quantity was formerly procured from some districts of the Highlands, where the inhabitants made a livelihood by stripping the plants from off the stones by means of iron hooks. Those specimens having the most fructification are reckoned the best.

Several other Lichens are also used in dyeing, but not to near the same extent as the Cudbear, at least in this country. The principal are *Lecanora perellus*, which also affords a purple colour, and in the south of Europe is used in lieu of the *L. tartarica*; from *L. candelaria* the Swedes obtain a colour which they employ for staining candles used in their religious ceremonies; *Rocella tinctoria*, Orchal or Archel, which grows naturally on rocks in the Cape Verd and Canary Islands, and from which the rich purple, but rather fugitive colour, which bears its name is derived; *Lepraria chlorina*, *Parmelia saxatilis*, *Sticta pulmonacea*, *Solorina crocea*, *Gyrophora pustulata*, *G. deusta*, *Usnea plicata*, *Alectoria jubata*, and others, yield dyes of various kinds.

Several of the *Lycopodineæ*, another order of *Cryptogamic* plants, are employed instead of alum in some parts for fixing dyes, particularly *Lycopodium selago*, which is used for that purpose in Skye, and other of the Western Isles; *L. complanatum* and *L. clavatum* are likewise found to produce the same effect.

Judging from the great variety and beauty of some colours given out by plants of the order *Algae* or Sea-weed, several of these might be found to yield valuable dyes; but hitherto it does not seem that any extensive successful experiments have been made with them.

Of plants yielding dyes, peculiar to the tropical and warmer climates, and which are imported from thence to this country, the following are the principal:—*Indigofera tinctoria*, *I. argentea*, *I. Anil*, &c. from the first two of which is chiefly procured the East Indian Indigo, and from the last the West Indian Indigo, of commerce; *Hæmatoxylon campechianum*, Log-wood; *Cæsalpina sappan*, Sappan Red-wood; *C. crista*, *C. brasiliensis*, *C. echinata*, from all of which

the Red Brazil Wood, which is extensively imported to Britain from the West Indies, is obtained ; *Maclura tinctoria*, Fustic ; *Diospyros ebinaster*, Ebony ; *Pterocarpus santalinus*, Red Saunder's Wood ; *Bixa orellana*, the seeds of which form the *Arnotta* of the shops, and *Curcuma longa*, the roots of which yield the fine yellow colour known by the name of Turmeric.

Presented to the Museum by Messrs John Grey and Son, Denny, near Stirling, specimens of the principal vegetable dyes used in this country, in a prepared state ; also specimens of the woods from which many of these are derived.

IV. VARIOUS PLANTS USED IN THE ARTS AND MANUFACTURES, NOT INCLUDED IN THE THREE LAST DIVISIONS.

I. Belonging to the class and order *Tetrandria Monogynia* of Linnaeus, and to the natural order *Dipsacæ* of Jussieu.

DIPSACUS—TEASEL.

GENERIC CHARACTERS.—Flowers monopetalous, tubular, four-cleft, and, together with the proper calyx, superior, or placed on the summit of the single seed, which is terminated by an entire cross-shaped crown ; common calyx, or involucre, many-leaved ; receptacle conical, with long rigid entire paleæ or chaff.

II. DIPSACUS FULLONUM—CLOTHIER'S TEASEL.

SPECIFIC CHARACTERS.—Leaves without footstalks, entire, with small scattered spines on their margins and surfaces, those of the stem opposite joined together at the base ; stems upright branching, angled or furrowed, and prickly ; heads cylindrical ; chaff prominent, rigid, with recurved spiny points ; perennial. Native of England.

The Clothier's Teasel is cultivated to a considerable extent in the woollen cloth manufacturing districts of England for its use in raising the nap upon these stuffs, which it does by means of the rigid hooked awns or chaff of the heads, these being fixed round the circumference of a large broad wheel, which is made to revolve and

the cloth held against them. It grows best on superior rich soils of medium or rather strong texture, which should be reduced to a fine tilth previous to sowing. This operation is generally performed in March, and the usual method was formerly broad-cast, at the rate of about a peck of seed to the acre ; but the drill system is now pretty generally adopted, by which, in addition to other advantages, a saving of about a fourth part of the seed is attained. The after culture consists of thinning out the plants to about a foot distance, and keeping them free from weeds until the month of August in the following year, when the heads are cut, tied in bundles, and sold to the manufacturers. It is a frequent custom to sow other crops, as caraway or coriander, along with the teasel, but this practice cannot be recommended.

II. Belonging to the class and order *Pentandria Digynia* of Linnaeus, and to the natural order *Chenopodeæ* of Jussieu.

SALSOLA—SALTWORT OR SODA PLANT.

GENERIC CHARACTERS.—Flowers five-petaled, inferior ; capsules closed, imbedded in the fleshy calyx. Seed with a spiral embryo.

SALSOLA KALI—COMMON OR FRICKLY SALTWORT.

SPECIFIC CHARACTERS.—Stems spreading, hairy ; leaves somewhat rugged, narrow, and terminating in a sharp bristled point. Calyx solitary, with coloured membranous edges ; flowers minute and flesh-coloured ; annual. Grows naturally on light sandy soils on the sea coasts.

This is the principal native plant from which the alkaline salts, barilla, soda, potash, and kelp are obtained ; it was formerly collected in considerable quantities on the west coast of Britain, and burned for soda for the manufacture of glass, &c.

Many more of the sea-side plants possess the same principles as the above ; but those most esteemed and cultivated in Spain and other countries of the South of Europe, of which they are natives, are the *Salsola Soda*, long fleshy-leaved Saltwort, and *S. sativa*, cultivated Saltwort ; from these two, which are grown on light sandy soils on the coasts of the Mediterranean, and on those of Spain in particular, is obtained the Spanish barilla, and all the best soda used

in Europe. It does not appear that the growth of these has hitherto been fairly tried in Britain ; and even the *S. kali*, which grows freely from seed, notwithstanding it at one time formed a pretty considerable branch of trade, was never made the subject of careful cultivation.

III. Belonging to the class and order *Tetrandria Monogynia* of Linnæus, and to the natural order *Plantagineæ* of Jussieu.

PLANTAGO—PLANTAIN.

GENERIC CHARACTERS.—See page 200.

PLANTAGO PSYLLIUM—FLEA-WORT.

SPECIFIC CHARACTERS.—Stem branched, spreading ; leaves somewhat toothed, recurved ; heads leafless ; annual. Native of Spain.

A good deal of attention has of late been bestowed on the cultivation of Flea-wort in France, from the circumstance of its yielding a gelatinous viscid substance, which is used by paper stainers, and found much superior to the extract obtained from lintseed, which was formerly and is yet still made use of by them ; that of the flea-wort being much easier dried.

IV. Belonging to the class and order *Triandria Monogynia* of Linnæus, and to the natural order *Cyperaceæ* of Jussieu.

SCIRPUS—CLUB-RUSH.

GENERIC CHARACTERS.—Flowers glumaceous, as in the grasses ; spikelets imbricated in all directions, many-flowered, none of the scales empty ; bristly under the ovary ; style deciduous and not jointed at the base.

SCIRPUS LACUSTRIS—TALL-CLUB OR BULL-RUSH.

SPECIFIC CHARACTERS.—Culm or stalk about six feet in height, round, and filled with soft white pith in the centre, about half an inch in diameter at the base, where it is generally furnished with two sheaths, the interior one ending in a leaf-like point ; cyme or panicle

terminal, decompound with a two to four leaved involucre ; spikelets ovate and smooth ; perennial. Grows naturally on alluvial soils, which are occasionally covered with fresh water, as by the side of lakes, rivers, &c.

The Bull-rush is much used by coopers for putting between the staves of barrels, &c., also by chair-makers for making chair bottoms, and for various other purposes, for which it might be profitably grown in marshes, where the soil is not very peaty, and of rather superior quality ; particularly on the banks of rivers which are flooded by fresh-water tides.

Many others of the natural order *Cyperaceæ* are employed for various economical purposes, such as forming seats, ropes, mats, fancy basket-work, thatching houses, &c. ; for which purposes, although they may be beneficially employed when found growing in sufficient quantities, yet they are not at all likely to be cultivated advantageously under any circumstances for such alone.

V. Belonging to the class *Cryptogamia* and order *Equisetaceæ*.

EQUISETUM—HORSE-TAIL.

GENERIC CHARACTERS.—Stems and branches without leaves and regularly articulated, each articulation arising from a tubular sheath ; reproductive organs in terminal spikes or heads, composed of peltate several sided scales, producing on their under surface from four to seven elongated involucres containing the seed.

EQUISETUM HYEMALE—LARGE BRANCHLESS HORSE-TAIL OR DUTCH RUSH.

SPECIFIC CHARACTERS.—Stem simple, erect, rough ; sheaths whitish, but black at the base and summits ; teeth small and deciduous ; roots creeping ; perennial. Grows naturally in moist thick shady woods, but by no means abundant in Scotland.

The dried stems of this plant are used extensively for polishing wood, metal, &c. ; and from being generally imported from Holland have received the name of Dutch Rushes. As the *E. hyemale* grows naturally in such places as few other plants will exist in, it might be cultivated with advantage under trees, on rather light moist

but superior soils ; it can only be propagated by dividing and transplanting its roots.

V. PLANTS CULTIVATED FOR VARIOUS ECONOMICAL PURPOSES.

I. Belonging to the class and order *Pentandria Digynia* of Linnæus, and to the natural order *Umbelliferae* of Jussieu.

CARUM—CARAWAY.

GENERIC CHARACTERS.—Calyx acute, minute or obsolete ; flowers in umbels, five-petaled, superior, irregular ; petals inversely heart-shaped ; flower receptacle angular, thin, wavy, and permanent ; styles tumid at the base, subsequently elongated, and widely spreading ; seeds two, elliptic, oblong, with equidistant ribs ; interstices convex.

CARUM CARUI—COMMON CARAWAY.

SPECIFIC CHARACTERS.—Stem about two, or two and a half feet in height, with numerous spreading branches ; leaves finely cut, having ventricose sheaths, and of a deep green colour ; flowers white ; common calyx or involucre awanting ; roots somewhat fusiform ; biennial. Grows naturally in some parts of England.

The cultivation of Caraway for its seed, which is always in considerable demand, has in Britain hitherto been almost exclusively confined to the southern districts of England, and is so closely assimilated with that of the next plant (*Coriander*), that the culture of both will be noticed at the same time.

The seeds of Caraway are used to a considerable extent in confectionery, also for flavouring cheese, spirits, &c. and in the distillery. The leaves, to a limited extent, are used in salads, or as a pot-herb like parsley, and the roots are by some preferred to those of the parsnip.

By Mr Samuel Girdwood, Isle of Bute, sample of a crop of caraway seed grown with satisfactory profitable results, on the home farm of the Marquis of Bute, in summer 1835, and equal in quality to medium samples of the London market, grown in the south of England.

CORIANDRINUM—CORIANDER.

GENERIC CHARACTERS.—Calyx broad, unequal ; flowers in umbels, petals radiate ; floral receptacle awanting ; fruit a single or double globe.

CORIANDRINUM SATIVUM—COMMON OR CULTIVATED CORIANDER.

SPECIFIC CHARACTERS.—Stem leaves much more cut than those of the root, and all possessed of rather a strong disagreeable smell ; stems pretty upright, much branched, but acquiring a drooping habit, as the globular seeds ripen ; annual. Naturalised in some parts of England, but supposed to have been originally introduced from the south of Europe.

The demand for and application of coriander seeds is much the same as regards those of the caraway, and in the south of England they are generally cultivated together, 18 lb. of caraway mixed with 15 lb. of coriander being usually allowed to the acre, and these are sown in March or early in April on rather strong rich land, and such as is newly broken up from pasture is preferred. The coriander being an annual, yields its crop the first season, and is generally ready to cut in the beginning of July ; it is then left on the field to dry, and the seed afterwards beaten out on cloths, the facility with which these are detached not admitting of carting home to the barn. In April following, the caraway will require a hoeing to destroy weeds, and another in June. The crop will be ready in July, and requires the same treatment as the coriander.

Although few trials on an extensive scale have been made of the culture of coriander and caraway in Scotland, yet there is no doubt but that such could be done as well as in England. The harvesting might be a week or a fortnight later, but even at that period (end of July or beginning of August) the weather is generally drier than at any other period of the season, and consequently most favourable for getting the crop properly secured. A seemingly preferable mode of cultivation would be to sow them both in drills alternately, by which means the caraway would be more easily hoed and cleaned after the removal of the coriander.

CUMINUM—CUMIN.

GENERIC CHARACTERS.—Flowers in umbels ; involucre five-leav-

ed ; seed ovate, with seven ribs, and bearded in the interstices, two together.

I. CUMINUM CYMINUM—COMMON CUMIN.

SPECIFIC CHARACTERS.—Lower leaves broad, upper minutely divided ; flowers white ; seeds adhesive ; annual. Native of Egypt ; introduced in 1594.

From the Cumin being a native of such a warm climate as that of Egypt, it was formerly supposed that in Europe its culture was only practicable in the most southern countries. It is now, however, grown in Germany, Holland, and other parts still farther north ; and in these countries its seeds are at present the principal carminatives used, as those of the caraway and coriander are in Britain ; also in the distillery, and for imparting a favourite flavour to spirits. In this country cumin ripens its seeds in gardens about the middle of August, and there seems no doubt that if these were more in demand they might be grown to any extent in early districts.

Besides the caraway, coriander, and cumin, many more umbelliferous plants produce carminative seeds, but are not the objects of cultivation to much extent for these alone. The following are a few of the more common : *Apium Petroselinum*, Parsley (page 199) ; *A. graveolens*, Celery ; *Anethum graveolens*, Common Dill, and *A. Feniculum*, Fennel ; *Legusticum levisticum*, Lovage ; *Pastinaca sativa*, Parsnip ; *Angelica archangelica*, Common Angelica ; *Myrrhis odoratus*, Myrrh, &c. ; in collecting the seeds of which great care is requisite to reject those of other plants belonging to the same natural order (*Umbelliferae*) which are violent poisons, and bear a considerable resemblance to the preceding. Of these the most dangerous are *Conium maculatum*, Common Hemlock ; *Phellandrum aquaticum*, Water Hemlock ; and *Anthusa Cynopium*, Fools' Parsley.

II. Belonging to the class *Tetradynamia* of Linnæus, and to the natural order *Cruciferae* of Jussieu.

SINAPIS NIGRA—RED, BROWN, OR BLACK MUSTARD ; AND S. ALBA—WHITE MUSTARD.

GENERIC and SPECIFIC CHARACTERS.—See Plants Yielding Oil, page 285.

Although the Mustards are included and described amongst the Oliferous Plants, their seeds being occasionally crushed for oil in common with those of the rape, &c., yet the purpose for which they are chiefly used is for making the Flour of Mustard, which, in the case of the first species, is done by removing the outer skin, and afterwards reducing the remainder of the seeds to powder, both of which operations are performed by means of machinery. The manufacture of mustard was first understood and extensively practised in the county of Durham, and the *S. nigra* was used in preference to the white sort, it being more pungent, and of much finer quality; but as it is impossible to remove the skins entirely, the flour made from the red or black seeded sort retains a darkness of colour which that made from the *S. alba* (White-seeded Mustard) wants; and as much less labour is required in the manufacture of the latter, it is now employed to the greatest extent, either alone, or more generally in mixture with the former, particularly in Britain. In France, however, and other parts of the Continent, where the art of removing the skins is not properly known, the black or red mustard seed is still chiefly used, and the flour made from it has a very dark or greyish colour.

Sample in the Museum of mustard flour, made from the seed of *Sinapis nigra*, by Mr Webster, mustard-manufacturer, Durham.

COCHLEARIA—HORSE-RADISH OR SCURVY-GRASS.

GENERIC CHARACTERS.—Petals four, entire; stamens without teeth; pod sessile, ovate, globose, or oblong, with ventricose valves opening lengthwise; seeds numerous, compressed, and not edged; cotyledons flat, accumbent, parallel, with the broad oval membranous internal partition.

COCHLEARIA ARMORACIA—HORSE-RADISH.

SPECIFIC CHARACTERS.—Root-leaves oblong and notched, those of the stem long, lanceolate, toothed or cut; flowers white; pods short, thick, and tapering to both ends; roots whitish, thick, fleshy, long, and branching.

The Horse Radish is a well known plant, the roots of which are commonly used as a condiment to roast beef, but of late years it has been cultivated in fields to a pretty considerable extent in some parts of England; for an extract obtained from its roots, and which is beneficially employed for preserving mustard made ready for the

table and exported to the East and West Indies in that state. To grow the roots to the greatest perfection requires a rich, damp, and deep soil; small pieces of the root will vegetate, but it is as well that each set be provided with a crown or bud; these should be planted pretty deep, and the crop is ready for taking up the second or third season after planting.

III. Belonging to the class and order *Diacia Pentandria* of Linnæus, and to the natural order *Urticeæ* of Jussieu.

HUMULUS LUPULUS—HOP.

GENERIC AND SPECIFIC CHARACTERS, see page 275.

Although the Hop be previously noticed as a *plant yielding fibre*, it is never cultivated for that purpose alone, but (in Britain at least) almost exclusively for the bitter principle contained in the flowers and catkins of the female plants, which are employed in the brewing of ale, small beer, and porter, to impart to these an aromatic bitter taste, and prevent them from becoming sour. There are several cultivated varieties of hop distinguished by the names of Flemish, Goldings, &c. Of these the Flemish comes nearest the wild sort, and is consequently inferior in quality to the others, but is much more hardy and less liable to be injured by unfavourable harvest weather than the others. Its limited cultivation, by all extensive growers, is, therefore, recommended, and, from possessing these properties, it seems the sort most likely to be successfully cultivated in Scotland, the climate of which is generally considered unsuited for the hop, its growth in Britain being at present confined to the southern counties of England.

Such clay soils and strong deep loams as have a free porous subsoil and a south or westerly exposure, being well sheltered by plantations from the north and easterly winds, (but at the same time not so much as to prevent the free circulation of air), are best adapted for hop plantations, previously to forming which, the ground should be cleared of weeds by fallowing or otherwise, well manured, trenched, and pulverized. The planting is performed either in March or April when cuttings are used, or in October and November when ground plants or slips from those of an old plantation are employed. In either case small pits are made in rows from six to eight feet distant, every way into each of which from a half bushel to a bushel of farm-yard

manure is put, and the earth placed over the same in the form of small hillocks, and on each of these hillocks from four to six plants or cuttings are planted by means of dibbles ; and, as it is the third year after planting until the hop comes into full bearing, other crops of a light and unimpoverizing nature, such as onions, turnips, &c. are generally grown between the rows, taking care, however, not to allow either them or weeds to injure the hop plants. In May, a pole from six to nine inches in diameter, and from fifteen to twenty feet in height, is placed on each hill for the support of the plants ; and in harvesting the crop in September, when the seeds assume a somewhat ripened-like colour, the stems are cut over at the ground, and, together with the poles, laid on wooden frames to admit of the catkins being easily gathered. These are then carried immediately to kilns, dried, and packed in bags for sale. The average length of time which a hop plantation may be considered to remain in a good bearing condition, on rich deep soil, is about twenty years, but in some instances they are allowed to remain thirty years before being broken up, and the land cleared of their roots for corn crops. No crop is more precarious or liable to suffer from mildew, blight, attacks of insects, weather, &c.

Several other plants have been recommended and used as substitutes for the hop in brewing : of these the most easily obtained are the following : Twigs of *Buxus sempervirens*, Common Boxwood, which are extensively used in France ; *Menyanthus trifoliata*, Marsh Trefoil or Buckbean, one ounce of the dried leaves of which is said to be equivalent to half a pound of hops ; leaves of *Glechoma hederacea*, Ground Ivy ; roots of several of the Gentians, as *Gentiana acaulis*, *G. lutea*, *G. purpurea*, *G. rubra*, &c. In some of the northern countries of Europe, and formerly occasionally in Britain, tops or twigs of *Erica vulgaris*, Common Heath ; *Cytissus scoparium*, Common Broom, &c.

IV. Belonging to the class and order *Diadelphia Decandria* of Linnaeus, and to the natural order *Leguminosæ* of Jussieu.

ASTRAGALUS—MILK-VETCH.

GENERIC CHARACTERS.—See page 168.

ASTRAGALUS BOETICUS—TRIANGULAR-PODDER MILK-VETCH.

SPECIFIC CHARACTERS.—Stems upright and branching ; leaflets oblong, blunt, each with a notch and a small withered-like prickle at the points ; spikes few-flowered, scarcely so long as the leaves ;

pods triangular and curved, with hooked points ; annual. Native of the south of Europe.

The *Astragalus boëticus* is cultivated in Hungary, Germany, and other parts of the Continent, from whence it has been introduced into Britain for its seeds, which are roasted, ground, and used either alone as a substitute for, or mixed with coffee ; in the former state it is by some preferred to, and in the latter is considered to improve the flavour of, that wholesome beverage. It is of the easiest culture, and may be sown in April in drills, twelve or fifteen inches apart, on rather light sandy soil, and reaped in August following.

Although plants employed, or likely to be so, as substitutes for coffee or tea, cannot be expected to form any important part of field culture in this country, yet it is not deemed out of place here to mention a few of the hardy plants which have been tried and used for these purposes with most success. Continuing, therefore, with such as may be used for coffee, and without giving any generic or specific descriptions, these are as follows:—*Cichorium Intybus*, Common Chicory (see page 194), the roots of which, as also of *Leontodon Taraxacum*, Common Dandelion, and *Beta vulgaris hortensis*, Garden Beet, are used, after being cut in small pieces, roasted, and ground ; as are also the seeds of *Galium Aparine*, Fetter or Cleavers ; *Iris Pseud-Acorus*, Common Yellow Iris ; Wheat, and Rye.

The true Tea plants, *Thea viridis*, Green Tea, and *T. bohea*, Black Tea, have been found capable of withstanding the winter in Britain, with a little protection when young, particularly *T. viridis*, but how far the culture of either, from seed procured in the most northern or colder parts of their native countries, China and Japan, would be attended with advantage in Britain, yet remains to be ascertained. As substitutes for Tea, the leaves of the following more hardy plants have been used :—*Betula Lenta*, Sweet American Birch, or Mountain Mahogany ; *Ledum palustre*, Marsh Labrador Tea Plant ; *Ribes nigrum*, Black Currant, and others of the genus ; *Salvia officinalis*, Common Sage ; *Agrimonia Eupatoria*, Common Agrimony, *Veronica officinalis*, Officinal Speedwell ; *Lithospermum officinale*, Officinal Gromwell, or New Zealand Tea ; *Solidago odora*, Sweet-smelling Golden Rod ; *S. virgaurea*, Common Dwarf Golden Rod ; *Prunus spinosa*, Common Sloe-Tree, &c. ; the leaves of the last of which, together with those of *Fraxinus excelsior*, Common Ash Tree, and *Cratægus Oxyantha*, Common Hawthorn, are more exclusively used for adulterating the genuine teas than as proper substitutes for them.

V. Belonging to the class and order *Pentandria Monogynia* of Linnaeus, and to the natural order *Solanææ*.

NICOTIANA—TOBACCO.

GENERIC CHARACTERS.—Flower inferior, monopetalous, funnel or bell-shaped; stigma emarginate; seeds numerous, in a two-celled capsule.

I. NICOTIANA TABACUM—VIRGINIAN TOBACCO.

SPECIFIC CHARACTERS.—Leaves without footstalks, oblong, and tapering slowly to the point, large, averaging about two feet in length by from nine to twelve inches at the greatest breadth; stems upright, about six feet in height; flowers pink-coloured; tube much longer than the calyx, slightly inflated within the mouth; segment acuminate, and slightly recurved; annual. Native of North America.

This species is cultivated to a greater extent than any other in North America, but as it is considerably later in ripening its seeds, and also more tender than the next, it is not so well suited to the climate of Britain.

II. NICOTIANA RUSTICA—COMMON GREEN TOBACCO.

SPECIFIC CHARACTERS.—Leaves stalked, ovate, or somewhat approaching to a heart-shape, about nine to twelve inches long by five to eight inches in breadth; stems upright, from four to five feet in height; flowers of a dull yellowish green-colour; tube cylindrical, scarcely longer than the calyx; segments short, blunt, and recurved; annual. Native of America.

This is the species chiefly cultivated in the northern countries of Europe. In Scotland it ripens seed in ordinary seasons about the middle of August, at which period the former, unless assisted at one period of its growth or other by artificial heat, is generally only coming into flower. The seeds of *N. rustica* will lie in the ground for a number of seasons retaining their vegetative powers, so that where a crop has been once grown, the seedling plants will spring up spontaneously for a series of years thereafter.

Many more of the annual species of *Nicotiana* are cultivated for the manufacture of tobacco, but those above described are the hardiest, and best adapted for the climate of Britain. It does not seem, however, that their culture (which is at present prohibited except to a limited extent) will ever become an object of great im-

portance in this country ; for although any quantity of leaves might easily be produced, they are found deficient in those narcotic and pungent qualities on which their chief value depends, to such as are the growth of more dry and warm climates.

Tobacco succeeds best on rich rather light loamy soils, and may be cultivated (sown in the end of April) in the same manner as turnips ; but a preferable mode in such climates as that of Britain, and which is practised in Germany, &c. is to sow the seeds in March, on a moderate hot-bed, and protecting the young plants from frosts at night, until about the second week of May, when they may be planted out in drills. For much valuable information on collecting, drying, and manufacturing the leaves of tobacco, see *Loudon's Encyc. of Agriculture, and his Encyc. of Plants*.

Among the Economical Plants may be included some of the more extensively cultivated plants used in Medicine, as follows.

VI. Belonging to the class and order *Diadelphia Decandria* of Linnaeus, and to the natural order *Leguminosæ* of Jussieu.

LIQUORTIA—LIQUORICE.

GENERIC CHARACTERS.—Calyx tubular, equally five-parted ; standard or upper petal of the flower erect, reflexed at the edges ; wings spreading ; keel bifid ; pod oblong smooth.

LIQUORTIA OFFICINALIS—COMMON LIQUORICE.

SPECIFIC CHARACTERS.—Leaves compound, without stipules or appendages at their base ; leaflets from eleven to fifteen on each leaf, ovate, retuse, clammy beneath ; pods three or four-seeded ; roots thick, long, and running deep into the ground ; perennial. Native of the south of Europe.

Besides the uses of liquorice roots in medicine, they are also employed in brewing, and are grown in some parts of England pretty extensively for these purposes. Liquorice requires a rich deep dry sandy soil, which, previous to forming a new plantation, should be trenched to the depth of about three feet, and a liberal allowance of manure, regularly mixed with the earth in trenching. The plants, which are procured by slipping them from those in old plantations, are, either in February or March, dibbled in rows three feet apart, and from eighteen inches to two feet in the row.

The plants require three summers growth before being fit for use, when the roots are obtained by retrenching the whole, and are then stored in sand for their preservation until required. As the plants are small during the first summer of their growth, a crop of onions is often taken in the interstices of the rows.

VII. Belonging to the class and order *Enneandria Trigynia* of Linnaeus, and to the natural order *Polygonæ* of Jussieu.

RHEUM—RHUBARB.

GENERIC CHARACTERS.—Corolla six-cleft, persistent ; seed or small nut, one for each flower, three-cornered. *Rheum* being the only genus in the above class and order.

RHEUM PALMATUM—PALMATE-LEAVED RHUBARB.

This species is easily distinguished by its deeply divided or palmate leaves, and is generally considered as that from which the dried roots used in medicine are chiefly obtained. Those of other species, however, particularly *R. tataricum*, Tartarian, *R. compactum*, Thick-leaved, *R. undulatum*, Buck or Waved-leaved, and *R. rhaponticum*, Common Rhubarb, are also used, they all succeed best in a very rich soil of medium texture, and require to grow three or four years until the roots become large enough for use ; these are then taken up, cut in pretty large pieces, and dried either by the sun or in kilns made for that purpose, after which they are ready for use. Rhubarb from Turkey and neighbouring countries is generally preferred to that of British growth, but is said to owe its superiority entirely to the manner of drying it.

The leaf-stalks of all the above varieties are used in spring, and the earlier part of summer, for making tarts.

Of other medicinal plants may be mentioned the *Papaver somniferum flore albo*, Large White-flowered Poppy (page 291), it being the variety most esteemed for the production of opium, which is obtained by scratching the heads in the evening, and the white milky-like juice that escapes becomes dried into a dark brownish-like paste, which is carefully collected in the mornings, and afterwards being freed from impurity, is ready for use. An excellent opium is also procured from the different varieties of garden lettuce.

PLANTS CULTIVATED FOR THEIR TIMBER.

The number of forest trees capable of being cultivated in Britain is so great, that a complete enumeration of them, accompanied with even the most succinct descriptions, would far exceed the limits to which an Agricultural Report like the present must necessarily be confined, and a mere list of names without descriptive characters would not only be in a great measure useless, but also at variance with the plan adopted in the preceding pages. It has, therefore, been judged expedient to treat of a limited number, reserving the rest until the publication of future and Supplementary Reports, which, should circumstances permit, it is intended to give at such periods as may seem most advisable. The trees of the Pine or Fir tribe are those which of late years have most engaged the notice of cultivators, and as the interest which they have excited is undiminished, our attention has naturally been more particularly directed to them. The success which has attended the cultivation of the larch, and the perfection to which not only the natural forests, but also the numerous and extensive plantations of the Scotch Fir have attained in this country, lead us to expect favourable results from the extended culture of the *Coniferae*, which we have therefore selected for description, and of which a more complete collection has been exhibited in the Museum than of any other tribe.

I. Belonging to the class and order *Monœcia Monodelphia* of Linnaeus, and to the natural order *Coniferae* of Jussieu.

PINUS—PINE-TREE.

GENERIC CHARACTERS.—Male flowers in roundish or oblong cylindrical catkins ; anthers two-celled ; female, stigmas bifid or trifid ; scales in an imbricated cone, having each two styles, and a bractea or sheath-like appendage at their base ; pericarpa two, attached to the inside of each scale, more or less winged, generally about half surrounding the seed ; cotyledons from four to twelve ; leaves two or more together, in bundles, without a bud in their centre.*

* It is generally asserted that all the species of the genus *Pinus* are natives of the northern hemisphere ; seeds of various species have been received in this country from the Brazils, Cape of Good Hope, &c. but these are considered to have been introduced to such places by settlers from Europe.

* *Leaves generally in pairs.*

I. PINUS SYLVESTRIS—WILD PINE or SCOTCH FIR.

SPECIFIC CHARACTERS.—Leaves short (about from one and a half to two inches in length), rigid, straight, or slightly waved, and twisted, slightly concave on the interior, and convex on the exterior surface, margined or serrulated on the edges, of a light green colour, bound together towards their base by a short thin membranous lacerated vagina or sheath ; male catkins many together, short, and ovate, generally of a faint yellowish colour ; cones pedunculated or stalked, seldom more than two or three together, round the termination of the young shoots generally of a purplish colour, and pendent when young, afterwards greenish, and laterally of a dusky brown colour, and more upright, small, about as long or rather longer than the leaves, regularly conical and pointed, ripening the second year ; scales thick, and terminating in a somewhat irregular four-sided often recurved projecting point ; seeds small and dark coloured ; cotyledons five to seven. Grows naturally in Scotland, and in most of the northern countries of Europe.*

P. sylvestris is the only native Pine, but of it there are several reputed varieties, some of which differ so much as to be reckoned distinct species. Four of these, natives of this country, were first noticed and described by that talented botanist the late George Don of Forfar, in the Caledonian Horticultural Society's Memoirs, vol. I. from which the following descriptions are derived :—

1. **COMMON WILD PINE.**—Branches forming a pyramidal head ; leaves margined, of a dark or dull green colour, and but little glaucous underneath ; cones considerably elongated, and tapering to the point ; bark of the trunk very rugged.

This variety seems to be but short-lived, becoming soon stunted in its appearance, and is altogether a very inferior tree to either of the next two.

2. **HORIZONTAL-BRANCHED WILD PINE.**—Branches of a horizontally spreading habit, generally bent downwards near their junction, with the trunk or main stem ; leaves broader than in the last,

* No variety of *P. sylvestris* has yet been discovered in North America, notwithstanding that its reputed degeneracy in this country has been stated as arising entirely from seeds of an inferior variety having been imported from Canada.

and serrulated, not margined, also of a lighter and more beautiful glaucous colour ; cones generally thicker, not so much pointed, and smoother than those of No. 1 ; bark of the trunk also smoother or less rugged. This, Mr Don considered, might from its marked dissimilarity be admitted a distinct species from the last, and he therefore distinguished it by the name of *Pinus horizontalis*. It is rare in artificial plantations of the present day, being in proportion to the common sort No. 1, at most as one to ten or twelve.

3. HOOKED-CONED WILD PINE.—Leaves of a still lighter colour than those of the last, insomuch that they appear of a truly light glaucous hue, approaching to a silver tint, also serrulated, not margined as those of No. 1, with which the tree agrees in having a pyramidal head, but differs from either of the preceding in its cones having the points of their scales elongated and hooked, so as to give them the appearance of being beset with blunt prickles bent backwards. This variety is more common than the last, and is also a good tree.

4. SHORT TWISTED-LEAVED WILD PINE.—Differs from the others in its leaves, which are much shorter, and somewhat curled, or rather twisted. This seems to be a scarce variety, Mr Don having only discovered three or four trees ; he considered it to be nearly allied to *P. Banksiana* of Lambert, and therefore of little importance as a forest tree.

It was the opinion of Mr Don, that the natural pine forests which formerly abounded in Scotland, and the trees of which arrived at a large size, had been chiefly composed of the variety or species to which he had given the name of *P. horizontalis*, and that the supposed decline in the quality of the timber of *P. sylvestris* in this country, may be accounted for from the great predominancy in artificial plantations of var. No. 1, arising from its seeds being produced in greater quantities, and easier come at by seed gatherers ; and as the timber of *P. horizontalis* is still found possessed of all the qualities ever ascribed to the Scotch fir, an opinion which seems to be corroborated by the fact, that in such natural forests as yet remain in various parts of Scotland, as those in the counties of Perth, Aberdeen, and Inverness, which are remarkable for the superior quality of their timber, *P. horizontalis* is the most prevalent sort. Hence

the advantages of procuring plants raised from seeds collected in natural forests.*

Young plants, the produce of seeds, collected from native trees, when grown alongside those from seeds collected in the low country plantations, differ very perceptibly, in being of more vigorous growth, and having longer more waved or twisted leaves.

HAGANOE PINE, *Pin de Haganoe*, Fr.—This variety receives its name from being introduced from the forest of Haganoe in Germany, the old trees in which are remarkably tall, straight, free from branches, except near the summit, with remarkably smooth reddish-coloured bark; the leaves of the young plants are fully longer than those of any of the preceding, much waved or twisted, of a light green slightly glaucous colour, and minutely serrulated; the young terminal buds are of a peculiar reddish colour, and generally more or less covered with whitish resin. The young plants are, besides their difference in shade of colour, readily distinguished by their stronger and more rapid growth.

RIGA PINE, *Pin de Riga*, Fr.—From the superior quality of the timber of *P. sylvestris* imported from Riga, under the name of Red Pine, to distinguish it from that of *Abies communis*, or White Deal, it has been considered advisable to procure seeds from the natural forests in the neighbourhood of that place, and to plants the produce of such seeds, the above name is applied. They may at least be considered as possessed of equal merits with such as are derived from the best native forest in the Highlands of Scotland.

A great deal has of late been written for and against a rather prevalent opinion, that the difference in quality apparent in different specimens of timber of the *P. sylvestris*, is altogether dependent on soil, climate, slowness of growth, &c. That timber grown on a light, sandy, dry, or hazelly soil, is in general more resinous and redder in colour than such as is grown on soils of an opposite quality, seems

* As a proof of plants raised from such seed retaining the superior qualities of the original trees, may be mentioned a plantation, recently cut down, which stood on the north side of the Perth and Dundee road, nearly ten miles from the former, the seed of which was, seventy or eighty years since, received from the forest of Mar, and the timber, although grown on a poor damp tenacious clay, besides attaining to a great size, was found equal in quality to that for which the above natural forest is esteemed.

not at all disputable, but that such is invariably the case is not in accordance with universal experience; for Scotch fir-timber, of the best quality, has been grown in strong clay, very damp, and occasionally moist grounds, as in the case of the plantation referred to at the bottom of the last page. It must be evident to any minute observer, that there are several distinct varieties of *P. sylvestris*, both in natural and artificial plantations, distinguished by the external appearance of their habit of growth, bark, leaves, and fruit; and although it does not follow that the internal depend, or are consequent upon, external differences, yet it may be safely inferred, that whenever a marked external distinction occurs, a difference in the quality of the timber of the tree is by no means an unlikely accompaniment, and that such, in some instances, is actually the case, appears to be a fact admitting of little or no doubt; therefore, to the grower, the importance of selecting such varieties as produce the greatest bulk and best quality of timber, under the greatest variety of circumstances, is a matter of the utmost importance.

Besides the value of the *P. sylvestris* as a timber tree, from it as well as from others of the genus, a liquid resin is obtained by making incisions with a sharp knife, or other edged instrument, a little deeper than the bark, from which the resin flows into reservoirs made for its reception. This operation is performed from the end of May to about the middle of September, as it is only in warm weather that the juice flows freely. From this resinous juice are obtained by various modes of preparation, Yellow Resin, Essential Oil of Turpentine, Common Resin, and Black Resin or Colophony. Also by burning the roots, trunks, or branches in a close furnace, nearly somewhat in the same manner as is practised in burning charcoal, the juice is made to flow out into a cavity made below to receive it, and without farther preparation, except freeing it from pieces of burned wood and other impurities, forms Tar, the uses of which are well known. Pitch is made by melting coarse hard resin, with a portion of tar, generally one-half, but the quantity is increased or lessened according to the consistency of the tar. Lamp Black is obtained by burning the impurities left in the precipitation of tar and pitch, and collecting the particles carried off and deposited by the smoke in the shape of soot. The Laplanders and other native inhabitants of the North of Europe, as well as of the North of Asia, prepare a kind of bread from the inner bark of the less resinous wild pines, on which

either alone or mixed with rye-meal they often live during the great part of winter, and sometimes during the whole year.

The seeds of *P. sylvestris*, as well as those of most others of the persistent, scaly fruited Coniferae, are extracted by exposing the cones either to the heat of the sun, or drying them on kilns or by other artificial means, and afterwards thrashing or beating out the seeds, which are then sown in beds, and covered with from a quarter to half an inch of well pulverised soil. They are generally planted out for good at two or three years of age, and are all the better of being previously, at least once transplanted in the nursery. A very efficient, though rather slovenly-like, method is to sow on heathy moors, where the trees are intended to remain, from six to eight quarts per acre of the clean seeds in January or February, the succeeding rains and moisture being sufficient to establish the seeds in the soil, and the same may be depastured the following summer with cattle, provided they are not allowed to eat it too bare.

Presented to the Museum by James Farquharson, Esq. of Invercauld, a specimen of very fine red wooded native Scotch fir, cut from a tree 200 years old, and grown on a gravelly soil, with a mixture of clay, and a specimen of a white wooded variety taken from a tree about 70 years of age, and grown on the same soil. By Mr James Slight, of Messrs Slight and Co. Engineers, Panmure Place, and Curator of the Highland Society's Models, specimen of Red Baltic or Riga Deal, timber of *P. sylvestris*, variety No. 6. By Mr George Hutton, Salene, Fife, branch of *P. sylvestris* having twenty-five full grown cones in one cluster. By Charles Guthrie, Esq. Tay Bank, Dundee, cones of *P. sylvestris*, with very prominent rounded recurved scales on the under side, and almost perfectly flattened on their upper or more exposed side, a peculiarity not unfrequently in the rougher fruited varieties of this species. By Mr George Stephens seeds of *P. sylvestris* from native trees of Sweden. By M. Vilmorin and Co. seeds of the Haganoe pine, from the forest of that name in Germany. By Mr A. Gorrie, cones and branches of three very distinct varieties of Wild Pine. And cones of a variety from the Gulf of Bothnia, communicated to him by J. C. Loudon, Esq.; these cones are considerably smaller and rather smoother than those commonly met with in this country, but certainly belong to the same species.

II. *PINUS FISCHERII*—FISCHER'S PINE.

This is a new species, or very distinct variety of *P. sylvestris*, named by Messrs J. Booth and Sons, Flotbeck, Hamburgh, from whom the specimen in the Museum was received. Compared with the common varieties of wild pine, it seems of a stronger and much more luxuriant habit of growth, with longer leaves, which are also more frequently in threes, and the terminal buds are generally covered with white resin. It is presumed that *P. Fischerii* is a native of the North of Europe, but no farther information having been received from the Messrs Booth, along with the plants sent, which were grafted on stocks of *P. sylvestris*, no additional description of Fischer's pine can as yet be given.

III. *PINUS PUMILIO*—DWARF PINE.

SPECIFIC CHARACTERS.—Habit of growth dwarf and bushy, ten to fifteen feet in height; leaves numerous, short (from an inch to an inch and a half long), rigid, slightly waved, and twisted; the inner surface flat, or but slightly concave, exterior convex, minutely serrated on their margins, and bound together at their base by a short dry rigid dark brownish sheath; male catkins ovate oblong, many together at the base of the young shoots; female, or cones, without footstalks, always erect; single or many (often to the number of ten or twenty) collected in a bunch, of a reddish or purplish-brown colour when young, green afterwards, and finally of a dull brown colour, except the points of the scales, which are greyish, and in other respects a good deal resembling those of *P. sylvestris*, except in being smaller and generally more ovate or bluntly pointed; seeds also rather smaller, but otherwise very similar to those of the last mentioned.

This pine is also known by the name of *Pinus montana*, Mountain Pine, and *Pinus Mugho*, Mugho Pine, but the latter is more generally applied to the next species (*Pinus uncinata*). *P. pumilio* grows naturally above the altitude at which *P. sylvestris* is found, on mountains in several parts of the Continent, and forms dense bushes, having scaly barked branches proceeding from very short trunks, or immediately from the junction of the roots, which spread horizontally to a considerable distance on, or scarcely under the surface of the ground. *P. pumilio* is of little use for its timber, but in parks and pleasure grounds it often attains to much more than the height which it acquires on its native mountains, forming a com-

pact plant of rather handsome appearance, and seems particularly well suited for planting so as to blend or unite plantations of *P. sylvestris* or others, with plants of dwarfer growth as shrubs, or even grass lawns, &c. In Hungary an ethereal oil, termed *Krumholz*, is obtained from its branches by distillation; also a resin which spontaneously exudes from the branches, and is obtained from the green cones by expression, termed *Hungarian Balsam*, which, in Germany and neighbouring countries, is much extolled for its efficacy in the cure of wounds, &c.

IV. PINUS UNCINATA—HOOKED FRUITED PINE OF THE PYRENEES.

SPECIFIC CHARACTERS.—Branches forming a roundish head; leaves longer, less rigid, and darker coloured than those of any of the varieties of *P. sylvestris*, previously noticed; cones also rougher or more rugged, having the points of their scales recurved or hooked backward, particularly before ripening; timber highly resinous, and of great duration. Grows naturally on the Pyrenees at higher altitudes than *P. sylvestris*.

P. uncinata is the *P. sanguinea* of La Peyrouse, which has also been confounded with *P. pumilio* and *P. Mugho*; that to which the latter name is applied is probably the same, but its height, as given in botanical catalogues, is considerably under that to which *P. uncinata* attains, except when growing on the higher limits of phenogamous vegetation.

The most satisfactory account hitherto published of the nature and habits of this pine, is by Captain S. E. Cook, F. G. S., &c. of Newton, Northumberland, in his travels through Spain, from which the above description, and following extracts are derived:—

“The upper zone of the western Pyrenees is formed entirely of the *P. uncinata*, which is a species hitherto almost unknown, or unattended to, and which is certainly one of the most valuable trees in the European flora. The port and bearing, as well as colour, are quite different from those of any other species. The form, where the tree is fairly developed, is round and massy, frequently resembling that of some of the deciduous trees, the long arms sweeping the ground. The growth, as far as I could judge, appeared to be about the same, or of rather greater rapidity than that of the Scotch pine. The wood is highly resinous, so much so that it serves for torches, and is reputed in the Pyrenees to be of very great duration. A peculiar quality which, if it succeeds in other respects, will make it valuable in some parts of England, is that of resisting the wind. In the most elevated

and inclement regions, where I have observed the tree in every form and situation, I never saw an instance where the wind appeared to affect it, nor where it shewed a weather side. At the upper limits of its habitat, where it is compelled to yield to the law of nature, and lower its 'diminished head,' the same rule is observed; and instead of the stunted and starveling appearance of the rest of the tribe in similar situations, it assumes the shape of a furze bush, presenting an impenetrable and bristling front of dark specula on every side, the stem or branches being quite undiscoverable. This is the species to which the name of *Pyrenaica* ought to have been given; it being, as far as observations have yet been made, peculiar to that chain. It may be expected to form a valuable addition to our forest trees; and it is singular that it should have hitherto been nearly unnoticed."

"The republic of Andorre occupies a wild and alpine valley opposite to that of the Arriège, the waters falling to the side of Catalonia, and joining those of the Sègre. The lofty range which bound this valley are clothed with *P. uncinata*, and, alone in the Pyrenees, it resembles those of Switzerland, the lower part being covered with walnuts, and other deciduous trees, and the upper part with continuous masses of dark pine of this species."

V. PINUS PYRENAICA—PINE OF THE PYRENEES.

Concerning this species, which was first noticed and named by M. La Peyrouse, still less is known than of the last. The following is also quoted from Captain Cook's work :—

"This pine was first described by M. La Peyrouse as the same with *P. Laricio*, but in the supplement to his Flora of the Pyrenees, as *P. pyrenaica*. It grows at the southern foot of these mountains, and is first met with below the Pena de Ventimilla, a magnificent gorge, about three leagues lower down than Venasque, in Aragon, and extends to the neighbourhood of Campo, where it forms extensive forests, covering the district between the China and the Essera, which form the glaciers of Mont Perdu and the Maladetta. This habitat is a temperate and dry region, at a moderate elevation above the plains of Lower Aragon. The foliage is of a light grass-green colour, quite unlike any other European sorts; the cones are of a light reddish-green; and the seed is inclosed in a thin shell. The wood is not bad, but is of much inferior value to the other kinds which grow above it.

From Captain Cook, communicated by John M'Pherson Grant,

Esq. younger of Ballindalloch, seeds of *P. pyrenaica*. These resemble the seeds of *P. pinaster* in having a hard shell on one side (that next the scale), being of a dark grey colour, and the other shining black, but are considerably larger in size ; cotyledons eight to ten.

A pine, cones and seeds of which were received from France (summer 1835), under the name of *Pinus Brutia*, is, as far as regards the latter, so similar to those of *P. pyrenaica*, that they seem to belong to the same species. The cones are about $2\frac{1}{2}$ inches long, egg-shaped, smooth, and of a bright shining colour, except the centres of the thin flattened pointed scales, which are grey, and without the least vestige of hardened prickly points, as in those of *P. pinaster*.

VI. PINUS LARICIO—CORSIKAN PINE.

SPECIFIC CHARACTERS.—Tree tall, often 150 feet in height in its native country, and straight, of a regular conical form ; branches comparatively short, and in regular whorls round the main trunk ; leaves much longer (four to five inches), and darker coloured than those of *P. sylvestris*, flat or very slightly concave on the upper or interior surface, convex on the outer, and rough on the margins, much waved and twisted ; sheath of the leaves about three-fourths of an inch in length, membranous, and generally torn-like ; male catkins several together at the termination of the branches, cylindrical, obtuse, spreading, and about an inch in length, with long bractæ at their base ; cones generally solitary, without footstalks, scarcely half so long as the leaves, of a lighter colour, slightly curved, smaller, and terminating more bluntly than those of *P. sylvestris* ; outer extremities of the scales rounded, prominently two-ribbed or angled transversely, and tipped with a hard blunt point ; seeds of a greyish colour, and irregularly oblong, ovate shape, fully twice as large as those of *P. sylvestris* ; cotyledons six to eight.

The *P. Laricio* grows naturally on the summit of the highest mountains of Corsica, and is also found in several parts of the south of Europe. Its timber is superior to that of the Wild Pine, being more weighty and resinous, but unless the sap-wood is completely removed, it is found to be rather unsuitable for withstanding moisture : it also grows much quicker, and arrives sooner at maturity than the *P. sylvestris*. In the Appendix to Neill's Horticultural Tour through France and the Netherlands, a fine specimen of this pine is noticed as being in 1821 growing in the Jardin du Roi at Paris,

which was planted in 1784, and at that period measured fifty-six feet in height, being considerably larger and a much handsomer tree than the Wild or Scotch Pine; *P. sylvestris* growing along side of it, and under similar circumstances. More recent experience tends to prove that the *P. laricio* is equally well suited for the climate of Scotland as the *P. sylvestris*, and that it is found to retain its valuable properties when grown in this country.

By M. Vilmorin, Paris (who has the credit of first directing general attention to this valuable pine), specimens of cones, seeds, and wood, the last from trees sown on his estate at Barris in May 1823, and cut last winter 1834–35, being twelve years of age; the specimen sent is the shoot of 1829, with part of that of 1828, 1830, and being, when cut, five years old, it measures three feet in length, and nine and a half inches in circumference, at the thickest end; bark thin, pretty entire, and of a very light brownish colour.

In France, and others of the southern countries of Europe, there are several native pines, supposed to be only varieties of *P. laricio*, known by the following names:—*P. altissima*, *P. caraminica*, *P. calabria*, and *P. romana*. The first of these is so like *P. laricio*, that if at all different, it can only be considered as a very indistinct variety. The next (*P. caraminica*), although not hitherto separated with confidence by botanists, nevertheless differs materially from *P. laricio* in points which are of the utmost consequence to the arboriculturist. It seldom grows to much above half the height of the latter, has a more round bushy head, straight or nearly straight leaves, slender branches, reddish-coloured bark, reddish buds, which are generally wholly or partly covered with white resin, and the scales of the cones (which are larger) are tipped with a harder and more entire horny point than those of the *P. laricio*, and the wood, although smaller in size, is more firm, compact, and resinous. *P. calabria* and *P. romana*, particularly the former, seem nearer allied to the *P. caraminica* than to *P. laricio*, but as yet, although plants and seeds have been introduced into this country, no satisfactory botanical descriptions of them have been received.

By Messrs Hugh Ronalds and Son, nursery and seedsmen, Brentford, plants of *P. altissima*.

By M. Vilmorin, cones of *P. caraminica*, and wood of *P. calabria*, from his estate of Barris, and grown under similar circumstances as

that of *P. laricio* above mentioned. Length of the shoot (growth 1829) two feet three inches ; girth of the same at base ten inches ; bark thicker, more rough or cracked, and rather darker in colour than that of *P. laricio*.

By Mr A. Gorrie, plants of *P. caraminica*, the produce of seeds received through J. C. Loudon, Esq. from Mr Hartweg of Carlsruhe, under the name of *P. resinosa*, grown on native trees in the forest of Hartwald, in Leimerslachle.

VII. PINUS AUSTRIACA—BLACK PINE OF AUSTRIA.

Schwarzfohre—Ger.

The following description of this Pine is communicated by Sir J. M. Naismyth of Posso, Bart. from the German of Professor Hoss's Popular Account of the Trees and Shrubs of Austria.

SPECIFIC CHARACTERS.—Leaves in pairs, two to five inches long, straight, rarely very slightly twisted, exterior surface semicylindrical, dark green, shining, with serrulate margins, interior surface fawn colour, almost flat, faintly marked with longitudinal lines, and surrounded at their base by a short sheath, which is of a light ash-grey colour, inclining to red when young, latterly becoming darker, and finally almost black ; points hard, and of a brownish scorched-like colour ; buds large centre one, before beginning to expand, ten to fourteen lines in length, egg-shaped and pointed ; scales dark brown, attenuated at the margin, furnished with long white fringes, and acuminate, the exterior or lower ones separating from the bud, and recurved, the interior collapsed, and connected by a spontaneous exudation of white resin ; flowers in the end of May ; male catkins shortly peduncled, oblong, cylindrical, round, or bluntly pointed, becoming conical after arriving at maturity, placed many together in verticillated bundles round the bottom of the new shoots ; the female flowers (catkins or young cones), two, three, or occasionally more together, with pretty long peduncles from the extremities of the young branches, round, oblong, erect, and dark red, becoming in July about six lines long and four lines in breadth, elliptical, and assuming a reddish-brown colour ; cone two years in arriving at maturity, ripe in October, of a conical shape, rounded at the base, two to three inches long, horizontal, or nearly so, of a light yellowish-brown colour, passing into a deeper brown, and polished or shining-like ; seeds very like those of *P. laricio* ; cotyledons also six to eight ;

stem or trunk cylindrical ; bark very thick, of a blackish ash-green, marked with reddish-brown spots, scales deeply and longitudinally cleft, the fissures of a uniform reddish brick colour lighter than in the Silver Fir ; the branches stand in regular and remote whorls, aspiring next the tree, afterwards horizontal, and laterally drooping. In age the top becomes flat and spreading to a great extent, the bark of the young shoots is of a lightish yellow colour, regularly and deeply marked by the insertions of the leaves, furrowed and shining. Grows naturally in Austria, for the most part below the Breima Forest (Wenerwald) ; in the Banate, upon the Demoglet, by Wehadia, near to Hercules Baths ; in the vicinity of the Snow Mountains of Austria. It grows at higher altitudes than the *Abies Picea* (Veissfohre, Ger.) It naturally prefers a dry calcareous sand to a deep soil, but succeeds well in any loose shallow soil, when not too wet, and is mostly found in sandy or gravelly situations. The wood of the *P. austriaca*, which at the edge is a whitish-yellow, and towards the heart a rusty yellow, is very resinous, tough, and strong. It is much valued as a timber when kept dry, and even surpasses the Larch itself in resisting the injurious effects of water, or alternate moisture or dryness. It is much used by carpenters, joiners, and coopers. As firewood, it emits an intense and lasting heat, with an extraordinary powerful flame, but emits a considerable quantity of smoke, which renders it desirable in the manufacture of Lamp Black. It is preferred to the Beech for making charcoal, and the stumps or roots afford wood for torches. And amongst all the native Pines of Austria, the *P. austriaca* yields the greatest quantity of turpentine.*

VIII. PINUS PALLASIANA—PALLAS OR TARTARIAN PINE.

SPECIFIC CHARACTERS.—Habit of growth tall, and much more spreading than *P. sylvestris* ; trunk upright, covered with brown rough scaly bark, and producing long horizontal or declinate branches ; branchlets thick, and of a light brown colour ; leaves numerous, about five inches long, rigid and straight, subcylindrical on the exterior surface, flattened or slightly channelled on the interior, serrulate on the edges, and sharpened at the points ; sheaths short, membranous, torn-like at the margins, and of a light brown colour ;

* Mr Lawson, from seeing some specimens of *P. austriaca* on the Continent, together with Professor Hoss's account of it, was induced to import a considerable quantity of its seeds, which were sown last year on light sandy soil, the seedling plants, at the end of the first season, were fully twice as large as those of *P. sylvestris*, and had remarkably large deep penetrating roots.

male catkins sessile, about an inch in length, cylindrical, and somewhat acuminate; female catkins, or young cones, also sessile, generally two or three together on the points of the young shoots, and, as well as the male catkins, surrounded with numerous shaggy scales at their base, generally of a reddish-purple colour at first, changing afterwards to brown, dull green, and laterally (when full grown) to a dusky brown colour, at which period the cone is in size and shape not unlike that of the *Pinaster*, being four to six inches in length, about an inch and a half in diameter at the base, and generally slightly curved towards the points, exterior extremity of the scales thick, prominent, rounded, somewhat recurved, and tipped each with a short hard sharpened point; seeds similar to those of *P. austriaca*, but a shade darker in colour. Grows naturally in the central regions of the Crimea, forming large forests on the western declivity of the chain of lofty mountains which extend along the coast of the Black Sea.

This valuable Pine is named in compliment to Professor Pallas, who first introduced it to this country: he sent seeds of it to Mr Lee about nineteen or twenty years ago. The best trees of this species in Britain are growing at Boyton and White Knights, the former, at twelve years of age, were about thirty feet high, although the soil was scarcely two inches thick, on a bed of solid chalk: these trees yearly produce large quantities of cones, but do not perfect seeds. The timber is compact reddish-brown in the centre, and white towards the circumference, very resinous, of excellent quality, but so knotty as to render it unfit for large planks. Aylmer Bourke Lambert, Esq. F. R. S. &c. in his valuable work on the *Coniferae*, mentions this Pine as being "the one best adapted for thin chalky soils and maritime situations, and might be successfully employed for covering our barren sea downs, which at present produce nothing."

P. taurica is a name applied to a Pine also from the south-east of Europe, and generally supposed to be the same with the last. Cones under this name, which were procured from M. Vilmorin, differ from those of the true *P. Pallasiana*, in being much smaller, thicker towards the base in proportion to the length, and straight or not curved towards the point. In this last particular being more allied to a variety having straight cones noticed by Mr Lambert, than which, however, those of *P. taurica* are also shorter and thicker, and its cotyledons are generally eight.

Another Pine, native of the same parts, distinguished by the name

P. nigrescens, of which young plants have only as yet been obtained, seems nearly allied to the last.

XI. PINUS PINASTER—PINASTER OR CLUSTER PINE.

SPECIFIC CHARACTERS.—Tree tall; branches in remote regular whorls, large, and spreading horizontally; bark on the trunk and old branches of a dark brown colour, very thick, and deeply fissured, that of the young branches reddish-brown and shining; leaves four to six inches long, straight or slightly twisted, with sharp hard brownish points, subcylindrical on the exterior, flattened, with a longitudinal furrow on the interior surface, and very indistinctly serrated on the margins; sheath from three-fourths of an inch to one inch in length, dusky coloured; male catkins elliptic, oblong, and stalked, generally of a pale yellow colour, tinged with red; cones in verticillated clusters on the young shoots, purple at first, afterwards changing to green of various shades, and when at full maturity brown, smooth, and shining, five to seven inches in length, one and a half to two inches in diameter at the thickest, straight or slightly curved; points of the scales prominent, hard and prickly; seeds oblong, a little flattened, and furnished with a long narrow wing; cotyledons seven to nine. Grows naturally on the sea coasts in the south of Europe.

The Pinaster is supposed to have been first introduced to Britain in 1596, and the original trees, which were planted in the garden of Bishop Compton at Fulham, still exist. It is a strong vigorous grower, and very ornamental, particularly before arriving at a great age. From its being naturally adapted for growing on maritime situations, and extensively cultivated on such in some parts of France, as on the large tracts of light sandy soil along the sea-coast near Bordeaux, it is often known in that country by the name of *P. maritima*, which name is, however, more strictly applied to a very distinct species (No. 13). Although, therefore, the Maritime Pine of France be nothing else than *P. Pinaster*, yet there can be little doubt but from the long repeated cultivation which it has received in such situations, it has acquired habits which fit it better for the soil, and withstanding the influence of the sea breeze, than such as are grown more inland, on account of which it may be allowed to rank as a variety at least; and hence the evident superiority which seeds or young plants procured from these places possess over those of more inland growth for sowing in the more immediate vicinity of the sea.

VARIEGATED PINASTER.—This is a highly ornamental variety, having some of its leaves white, some white and green-striped, and some completely green. It is as yet rather rare, and likely to continue comparatively so, as it cannot be propagated by seed.

Specimens by Sir Patrick Murray Threipland, Bart. Fingask, of a branch and cluster of cones, *P. Pinaster*, grown at Fingask Castle, Perthshire.

By Sir John M. Naismyth, Bart. of Posso, branch and cones, grown at Lawhill, Fifeshire, the property of Charles Halket Craigie, Esq.

By Mr John Lawson, forester to her Grace the Duchess-Countess of Sutherland, Dunrobin Castle, Sutherlandshire, cones and branch of Pinaster, which at that place grows luxuriantly near the sea in a cold and most exposed situation.

By Mr Robert Fairbairn, Freeman Cottage, cones from trees growing at Muirhouse on poor siliceous sandy soil lately reclaimed from the sea.

By Mr J. Machray, a sketch of a Pinaster tree grown at Errol House, Perthshire, and which was blown down in 1823, full height sixty-four feet, diameter three feet from the ground, three feet four inches; soil deep strong clay.

By John James Burnett, Gadgirth, Esq. Ayr, specimens of the wood of Pinaster, from a tree between seventy and eighty years of age, and eight feet in circumference, grown on clay soil, with a northern exposure, and of another tree of smaller dimensions grown alongside of the former, which last specimen is more resinous, and of a deeper red colour than the first; also bark and cones of the same, the former measuring fully six inches in thickness, and showing very distinctly the annual layers. The wood of *P. Pinaster* has been used by Mr Burnett for general agricultural purposes, and is found to be very durable, but rather difficult to work from its hardness, and the large quantity of resin which it contains. There are several other trees growing at the same place, and all in perfect vigour at about eighty years of age; the largest measures nine feet in circumference.

It is a general opinion that the wood of the Pinaster is light, soft, spongy, and of short duration, but the above mentioned specimens by Mr Burnett shew that those characters only apply to the outer, white, or sap wood, and that as regards the red wood the very reverse is the case. There is no doubt, however, but that great variations in the quality of the timber may arise from differences in the soil and climate where the same is grown.

X. PINUS LEMONIANA—SIR CHARLES LEMON'S PINE.*

This is a new species, or rather a very distinct and permanent variety, of *P. Pinaster*, lately discovered in the plantation of Sir Charles Lemon, Bart., in Cornwall, and described by him in the London Horticultural Society's Transactions, from which the following is extracted :—

"In foliage similar to the pinaster, but differing in the general habit of the tree ; the form and position of the cone. In the common Pinaster, the cones, of which there are generally three or four, are situated behind the shoots of the whorl, and in the mature state point backwards. In this obscure species the cone is single and it universally occupies the place of the leading shoot, the side shoots being behind it. The necessary consequence of this practice is, that the tree can have no regular leader, but each year one of the side shoots strengthens and continues the growth for the ensuing season ; the year following the same process is repeated in another direction, giving the stem of the tree a zig-zag appearance which is never entirely lost."—"The general appearance of the tree is a short bushy Pinaster, the stem of which is zig-zag, and the branches closer and twiggy." Sir Charles has found hundreds of specimens with the characteristics permanent ; they remain the same when raised from seed, and the Secretary of the London Horticultural Society out of compliment to him has given it the name of *P. Lemoniana*.

XI. PINUS PINEA—STONE PINE.

SPECIFIC CHARACTERS.—Tree large, branches horizontal, and aspiring towards their point ; forming a roundish dense massy head, bark when old rough and deeply fissured, leaves five to seven inches long, thick, nearly straight, subcylindrical on the outer and flattened on the inner surface, smooth on the margin, and of a dark green colour ; male catkins numerous but not crowded, surrounding the young shoots towards their base, cylindrical, bluntly pointed, and about half an inch in length ; young cones with short footstalks, erect, one, two, or three together, also on the new shoots, globular, brownish-green coloured, afterwards becoming light green, and when ripe, which is four years from its first formation, of an ovate shape, from four to five inches in length, and two and a half to three inches in thickness ; points of the thick scales not prominent, round-

* Plants or specimens of *P. Lemoniana* have not yet been received for the Museum, but the description is here inserted in consideration of its being related to the Pinaster, and a native of Britain.

ed and flattened, generally four or five sided or angled ; seeds or nuts large, one-half to three-fourths of an inch in length, obovate, and furnished with short nearly obsolete wings ; shell very hard, and when newly removed from the cone covered with a dark brownish-purple bloom ; cotyledons nine to eleven. Grows naturally in the south of Europe and North of Africa.

The Stone Pine seldom attains to a great size in Scotland, but on account of its dense dark green massy foliage forms a very ornamental round-headed tree in pleasure grounds. Its timber is white and resinous, but although used for boards and other purposes is not considered of first-rate quality. The kernels are eatable, possess an agreeable taste resembling that of sweet almonds, and from these a pleasant oil is obtained by expression. A variety known in Portugal by the name of *Pinhao molar*, differs from the common in its nuts having soft shells.

By Mr G. Charlwood, London, specimens of cones grown in the south of Europe, which present a considerable difference in the prominence of their scales ; these in some being almost flat, in others much more prominent and distinctly marked at the angles.

By Mr James M'Pherson, architect, 50. Cumberland Street, a cone grown in Ireland. And by Mr Robert Arthur, Wall Tower, North Berwick, a cone grown at Beil, East Lothian.

XII. PINUS HALEPENSIS—ALEPPO PINE.

SPECIFIC CHARACTERS.—Tree under the medium size, (twenty-five to thirty feet in height) ; branches numerous, slender, spreading widely and somewhat pendent ; leaves two to three inches long, small, smooth, straight, and of a lively green colour ; male catkins about a third of an inch in length, without footstalks, generally curved and slightly acuminate ; cones stalked, almost always solitary and pendent, about two inches long, of an oblong ovate shape, smooth, shining, and reddish-brown coloured when ripe ; points of the scales flattened and unarmed ; seed about one-fifth of an inch in length, and dull grey coloured ; cotyledons about seven. Grows naturally in the south-east of Europe and adjacent parts of Asia.

Although the Aleppo Pine be quite unsuited for growing merely for its timber, yet as an ornamental tree it ranks amongst the best of the genus, forming by the habit of its growth, fineness, and light green colour of its foliage a beautiful contrast with some of the more lofty and robust growing species.

XIII. *PINUS MARITIMA*—MARITIME PINE.

SPECIFIC CHARACTERS.—Tree resembling the last species in size and habit of growth; leaves also like those of the last, but more crowded towards the points of the branches, and furnished with much shorter sheaths (about one-sixth of an inch in length); cones larger and more tapered towards their point than those of *P. halepensis*, and the wings of the seeds are shorter and considerably broader. Grows naturally on the northern shores of the Mediterranean.

Although rather of dwarf growth, the Maritime Pine is reckoned one of the most useful trees in Greece; being esteemed for its timber, also its resin, which, in addition to other uses, is employed for preventing wine becoming sour, and a few cones put into a barrel have the same effect. Its bark is also used for tanning, and the wood, which is very resinous, is made use of as a substitute for candles and torches. The true *P. maritima* is at present very rare in Britain, and is often confounded with the Pinaster or Maritime Pine of France (No. IX.) to which, however, it does not bear the smallest resemblance.

XIV. *PINUS BANKSIANA*—SIR JOSEPH BANKS' PINE or SCRUB PINE OF AMERICA.

SPECIFIC CHARACTERS.—Habit of growth irregular, straggling, and rather under medium size, being, in its native country, seldom above forty feet high; branches very flexible; bark dull brown, becoming cracked when old; leaves remarkably short, one to one and a half inches in length, crooked, twisted, and of a vivid green colour; terminal buds covered with white resin, which also exudes pretty freely from the old bark, has a pleasant fragrant smell, and sweetish taste; sheaths of the leaves long, light coloured, and falling off after the first season; male catkins about half an inch in length; cylindrical, and in crowded verticillate bundles at the base of the young shoots; cones almost sessile and in pairs, on the shoots of the previous season; when full grown, rather longer than those of *P. sylvestris*, always much curved towards the point, and remaining on the tree for many years after ripening, when they assume a grey colour from which the Canadian name of this species (Grey Pine) seems to be derived; seeds smaller than those of either *P. sylvestris* or *P. pumilio*, but similar in colour. Grows naturally on sandy and rocky soils in North America, often to the total exclusion of all others, and is found as far northward as lat. 64°.

The wood of *Pinus Banksiana* (*P. rupestris* of Michaux) is light

resinous, and from the straightness and flexibility of its fibres much prized by the North American Indians for making boat timbers. In this country the tree is often reckoned tender, and therefore kept in greenhouses, whereby such plants may, to a considerable extent, have lost their natural hardiness.

Specimens of cones and branches in flower by Mr Main, Landsteward, Dalhousie Castle, from a tree about sixteen feet in height, growing on a good deep rather light soil, at that place, the produce of seed sent from North America about fifteen or sixteen years since, by the Earl of Dalhousie, and which is at present, perhaps, the finest tree of the species in Scotland. It is rather of a bushy-like habit of growth, having several tops, and the terminal shoots of last season (1835) measure from eighteen inches to two feet in length.

XV. PINUS INOPS—NEW JERSEY PINE.

SPECIFIC CHARACTERS.—Tree of medium size (forty to fifty feet in height); branches somewhat pendent, irregular in size, not diverging from the stem in whorls, as in most of the genus; and forming in the general outline, a top more like some of the loose irregular-headed hardwood trees, than that uniformity in shape so peculiar to most of the Coniferae; small branches, smooth and pliant; bark of the young or annual ones violet-coloured, afterwards changing to dull brown; bark of the trunk rugged and very dark coloured, often almost entirely covered over with a whitish resin which exudes from its fissures; leaves one and a half to three inches long; subcylindrical on the exterior, and slightly furrowed on the interior surface; dark green, rigid, and furnished with short sheaths; male catkins few together (about three-fourths of an inch in length); lax, cylindrical, of a dull yellowish-brown colour; cones, when fully grown, about two inches long, of an oblong, conical, or nearly cylindrical shape, dull brown colour, and armed with long recurved prickles, having short footstalks, solitary, in pairs, or three (seldom more) together; seeds rather larger than those of *P. sylvestris*, very rough, and of a dark grey colour; cotyledons six to eight. Grows naturally in the inland districts of North America, chiefly south of latitude 45°, and always on the poorest dry gravelly sandy soils.

By Messrs Robert Brown and James Macnab, specimens of the wood and cones of *P. inops*, brought by them from the Alleghany Mountains, 1834.

XVI. *PINUS PUNGENS*—PRICKLY CONED OR TABLE MOUNTAIN PINE.

SPECIFIC CHARACTERS.—Tree forty to fifty feet in height ; branches stiff ; bark thick and smooth, becoming cracked and scaly when old ; buds resinous ; leaves thickly set, about two inches in length, straight, rigid, and slightly serrated at the margins ; sheaths short, tender, and light coloured ; cones about three inches long and two inches in their greatest diameter, of a regular form, and light yellowish-brown colour, without footstalks ; three or four together, and armed with hard incurved spines, which are about two lines in length, sharp-pointed, thick towards the base, and nearly similar in colour to the rest of the cone ; seeds rather larger than those of *P. inops*, also rough and blackish coloured ; cotyledons six to eight. Grows naturally on the Alleghany Mountains in North America.

This is one of the most circumscribed in its habitats of the American Pines, its presence, according to M. Michaux, (see his *North American Sylva*) being confined to the Alleghany Mountains in North Carolina. From one of the highest points of which, where it is found in greatest abundance, it derives the name of Table Mountain Pine ; its timber is of no particular use, but its turpentine is preferred by the inhabitants of these mountains for dressing wounds.

Specimens of the timber of *P. pungens* from the Alleghany Mountains, by Messrs Brown and McNab, 1834, and cones by Mr G. Charlwood, seedsman, London.

XVII. *PINUS RESINOSA*—PITCH PINE.

SPECIFIC CHARACTERS.—Tree above the medium size, being from 70 to 80 feet high in its native country ; leaves four to five inches in length, crowded towards the point of the branches, strong and nearly straight, flattened on the interior surface, subcylindrical on the exterior, approaching to a keel-shape towards the points, which are slightly scabrous ; sheaths resembling those of *P. sylvestris*, but much longer ; male catkins with footstalks about one-third of their own length, or fully more than one-fourth of an inch, rather lax, of a dull yellow colour tinged with purple, many crowded together at the base of the young shoots ; young cones bluntly ovate, and of a deep purple colour, changing to brown when full grown, to which state they attain in one year, and are much about the same size as those of *P. sylvestris*, but more blunt ; seeds also about the same size as those of the Wild Pine, but more oblong, and a shade darker

in colour. Grows naturally in North America between lat. 40° and 50°. Introduced to Britain in 1756.

This is the *P. rubra*, Red Pine, of Michaux, so named from the bark of the trunk, which is much redder than in any other of the native pines of Canada or the United States. Its timber is very resinous, heavy, strong, durable, when deprived of the sap-wood, and well fitted for planks, being very free from knots. It is used by the Americans in ship-building, especially for the decks, and also occasionally for masts of the largest size. It is a very handsome and vigorous growing tree when young, and succeeds best on sandy soils, which may be either dry or damp, provided the moisture is not stagnated.

XVIII. PINUS MASSONIANA—MASSON'S OR INDIAN PINE.

SPECIFIC CHARACTERS.—Leaves five to six inches in length, very narrow and slender, slightly channelled on the interior surface, and rough on the margins; sheaths rather short, membranous, and delicate; stipules or scales at the base of the leaves, of a light reddish-brown colour, very narrow and pilose; male catkins about three quarters of an inch in length, stalked, cylindrical, lower anthers remote. Native of China and the East Indies.

Very little is yet known concerning this pine. Mr Lambert has named it in honour of Mr Francis Masson, of whom he derived specimens, brought from the Cape of Good Hope, where it was raised from seed originally procured in China. On comparing a plant received from M. Cel, nurseryman, Paris, under the name of *Pinus nepalensis*, with Mr Lambert's figure and description of *P. Massoniana* there seems little doubt but they are the same. In habit of growth and general appearance it resembles *P. longifolia*, but differs in having only two leaves in each sheath, whereas the latter has three. The plant, however, above referred to, has not attained sufficient size to shew whether its leaves will become so pendulous as those of the long-leaved East Indian Pine.

Species belonging to this division, plants or specimens of which have not yet been received for the Museum.

PINUS ARABICA—*Arabian Pine*.

... GENIVENSIS—*Geneva Pine*.

... SINENSIS—*Chinese Pine*.

* * *Pines having their leaves generally in threes.*

XIX. PINUS VARIABILIS—VARIABLE TWO AND THREE LEAVED, OR YELLOW PINE.*

SPECIFIC CHARACTERS.—Tree tall 60 to 70 feet in height; head of a regular conical form, like the habit of the Spruce Firs hence this species is sometimes designated Spruce Pine; leaves three to four inches in length, fine, flexible, two or three together, concave on the inner surface when in pairs, but with a prominent rib when in threes, somewhat keel-shaped or triangular on the under, and rough particularly towards the point; cone from one to two inches in length, or nearly three times its greatest thickness, rounded at the base, and tapering gradually to the point, of a light brown colour, armed with small spines, and short footstalk; seeds, which arrive at maturity the first year, short, of rather an irregular form, rough, and dark coloured; cotyledons five to seven. Grows naturally very abundant in North America, between latitude 38° and 45°, on the poorest, light, sandy, arid soils, and is seldom met with at more than 100 and 150 miles from the sea coast.

This species is termed *P. mitis* by M. Michaux, who says that its timber is in great demand in North America, particularly in the northern and middle States, Virginia, and the upper parts of the Carolinas, for building log-houses; and in dock-yards of New York, Philadelphia, Baltimore, &c. immense quantities are used, for the decks, masts, yards, beams, and cabins of vessels, and is considered next in durability to the timber of *P. australis*. It is also largely exported to Britain and the West Indies. In the former it is designated New York Pine, and in the latter Yellow Pine; in both of which it is sold at a lower price than the timber of *P. australis*, but higher than that of the white pine (*P. Strobus*). From its growing chiefly in the vicinity of the sea, it is now becoming more rare in North America, and it seems probable that ere long the exportation of its timber will form but a very inconsiderable branch of American trade.

* This species might perhaps have been with the same propriety included in the last division, the number of its leaves in a great measure depending upon its luxuriance of growth; thus, when growing very vigorous, the leaves are most frequently in threes, and in pairs, on the other hand, when the plants are stunted in growth. The same variations, from similar circumstances, also occur in several of the two-leaved Pines, as *P. sylvestris*, *P. pinaster*, &c. but to a much less extent.

XX. *PINUS AUSTRALIS*—LONG-LEAVED AMERICAN PINE.

SPECIFIC CHARACTERS.—Trees tall and straight, attaining in their native country to the height of 60 or 70 feet, with trunks of an almost uniform diameter of 15 or 18 inches for two-thirds of their height ; terminal buds, very long, white, fringed, and not resinous ; leaves generally about a foot in length, and collected in bunches at the extremity of the branches, of a bright green colour, spreading, but not pendulous, narrow, semicylindrical on the exterior surface, and triangular on the interior, or having the middle longitudinal rib very prominent, as in most of the three-leaved pines, margins serrated ; sheaths fully an inch in length, delicate, and lacerated at their extremity ; male catkins many together, about two inches long, cylindrical and spreading, of a purplish or violet colour, shedding a large quantity of yellow pollen ; cones straight or slightly curved, seven to eight inches long, by about two in diameter near the base, and regularly tapered to a blunt point ; points of the scales slightly elevated and tipped with small curved or nearly obsolete spines ; seeds ovate, about three lines in length, kernal contained in a thin white shell, and of an agreeable taste. Grows naturally towards the eastern coast of North America between latitude 30° and 40°.

To this species Mr Lambert has given the name of *P. palustris*, but that of Michaux is here adopted in preference to the other, as the latter author, who had the advantage of personally observing this pine in its native habitats, asserts that, although it occasionally approaches near to the margins of swampy grounds, yet it is always found to arrive at greatest perfection where the soil is dry and sandy. It yields the best timber of all the American pines, the portion of sap-wood being very small. It is fine-grained, susceptible of a high polish, and from the great quantity of regularly distributed resin which it contains, is known in this country by the name of the *Resinous Pine of Georgia*, or *Georgian Pitch Pine*. In naval architecture the reddish coloured specimens of this timber (a quality depending much on the effects of soil) are preferred to all others of the fir tribe for the purpose of forming such parts of vessels as are continually exposed to moisture as keels, side-planks, and pins by which they are attached to the ribs. In this country it sells generally at 25 or 30 per cent. higher than any other pine imported from the United States ; and it is also the most valuable of American pines for yielding turpentine, resin, tar, &c.

P. australis might be grown with advantage in the southern coun-

tries of Europe, but the climate of Britain is so totally unfit for its proper development, that it is with difficulty preserved in winter without protection, even when it has attained to a considerable size.

By John Robison, Esq. 9 Athol Crescent, a specimen of the wood of *P. australis*, or resinous pine of Georgia.

Also a specimen by Robert Brown, Esq. factor to his Grace the Duke of Hamilton, imported from America for the purpose of flooring Hamilton Palace.

XXI. PINUS TÆDA—FRANKINCENCE OR LOBLOLLY PINE.

SPECIFIC CHARACTERS.—Tree tall, from 80 to 90, and often more than 100 feet in height, with a large loose spreading head; bark greyish, rough, and cracked when old; young branches slender, and somewhat pendulous; leaves light green, fine, long, and straight, elevated on the interior surface, and rough on the margins; sheaths fully an inch in length, spreading and rugged at the point; male catkins crowded together at the base of the young shoots, about an inch in length, sessile, cylindrical, and spreading, of a yellow colour approaching to a reddish-brown towards the point; cone almost sessile, generally more or less pendent, falling off when ripe, about four inches in length by one and a half thick near the base, straight or slightly curved and blunt at the points; external surface of the scales prominent, and tipped with hard, short, sharp incurved spines; seeds oval, one-sixth of an inch in length, and blackish. Grows abundantly in North America on sandy barren soils near the sea coast, sides of rivers, swamps, &c. between the 35th and 43d degrees of north latitude. Mr Lambert notices a variety of this species, under the name of *P. tæda alopecuroides*, having much smaller cones, and bearing more resemblance in size and shape to those of *P. resinosa*; differing from these, however, in being armed with short, sharp incurved points.

Although the *P. tæda*, according to Michaux, attains next in size to the *P. Strobus*, yet its timber is of comparatively little value, and seldom exported. From its being of rapid growth, the space between two of its concentric circles is often more than that occupied by twelve or fifteen of these in *P. australis*; it also contains a large portion of white or sap-wood, and is therefore only applied to secondary uses. It affords turpentine in great abundance, and has been recommended in preference to *P. Pinaster* for planting on the sea shores of Europe; and Mr Lambert is of opinion, "that it might be profit-

ably planted on some of our heaths, if it were only for the tar, pitch, and turpentine, which it yields."

Specimens of cones by Mr G. Charlewood, London.

XXII. PINUS RIGIDA—PITCH, BLACK, OR THREE-LEAVED VIRGINIAN PINE.

SPECIFIC CHARACTERS.—Tree very much branched; young branches strong and vigorous-like, terminated by resinous buds; buds of the old tree thick, blackish, and deeply furrowed; leaves varying in length from three to six inches, rigid, very rough on the margins, and furnished with short sheaths; male catkins about three quarters of an inch in length, straight, dense, cylindrical, and having several short blunt leaves or scales at their base; cones single or in clusters, from $2\frac{1}{2}$ to 3 inches long, regularly formed, and of a light brown colour when ripe; scales prominent, and tipped with short, hard, recurved, sharp-pointed spines; seeds rather larger, more oblong, and darker in colour than those of *P. sylvestris*. Native of North America, where it grows most abundant in the districts of Virginia, Maryland, and Pennsylvania, in the east, and has also been found in California on the west of that Continent.

M. Michaux found *P. rigida* as far north as Lake Champlain, on light sandy soils, where, however, it assumes a very stunted form, being only 12 or 15 feet in height; but in the lower part of New Jersey it is frequently found to attain the height of 70 or 80 feet, in large swamps, which are constantly covered with water; and it is also found to grow freely in salt marshes, or places overflowed by the tides, where any other species is not found to exist. The great number of its branches renders the timber of the Pitch Pine very knotty, its application is therefore limited. On mountainous and dry gravelly soils, the wood is compact with, however, a very large portion of sap-wood, heavy, and very resinous, and hence receives the above name. When grown in swamps and wet soils, on the contrary, its wood is white, soft, spongy, and distinguished by the name of *Sap Pine*, &c. That of the best quality is employed for flooring, and building houses, making ship-pumps; both Pitch and Sap Pine is used very extensively as fuel by the bakers and brickmakers of New York, Philadelphia, and Baltimore. A considerable portion is also consumed in manufacturing tar.

By Messrs R. Brown, and J. M'Nab, specimens of the wood and cones of *P. rigida* from the Alleghany Mountains, the summits of which

they found entirely covered by scraggy trees of this species, with dwarf scrub oaks as underwood.—(*See Quarterly Journal of Agriculture*, vol. v. p. 604.)

XXIII. PINUS SEROTINA—POND PINE OR FOXTAIL PINE.

SPECIFIC CHARACTERS.—Tree under the medium size (35 to 40 feet in height); branches remote; leaves five or six inches long, fine, nearly straight, subcylindrical on the exterior, and triangular on the interior surface, with scabrous margins; sheaths short, rugged or lacerated at their upper extremity; male catkins erect and crowded together, with short footstalks; cones arriving at maturity the second year, egg-shaped or nearly globular, about two inches in length by one and a half in breadth, at their thickest part; external surface of the scales rounded, and terminating by very small, weak, sharp-pointed prickles; seeds rather less than those of *P. sylvestris*, and blackish coloured. Grows naturally in the southern states of North America, in swamps and marshy maritime situations.

The Pond Pine is, from the small size to which it attains, and the inferiority of its timber, undeserving of cultivation, except as serving to complete collections, and affording by its long delicate-like foliage a desirable diversity in pleasure grounds. It is rather tender for this climate, and requires a slight protection in winter, particularly when young.

XXIV. PINUS SABINIANA—SABINE'S, OR GREAT PRICKLY-CONED PINE.

This highly interesting species was discovered by the late Mr David Douglas, Botanical Collector to the London Horticultural Society, and named by him in honour of his friend and patron James Sabine, Esq. late secretary of that society. The following is a copy of an extract from Mr Douglas's own description of this Pine:—"Pinus Sabiniana attains to but a small size as compared with those species of the genus which inhabit the northern and western part of North America. The trees are of a tapering form, straight, and of regular growth, forty to one hundred and twenty feet in height, two to twelve feet in circumference, clothed with branches to the ground when standing far apart or solitary. Some few reach one hundred and forty feet in length, but those are not of great circumference. The largest and most handsome trees inhabit the aqueous vegetable deposits on the western flank of the Cordilleras of New

Albion at a great elevation above the level of the sea, sixteen hundred feet below the verge of perpetual snow, in the parallel of 40° north. On the less elevated mountains near the coast, where the temperature is higher but more uniform, in the parallel of 31° north, in decomposed granite, schist, or gravelly soils, the trees are smaller and few, inhabiting the summits of the mountains only. The wood is white, soft, even-grained, and perhaps not very durable. The leaves are in threes, very rarely in fours, eleven to fourteen inches long, sharp, round, and smooth on the outside, angular on the inside, serrated, more widely and conspicuously so towards the point, erect, but flaccid, and drooping during winter. Sheath one and a half inch long, light brown, chaffy, and torn at the top. Stipule lanceolate, rigid. Male and female flowers erect. Flowers in February and March. Cones ovate, recurved, pressing on the shoots for support, three to nine in number surrounding the same stem, remaining on the tree for a series of years, nine to eleven inches long, sixteen to eighteen inches round; some, however, are longer. Scales spatulate, two and a quarter inches long, having a very strong, sharp, incurved point, which near the base exceeds the length of the scale; with abundance of pellucid resin. Seed somewhat oblong, tapering to the base, flattish on the inside, an inch long, and nearly half an inch broad. Shell thick, hard, brown. Wing short, half the length of the seed, stiff, nearly encompassing the seed. Kernel pleasant. Cotyledons from seven to twelve in number. The first year the cone measures from six to eight inches round, and is of a more rounded form than when perfect in November of the following year. The colour of the young cone is bright green."

Mr Lambert, in the latest edition of his description of the genus *Pinus*, has given a beautiful figure of the cone of *P. Sabiniana*, brought to this country by Mr Douglas, and at present in the collection of the London Horticultural Society.

In Museum, young plants of *P. Sabiniana*, procured from Messrs Young, Nurserymen, Slough. Those seem hardy and perfectly suited to the climate of Britain.

XXV. *PINUS PONDEROSA*—HEAVY WOODED PINE.

From not possessing the advantage of deriving information from any previous description of this species, and having only young trees in the Museum to refer to, an opportunity has not been afforded of giving any details regarding its flowers, cones, &c. It is hoped, however, the following will be sufficient to enable those less acquainted

with the general appearance of this seemingly valuable and highly interesting tree to distinguish it from others of the three-leaved pines. In its habit of growth *P. ponderosa* seems to surpass all others of the genus for strength and luxuriance, the branches are few, regularly verticillated, horizontal, and seem inclined to assume a pendulous or drooping habit as the tree becomes older; central or top-shoot often more than an inch in diameter, and of proportionable length; buds large and free from resin; leaves thickly set, nine inches to a foot or fourteen inches in length, thick, rigid, and nearly straight, rounded on the exterior, and having a longitudinal prominent rib, together with minute channels on the interior side; smooth, with very indistinctly serrated margins; sheaths short, of a dull blackish colour, and lacerated or torn at their extremities; timber said to be so ponderous as almost to sink in water. Introduced by Mr Douglas from the west coast of North America in 1828.

Such of the above remarks as cannot be supposed to apply to small plants in pots, are derived from a specimen, perhaps the finest in Scotland, growing in the Caledonian Horticultural Society's Gardens, Inverleith Row. Judging from its rapid growth and hardness, this seems to be one of the most valuable species which has yet been introduced, particularly should the wood, when grown in this country, be found to possess the valuable qualities which have been ascribed to it.

XXIV. *PINUS LONGIFOLIA*, OR LONG-LEAVED EAST INDIAN PINE.

SPECIFIC CHARACTERS.—Tree tall (often upwards of one hundred feet); branches few, short, and remotely verticillate; leaves of a vivid green colour, deposited in approximate spiral rows round the young wood or extremities of the branches, nine to eighteen inches in length, very narrow and slender, generally pendulous, somewhat triangular, serrated on the margins, and imperfectly scabrous throughout; sheaths under an inch in length, delicate and lacerated at their margins; male catkins crowded round the base of the young shoots, aspiring cylindrical, and about an inch in length; young cones globose, stalked, and erect; ripe cones generally not half the length of the leaves, of an oblong ovate shape, and dark brown colour; outer surface of the scales very prominent, irregularly four-sided, and recurved; seed ovate, about one-third of an inch in length by one-fourth in breadth, light coloured, with a broad wing nearly three times its own length. Native of Nepaul.

In this country the *P. longifolia* is generally supposed to require protection in winter. Any tenderness, however, which it is possessed of may arise from the seeds brought to this country being the produce of trees grown in the lower and warmer parts of India, where they are cultivated on account of their beautiful foliage and graceful habit of growth, but where they never attain the same size as on the mountains in Nepaul. If by procuring seed from trees at the highest elevation where they are found to exist, plants could be raised sufficiently hardy to withstand the climate of Britain, their introduction would be a valuable acquisition to the number of hardy ornamental exotic trees already known and employed for decorating parks and pleasure grounds.

By Messrs Dickson and Turnbull, Nursery and Seedsmen, Perth, a plant of *P. longifolia*, raised by them from seed originally received from Nepaul. Also by M. Vilmorin and Co. Paris, seeds from Calcutta under the name of *Neozia* (not, however, the true *Neozia Pine* of the East Indies, see *P. gerardiana*) which seem identically the same with those of *P. longifolia*, figured by Mr Lambert, and which are found to have about twelve cotyledons.

XXVII. PINUS GERARDIANA—CAPT. GERARD'S, OR SHORT-LEAVED INDIAN PINE.

SPECIFIC CHARACTERS.—Tree tall; habit of growth compact and rather conical; leaves seldom above four inches in length, fine, straight, rigid, serrated on the margins, with a slight serrated longitudinal rib on the interior, and convex on the exterior surface; sheaths not surrounding the leaves, but scaly and falling off, as those of the Weymouth and other five-leaved pines; cones eight to ten inches in length, oblong, ovate, brown, with thick pointed recurved scales like those of *P. longifolia*, and generally partly covered with white resin; seeds nearly an inch in length, by little more than a sixth part in breadth, of an oblong cylindrical shape, pointed at both ends, and dark brown colour.

This species was named by Dr Wallich in honour of Captain P. Gerard of the Bengal Native Infantry, author of *Observations on the Climate of Subathu and Kotgerh*. See 15th vol. of the *Asiatic Researches*.

Specimen of a cone and seeds of *P. gerardiana*, communicated to the Highland and Agricultural Society by the Hon. W. Leslie Melville from the Himalaya, and by G. R. Campbell, Esq., a cone and seeds

under the name of *Neoza* or eatable-seeded pine of the East Indies, collected by him on the Chinese territory side of the Himmalaya Mountains, where the seeds are gathered in considerable quantities, and conveyed to the lower parts of India, where they are eaten by the inhabitants, as those of the *Stone Pine* are in the southern countries of Europe.

XXVIII. PINUS CANARIENSIS—CANARY PINE.

SPECIFIC CHARACTERS.—Tree tall (sixty to seventy feet); leaves about one foot in length, very fine, spreading or pendulous, exterior surface convex, smooth and shining, interior channelled, with an elevated central margined or serrulated longitudinal rib; sheaths nearly an inch in length, light coloured, membranous, and lacerated or torn at the extremities; male flowers in crowded cylindrical catkins, about an inch long; cones five or six inches in length, oblong, oval, of a dark brown colour, with very prominent four-angled blunt regularly tapering pointed scales; seeds oblong, about a third of an inch in length, and of a dun colour. Native of the Islands of Teneriffe and Grand Canary, where it grows from the seashore to an altitude on the mountains of 6700 feet.

The *P. Canariensis*, which, according to Sprengel, is the *P. adunca* of Bosc, in addition to being a very ornamental tree, affords timber of excellent quality, capable of being used for any purposes to which Pine timber is applied, not excluding ship-building, and is said to be so resinous as to resist the attacks of insects. Mr Lambert, however, states that plants raised by him and kept in the greenhouse for several seasons, were destroyed by frost the first winter after being planted out, so that it seems too tender for this climate. By farther experiments and proper attention in selecting seed from trees growing on the coldest climates, it may yet, however, be found hardy enough to resist the winters of Britain.

By M. Cel, Paris, a young plant of this species.

Species having generally their leaves in threes, specimens of which have not yet been procured:—

PINUS TEOCOTE, *Twisted-leaved Mexican Pine.*

... PATULA, *Spreading-leaved do.*

... ECHINATA, *Hedgehog-fruited North American Pine.*

... LUTEA, *Yellow North American Pine.*

* * * *Leaves in fives, surrounded by deciduous scaly appendages, but having no legumintory sheath at their base.*

XXIX. PINUS CEMBRA—CEMBRA STONE PINE.

SPECIFIC CHARACTERS.—Tree medium-sized, from twenty to fifty feet high, of a regular conical habit of growth ; branches horizontal, short, and rigid ; bark smooth, at least until it attains a considerable size, of a greenish colour, and afterwards changing to a light grey ; leaves three to four inches long, fine, nearly straight, and of an agreeable light green colour, except the inner surfaces, which are marked with longitudinal silvery channels, exterior surface slightly convex mid-rib of the interior very prominent, so as to give the whole leaf a triangular-like form ; margins scabrous or serrated ; scales which surround the base of the leaves lanceolate-acuminate and membranous at the edges, generally falling off after the first season ; male catkins short, crowded at the base of the young shoots, and of a bright purple colour on their outer surfaces ; young cones globose, erect, nearly sessile, and of a purplish or violet colour, covered with a fine bloom, which they retain until nearly ripe, changing afterwards to a brownish colour, and are, when at full maturity, of an oval form, about two inches in length by one and a half in breadth, scales oval, loose, and sometimes reflexed at the margins ; seeds or nuts rather larger in size than common pease, of an irregular somewhat triangular shape, each with a hardish shell surrounding the kernel, which is of a pleasant nut-like flavour ; wings obsolete ; cotyledons eleven to thirteen. Grows naturally on the Alps of Switzerland, and other mountains to the north-east, both in Europe and Asia, at elevations much above the range of *P. sylvestris* and *Larix europæa*, on the verges of perpetual snow. Supposed to have been first introduced to Britain in 1746.

Of *P. cembra* there are two distinct and several subvarieties, the most important of which, as a timber tree, is known by the name of

1. PINUS CEMBRA HELVETICA—SWISS STONE OR APHERNOUSLI PINE.—And is also occasionally termed Gledhow Pine, from some of the oldest and best specimens in Britain being at a place of that name near Leeds. This variety attains, on the Alps of Switzerland, to a height of forty or fifty feet, with more than an average proportionably thick trunk ; its timber is of a light colour, fine-grained, compact, very durable, and possesses an agreeable smell, which it

retains for a surprising length of time after being made into furniture; and some of the best deal imported to this country from Riga, is said to be that of this variety. The kernels of the nuts or seeds often form an important part of a Swiss dessert, and an essential oil is obtained by distillation from the young shoots, after they have been bruised, macerated and steeped a month in water, which is pellucid, very liquid, whitish coloured, and known by the name of Carpathian Balsam, which in Germany is believed to possess extraordinary healthy qualities.

Although the Cembra Pine has been introduced into this country for a considerable time, yet its cultivation has not only been neglected, but discouraged, by generally received reports of its slowness of growth, and consequently long period which it takes to arrive at maturity. That some varieties do grow remarkably slow, is by no means disputed; but that character is not applicable to the *P. Cembra Helvetica*, which, although it may not possess the same rapidity of growth as the Wild Pine when young, yet after three or four years, under ordinary circumstances, it will annually put forth shoots from a foot to eighteen inches, and even nearly two feet in length; as a proof of which statement, many specimens grown from seed, imported to this country in 1828 (see *Quarterly Journal of Agriculture*, vol i. page 813), may be seen in the vicinity of Edinburgh, from eight to twelve feet in height: these possess considerable diversity in the colour of their foliage, habit of growth, &c. but none seem at all to approach the next variety in their general characteristics. There can therefore be no doubt but the *P. Cembra Helvetica* is well adapted, from the high altitude at which it naturally grows, to clothe the tops of many hitherto almost barren mountains of this country, not only with fresh and luxuriant vegetation, but also with valuable timber. The only obstacle to its general and extensive culture is the comparatively high price which the young plants will always retain, from the seeds lying a season in the ground before brairding, and the plants afterwards requiring a longer period in the nursery than those of *P. sylvestris* to fit them for being planted out, and (for a considerable time at least) the greater difficulty experienced in obtaining seeds.

Specimens from two handsome trees, growing before the cottage of Peter the Great at Peterhoff, near St Petersburg. By Mr Black, land-steward, Dalkeith Park, a cone of *P. Cembra Helvetica*, received by him from Moscow. And by Charles Guthrie, Esq. Tay

Bank, Dundee, a branch and cones from trees about thirty-five years old, and thirty-five feet high, the produce of seed originally received from Dr Hunter of York, and grown on the estate of Balhary, Forfarshire, the property of John Smyth, Esq.

2. *PINUS CEMBRA SIBIRICA*—SIBERIAN STONE PINE.*—This has been by some separated into a distinct species from the last, but having neither flowers nor cones to refer to, and as the foliage is exactly similar to that of the last, it is here included as a variety. Its principal distinguishing characteristics are its very dwarf close bushy habit of growth, and darker coloured and rougher bark than that of the Swiss variety, to which in appearance it may be said to bear the same relation as the *P. pumilio*, or Mountain Pine, does to *P. sylvestris*, Wild Pine.

By Mr J. Smith, Hopetoun Gardens, a branch from a tree growing there, said to be upwards of a hundred years of age, and which only measures five and a half feet in height.

XXX. *PINUS STROBUS*—WEYMOUTH or WHITE AMERICAN PINE.

SPECIFIC CHARACTERS.—Tree tall (100 feet, and sometimes considerably more), branches few, slender, regularly verticillate, and forming a small conical-like head on the top of the long bare smooth-barked trunk; leaves four to five inches long, fine, straight, of a light green colour, with silvery longitudinal channels, and a prominent rib on the inside, convex on the outer, and scabrous on the margins, spreading in summer, but, like most of the fine-leaved sorts, considerably more contracted, and lying inwards to the branches in winter; scaly appendages short, and falling off towards the end of the first season; male catkins solitary or few together, small, having long footstalks, and of a light purplish colour, mixed with yellow; young cones also one or few together, ovate, cylindrical, and erect, with short footstalks; ripe cones pendulous, four or five inches long, and scarcely one in diameter at the middle, slightly curved, partly covered with white resin, particularly on the tips of the oval scales, which open in the beginning of October to allow the seed to escape; seeds ovate, about one-sixth of an inch in length, and of a dull grey-like colour; cotyledons six to eight. Native of North America, where it grows in great abundance towards the eastern part of that Continent; be-

* May not this be the same as *P. pigmæa* of the gardens and Botanical Catalogues?

tween the 42d and 47th degrees of latitude, on deep soils, which are neither too dry nor moist.

This, which is the tallest growing tree to be met with in the eastern parts of North America, yields the most universally used timber of American pines, and that which is imported to this country under the name of White Pine, although the timber is not so hard and durable as that of many others; yet its great size, lightness, freeness from knots, and the ease with which it is wrought, amply recompense for its inferior properties. The Weymouth Pine has been known and partially cultivated in Britain for upwards of a century, but has not been found to attain the same size as it does in its native country, where it often forms extensive forests to the almost total exclusion of other trees. The want of success which has hitherto attended its cultivation in this country, may no doubt partly be attributed to the climate, but more especially from a want of proper selection of soil, and, above all, by mixing it in small quantity amongst other trees, a system to which it, in particular, seems naturally averse. From its growing only on what may be termed a superior class of soils, it is not certainly so deserving of general attention in this country as some others, which will succeed well on poor exposed moors; but it might be introduced with the best effects in parks and pleasure grounds, banks of rivers, mountain glens, &c.

By James Booth and Sons, Hamburg, plants of a variety under the name *Flottbeck Weymouth Pine*, which differs from the common in having still finer and lighter green coloured foliage.

XXXI. PINUS LAMBERTIANA—LAMBERT'S OR GIGANTIC PINE.

To this species, which was first discovered by Mr D. Douglas on the west coast of North America, is now considered to belong the loftiest trees in the world, a mark of distinction previously supposed to be possessed by some of the Palms. The following extract is from Mr Douglas' own account of Lambert's Pine—(*See Linnean Transactions*, vol. xvi.):—"This plant covers large districts about a hundred miles from the ocean, in latitude 43° north, and extends as far to the south as 40°. It first came under my notice in August 1825, while at the head waters of the Multnomah River. In October 1826, it was my good fortune to meet with it beyond a range of mountains, running in a south-western direction from the Rocky Mountains towards the sea, and terminating at Cape Orford of Vancouver. It grows sparingly upon low hills, and the undulating

country east of the range of mountains just mentioned, where the soil consists entirely of pure sand, in appearance incapable of supporting vegetation. Here it attains its greatest size, and perfects its fruit in most abundance.

“The trunk grows from 150 to above 200 feet in height, varying from 20 to near 60 feet in circumference. One specimen, which had been blown down by the wind, and this was certainly not the largest which I saw, was of the following dimensions:—Its entire length was 215 feet, its circumference, 3 feet from the ground, was 57 feet 9 inches, and at 134 feet from the ground, 17 feet 5 inches. The trunk is unusually straight, and destitute of branches about two-thirds of the height; the bark is uncommonly smooth for such large timber, of a light brown colour on the south, and bleached on the north side. The branches are rather pendulous, and form an open pyramidal head, with that appearance which is peculiar to the *Abies* tribe; the leaves are between four and five inches long, and grow in fives, with a short sheath like those of *Pinus Strobus*; they are rigid, of a bright green colour, but not so glossy, and from minute denticulations of the margins are scabrous to the touch. The cones are pendulous from the extremities of the branches, they are two years in acquiring their full growth, are at first upright, and do not begin to droop, I believe, till the second year. When young they have a very taper figure; when ripe they are about eleven inches in circumference at the thickest part, and vary from twelve to sixteen inches in length. The scales are lax, rounded at the apex, and perfectly destitute of spines. The seeds are large, eight lines long and four broad, oval; and like that of *P. pinea*, their kernel is sweet and very pleasant to the taste. The wing is membranous, of a dolabriform figure, and fuliginous colour, about twice as long as the seed. It has an innumerable quantity of minute sinuous vessels filled with crimson substance, and forming a most beautiful microscopic object. The embryo has twelve or thirteen cotyledons.

“The whole tree produces an abundance of pure amber-coloured resin. Its timber is white, soft, and light; it abounds in turpentine reservoirs, and its specific gravity has been ascertained from a specimen brought home by me, to be 0.464. The annual layers are very narrow; in the above specimen there were fifty-six in the space of four inches and a half next the outside. The resin which exudes from the trees when they are partly burned, loses its usual flavour, and acquires a sweet taste, in which state it is used by the natives as

sugar, being mixed with their food. The seeds are eaten roasted, or are pounded into cakes for their winter store.

“The species to which this pine is most nearly allied, is undoubtedly *P. strobus* ; from which, however, it is extremely different in station, habit, and parts of fructification. I have named it in compliment to Aylmer Bourke Lambert, Esq. a Vice-President of the Linnean Society, whose splendid labours in investigating the genus *Pinus* are too generally known and appreciated to require any eulogium from me.”

Although of rather a tender or delicate appearance, the *P. Lambertiana* does not seem too tender to withstand the winters of Britain. Those specimens, however, which were raised and distributed to various parts of the country, by the London Horticultural Society, from seeds sent home by Mr Douglas, have in several instances unaccountably perished when about four or five feet in height. This may have arisen from the soil being too stiff and retentive compared with that in which Mr Douglas found trees of this species to attain their greatest size, or from some other cause at present not properly understood.

XXXII. *PINUS MONTICOLA*—SHORT-LEAVED WEYMOUTH PINE.

This is another North-west American pine, discovered and introduced by Mr Douglas. It bears a greater approximation to the *P. strobus* than the last, but differs from it in having much shorter and more rigid leaves ; considerably larger cones, which are however nearly similar in shape ; and in its wood being more resinous, hard, and durable.

XXXIII. *PINUS EXCELSA*—TALL BHOTAN OR NEPAUL PINE.

SPECIFIC CHARACTERS.—Tree tall (90 to 120 feet) of a pyramidal habit of growth ; bark smooth, and of a dusky-brownish colour tinged with green when young ; leaves six to eight inches in length, fine, lax, or slightly pendulous, with a very prominent serrated rib, and longitudinal silvery channels on the interior surface, and serrated edges ; scaly sheaths, generally under an inch in length, deciduous ; male catkins ovate, two to three lines in length, compact, and without footstalks ; young cones generally from three to six together at the termination of the shoots, oblong, cylindrical, and upright, declining afterwards, and pendulous when quite ripe, at which period they average in length from 12 to 20 inches, and their greatest dia-

meter is from $1\frac{1}{2}$ to 2 inches ; outer surface of the thin imbricated, scales oval, of a yellowish-brown colour, tipped with darker points ; seed oval, about two lines in length, and, together with their oblong obtuse wings, of a dusky grey or dun colour ; cotyledons about 10 or 12. Grows naturally in Upper Nepaul and Bhotan, in the former of which it is known by the names of *Decoshera*, *Deoologhosee*, or *Dhoop* ; in the latter, by the name of *Semshing*, and the Hindoos term it *Raesula*, or King of Pines.

The *P. excelsa* in general appearance may be compared to a very luxurious growing Weymouth Pine, like which its wood is white but more hard and resinous, equally free from knots, and altogether superior in quality. Its timber is preferred by the Bhoteas to that of all their other pines, and by making slight incisions in the bark of growing trees they procure large quantities of pure limpid turpentine.

In the Museum a young plant received from Messrs Dickson and Turnbull, Perth, who have in their nursery grounds at Kinnoul, a specimen about 15 feet high ; it requires no protection in winter, and is supposed to be the finest specimen in this country.

From Mr Murray, of the Glasgow Botanical Gardens, young plants, the seeds of which were received from Nepaul under the name of "Chili, a pine with cones 18 inches long." And by the Hon. W. Leslie Melville, through the Highland and Agricultural Society, a cone and seeds from the same parts.

The leaves of those plants from the Glasgow Botanical Garden are exactly similar to those of *P. excelsa*, and the seeds received from the Hon. W. Leslie Melville agree in every particularity with the drawing and description of those of the above species given by Mr Lambert ; there seems, therefore, little doubt but that they all belong to *P. excelsa*, for although there be a considerable difference in the stated size of the cones, it is not at all improbable but those of the tall Nepaul pine may occasionally be found to attain to much more than average dimensions ; and collectors, when stating the size of cones which they saw, would doubtless give the measurement of the largest.

Five-leaved Pines, specimens of which have not yet been received for the Museum :—

PINUS MONTEZUME, *Rough-branched Mexican Pine.*

... LEIOPHYLLA, *Short-leaved do. do.*

... OCCIDENTALIS, *West Indian Pine.*

ABIES—FIR TREE.

The genus *Abies* does not differ from that of *Pinus* in any distinct permanent characteristic of either its flowers or fruit; hence they have been included in one genus, and the expediency of separating them disputed by some of the most eminent botanists of the present day. The difference in their general habits, however, and particularly in the arrangement of their leaves, (those of the Firs being always solitary, and not two or more together, as in the case of the Pines,) are reckoned by some sufficient to permit of dividing them into two separate genera, which method is here followed. The genus *Abies* also differs from that of *Pinus*, in having a common membranous scaly covering for each bud or unexpanded shoot; while each bud of the latter is protected by closely imbricated, chaffy, or feathery scales, arising from the base of, and covering the additionally membranous, or scaly, sheath-enveloped young leaves, and also from most, although not the whole, of the pines, in the imbricated scales of the cones being all thinner, or more foliate, and in the number of their cotyledons being from 3 to 9.

* *Such as are more exclusively denominated SPRUCE FIRS, having hard rigid leaves, and seeds like those of the Pines about half surrounded by the winged, deciduous pericarp.*

I. ABIES COMMUNIS—COMMON, OR NORWAY SPRUCE FIR.

GENERIC CHARACTERS.—Tree tall; branches verticillate, short, lower ones decumbent, and forming altogether a regularly pyramidal head; leaves of a grassy green colour, generally under an inch in length, curved or bent, sharp-pointed, and more crowded together laterally, than on the upper and under sides of the branchlets; male catkins solitary, in pairs, or few together, about an inch in length, cylindrical, generally curved, of a yellowish colour tipped with red; young cones terminal, pendulous, and of a bright red or scarlet colour, when ripe still retaining the same pendulous habit, of nearly a cylindrical shape, five to six inches long, and from one and a quarter to half an inch in diameter at the middle; scales of a rhomboidal-like shape, generally slightly incurved, and rugged or toothed at the exterior point; seeds very much resembling those of the Wild Pine, from which they are, however, easily distinguished, by being of a more uniform brown colour, and also by their being

sharper pointed, and feeling much harder or rougher-like to the touch; cotyledons seven to nine. Native of Norway, and other countries in the north, both of Europe and Asia, where it abounds chiefly on deep mountain valleys and declivities exposed to the north, where the soil is humid, and rather of medium or light texture. Supposed to have been first introduced to Britain in 1548.

In those countries where it grows naturally, the *A. communis*, or, as it is sometimes called, *A. excelsa*, attains a height of from 100 to 150 feet, and is supposed to require a century before it arrives at full maturity. Its timber is whiter, more elastic, less resinous, and consequently lighter, than that of *P. sylvestris*, and hence is preferred for the masts, yards of large ships, &c. When imported into this country from the north of Europe, it is known by the names of White-deal, White Baltic-deal, and White Christiana-deal. The true Burgundy pitch is obtained from the Norway Spruce, by making incisions in the bark in the warmer part of the season, from which it distills and becomes consolidated, before falling to the ground; it is then scraped off, and afterwards strained under a press, through strong coarse cloths, into barrels for transportation. A medium-sized vigorous tree will, in one season, yield thirty or forty pounds of juice. In Germany, and some other parts of the continent, where the culture of the Norway Spruce is becoming a good deal attended to, the seeds are sown along with oats or barley, in the quantity of from two to four quarts or so to the acre, on ground where they are intended to stand, and which has been previously well prepared. The same method is also sometimes practised with the Wild Pine.

In some of the northern parts of Europe, immense havoc is made in Norway Spruce and Wild Pine forests by the attacks of insects, chiefly of the beetle tribe, which introduce themselves into the cellular integument of the bark, in consequence of which the trees ultimately perish, and the insect's progress is only checked by felling and removing all the trees for a distance of fifty yards round the affected parts, and burning the branches on the ground.

By Messrs James Booth and Sons, Flotbeck, Hamburg, plants of the following varieties of *A. communis* :—

1. *ABIES COMMUNIS PENDULA*—PENDULOUS or WEEPING-BRANCHIED NORWAY SPRUCE.—Distinguished from the common by the drooping habit of its branchlets, and also by the darker glossy green colour, and rather greater length of its leaves.

2. *ABIES COMMUNIS FOLIIS VARIEGATIS*—**VARIEGATED-LEAVED NORWAY SPRUCE.**—Leaves short, of a yellowish blotched or variegated colour; tree more compact and dwarfer in growth than the common. These varieties are only interesting, as serving to form a little diversity in parks and pleasure-grounds.

II. *ABIES NIGRA*—**BLACK AMERICAN SPRUCE.**

SPECIFIC CHARACTERS.—Tree medium sized, or about fifty feet in height, of a regularly conical habit of growth; branches regularly verticillate, horizontal, or declining next their base, and aspiring towards the extremities; branchlets also more regularly verticillate than those in the next two species; bark of the trunk and branches of a dark dusky-like colour; leaves thick set, and spreading regularly on all sides of the branchlets, scarcely half an inch in length, straight, rigid, terminated abruptly, and four cornered or angled, of a dark glaucous green colour, with two small silvery stripes on the exterior or under side, and two longer on the interior; male catkins cylindrical, erect, and stalked, about an inch in length, yellowish with red tipped anthers; female, or young cones, ovate, erect, and of a purplish colour, afterwards becoming pendulous, darker coloured, and, when arriving at maturity, changing to a dusky reddish brown, full size, about an inch and a half in length, and three-fourths of an inch in diameter at the middle; scales blunt, or rounded, and when ripe, rugged or torn-like on their thin margins; seeds small, scarcely more than a line in length, and of a brownish colour. Grows naturally in North America, particularly between the 44th and 53d degrees of latitude, on cold moist sand, or light soils, and is found to attain the greatest height, which is seventy or eighty feet, in valleys composed of deep black peaty soils. Introduced to Britain in the year 1700.

The wood of the Black Spruce is of a lightish red colour, strong, light, elastic, and in America much in repute for making top-masts, spars, and for ships; as also the lower portions of the trunk, and the larger roots, for forming knees of vessels, in districts where oak is scarce. It is also imported to this country and the West Indies, for making packing-boxes, herring-barrels, &c. It contains too little resin to be useful in the production of turpentine. The tops of the branches are employed in common with, but generally preferred to, those of the next two species, for making the essence of spruce, which is employed in the brewing of spruce beer. The black spruce

will not succeed in dry warm exposures, and in this country should be chiefly planted on moist, peaty, or moorish soils.

By Mr John Kinment, gardener, Murie, Perthshire,—specimens of branches and cones grown at that place; and also by Mr Main, land-steward, Dalhousie, specimens grown there on trees, the seeds of which were sent home from America, by the Earl of Dalhousie.

III. ABIES ALBA—WHITE AMERICAN SPRUCE.

SPECIFIC CHARACTERS.—Tree about the same size as the last, also of a pyramidal habit of growth; branches more horizontal; bark considerably lighter in colour; leaves also lighter, less crowded, and not so straight, nor terminated so abruptly at their point; male catkins pendulous, on long foot-stalks, and of a yellowish and brown colour; female catkins, or young cones, ovate, and pendulous; ripe cones from one and a half to three inches in length, or nearly four times their greatest diameter, and of a light brown colour; scales thin, round, or bluntly pointed, and entire; seeds still smaller than those of the last species. Grows naturally on the same parts as *A. nigra*, but extends farther to the north, and does not succeed so well on a dry peaty soil. Introduced in 1700.

In the Appendix to Captain Franklin's Tour to the North Pole, by Dr Richardson, he mentions *Abies alba* as being the most northerly tree which came under their observation, and that the preceding was not observed at a higher latitude than 65 degrees. Its wood is employed for the same purposes, although considered inferior in quality to that of *A. nigra*. The small root fibres are very pliable when macerated in water, and deprived of their thin skin, are used by the North American Indians for making ropes, as also for sewing their birch-bark canoes.

IV. ABIES RUBRA—RED AMERICAN SPRUCE.

SPECIFIC CHARACTERS.—Tree more dwarf than either of the two last, being seldom thirty feet in height, also of a pyramidal habit of growth; branches slender; bark of a reddish-brown colour; leaves slightly compressed, or having only two prominent angles, of a uniform, rather vivid than glaucous-green colour, fine, curved or waved, sharp-pointed, those on the under side of the branches aspiring; cones in size and shape intermediate between those of the Black and White Spruce, of a dusky brown colour; scales often notched in the middle, but otherwise entire; seeds rather

smaller than those of the last. Grows naturally in Nova Scotia and Newfoundland, in moist cold soils, but not nearly so abundant as the preceding two. Introduced in 1755.

The timber of *A. rubra* is reddish coloured, and superior in quality to that of either of the preceding, but is of less value for general purposes from the small size to which it attains. It was formerly confounded with *A. nigra*, but differs essentially from both that species and *A. alba*, in all its parts, and particularly in its leaves, which are more slender and sharper-pointed than either.

V. ABIES SMYTHIANA VEL MORINDA—SMYTH'S HIMALAYAN
SPRUCE FIR.

SPECIFIC CHARACTERS.—Tree tall, of a pyramidal habit of growth; branches remotely verticillate, and somewhat pendulous; bark light coloured; unexpanded buds copper-coloured; leaves about an inch and a half in length, fine, and almost straight, spreading nearly equally on all sides of the branchlets, mucronate or bristle-pointed, somewhat flattened, or having two prominent rounded angles, and two less distinct of a darkish green colour, very faintly marked with a silver tinge, on the somewhat channelled spaces between the angles. Native of the Himalaya Mountains. Not having any previous description or flowers to refer to, nor cones which can be decidedly relied on, belonging to this species, the above description is all that can be given with confidence.

From the rapidity and habit of growth of *A. smythiana*, it is likely to prove a valuable acquisition both as a timber and an ornamental tree: it bears a greater resemblance to the Norway Spruce than to any of the preceding American species, from which, however, it is easily distinguished by its more rapid and luxuriant-like habit of growth, by the darker green colour, longer and proportionably finer leaves, and by the more remote slender and pendulous habit of its branches.

Specimen received from Mr J. Smith, Hopetoun Gardens, of a branch from a tree growing there, and allowed to be the largest of the species at present in Britain.

“ It was raised from seeds sent to the Earl of Hopetoun by Dr Govan in 1818, which were sown in a pot placed in gentle heat; only six plants came up; they were kept in pots for two years, and when first planted out were protected from the north and east winds, which was afterwards found unnecessary, the tree being sufficiently

hardy. Of the six plants three were sent to Edinburgh, and one to the Horticultural Society, London, and the remaining two kept at Hopetoun. The largest is now sixteen feet in height, the circumference at the ground two feet three inches, and at three feet high one foot five inches; the branches extend to a diameter of ten feet, and are rather pendulous. Several have been grafted on Spruce Fir about four feet from the ground, and form a singular contrast with the branches of that tree. Several have also been grown from cuttings, but they are not making such rapid progress as the seedlings.* And by Dr Neill, Canonmills, seeds received through D. Don, Esq. Professor of Botany in King's College, London. Also by G. R. Campbell, Esq. a cone of species of *Abies*, under the name of *Abies pendula*, found by him on the southern declivity of the Himmalaya, where it forms large trees, with beautiful pendent branches. And by the Hon. W. Leslie Melville, through the Highland and Agricultural Society, several cones of the same sort, also from the Himmalaya. These cones are in size and shape somewhat resembling those of the *A. communis*, but differ in their scales, which are almost round and entire, while those of the latter are of a rhomboidal shape and rugged, or notched on the outer extremity; the seeds and wings are also very similar.

VI. ABIES CLANBRASSILIANA—LORD CLANBRASSIL'S SPRUCE FIR.

SPECIFIC CHARACTERS.—Habit of growth remarkably dwarf, compact, round, and bushy, the height being seldom more than three to four feet; annual, shoots from one to three or four inches in length; bark light brown, unexpanded buds of a light copper colour; leaves about a quarter of an inch in length, slightly compressed, broadest in the middle, tapering to both extremities, and sharp-pointed. Original plant found on the Earl of Moira's estate in Ireland, and first introduced into Great Britain by Lord Clanbrassil.

As none of the other species are natives of Britain, and only one plant of *A. clanbrassiliana* being found in Ireland, it is, although enumerated in catalogues as a species, considered only a very distinct variety of either *A. rubra* or *A. communis*. The former of these certainly bears the closest approximation to it in size, but the latter resembles it most in the colour of its bark, buds, and leaves, and seems

* These plants were at first considered to be the *Cedrus Deodara*, although they differed materially in having none of the verticillate bundles of leaves in common with solitary ones peculiar to the genus *Cedrus*, from taking in view the great diversity between the leaves in young and old plants of many of the *Coniferae*.

upon the whole most entitled to its relation, notwithstanding the immense disparity in their height and habit of growth. That *A. communis* is, however, occasionally liable to accountable variations in its size, is ascertained by very dwarf specimens being occasionally found in plantations, although enjoying similar advantages with the rest; and in the Edinburgh Royal Botanical Gardens are several varieties, the produce of seeds procured from native forests on the Continent, which are nearly as dwarf in their habit of growth as *A. clanbrassiliana*. The same unaccountable variations also occur in Black and White Spruce plantations.

Lord Clanbrassil's Spruce Fir is only interesting in gardens and pleasure grounds, as forming a curious contrast with the taller growing species; it seldom or never produces either male or female flowers, and is propagated by cuttings or layers.

Species belonging to this division, plants or specimens of which have not yet been obtained for the Museum.

1. *ABIES ORIENTALIS*, *Oriental Spruce*.—Native of the Levant and China.

2. *ABIES CARPATICA*, *Carpathian Spruce*.—Native of the Carpathian Mountains.

*** Such as are usually denominated Silver Firs, having flattened and more or less pectinated leaves; also irregularly shaped seeds, more than half surrounded by the winged persistent pericarp.**

VII. *ABIES PICEA*—COMMON SILVER FIR.

SPECIFIC CHARACTERS.—Tree tall, pyramidal, branches diverging horizontally from the trunk, and in regular verticels or whorls; bark smooth and light coloured; leaves fully more than an inch long; pectinate, smooth, flattened, dark green, with two silvery channels on the under side, one deep central channel on the upper, and rounded or almost imperceptibly indented at the point; male catkins shortly cylindrical, and stalked; cones on the upper branches, erect, generally of a purplish colour, but in some varieties white, four to six inches in length by fully one in diameter, cylindrical; scales very broad, rounded, and incurved at the external edge, toothed at the sides, and having their long pointed persistent bractæ produced con-

* This division has been by some formed into a distinct genus, of which the Silver Fir is made the type, and which is termed *Picea pectinata*.

siderably beyond their points, deciduous or falling off when ripe ; seeds fully a third of an inch in length, irregularly triangular, somewhat wrinkled, and nearly surrounded by their persistent shining brownish purple pericarp, to which is generally attached a small portion of the wing ; cotyledons four or five. Grows naturally on mountains in Europe and the North of Asia, at altitudes immediately under what is termed the zone or range of *P. sylvestris*.

The *A. picea* succeeds best in this country on deep rather superior soils, and especially in such as are of a damp nature, as in glens at the base of mountains or rising grounds, &c. but is very impatient of the sea breeze. Its timber is rather soft, and not of long duration, therefore not held so much in repute by carpenters, nor imported to the same extent as that of *A. communis*. It is, however, a very ornamental and free growing tree when planted on a suitable soil. From the Silver Fir the Strasburg turpentine is derived, which is considered superior to all the other substitutes for the true turpentine of *Pistachia Terebinthus*. This liquid resin is obtained in small quantities by making incisions in the bark, but chiefly from small vesicles under the bark ; and the collecting of this substance forms a considerable branch of business to the natives, in some of the central districts of Europe, who climb the highest trees by means of cramp-irons fixed to their shoes, provided with a small hook to pierce the vesicles, and a bottle slung to their waist for containing the juice.

By Major Pringle, 14. Walker Street, seeds of *A. picea* from native trees in the Black Forest of Germany, with the following particulars, a copy of which was also sent to the Museum by John M'Pherson Grant, Esq. younger of Ballindalloch.

“ Silver Tanne, or Silver Fir of the Black Forest.—This tree grows in the greatest quantity, and to a large size, in the neighbourhood of Darmstadt, Baden, and inwards towards Switzerland. The soil in general is good, and even on the sides of the hills where it is found, the soil is of a considerable depth. The districts I have seen most of this timber in is the territory of Baden, the character of the ground hilly, from four hundred to eight hundred feet above the level of the Rhine ; climate in spring early and mild, summer very hot, winter cold with snow, Fahrenheit's thermometer, from December till March, being frequently many degrees below zero. Fine specimens of oak are occasionally met with among the firs, in groups of a dozen or twenty from eight, twelve, to sixteen feet in circumference, six feet from the ground. The Silver or White Fir grows almost invariably perfectly straight in the stem, free of branches, to a considerable height, mea-

suring from fifty to eighty, and one hundred and twenty feet in length, and ten to sixteen and twenty feet in circumference, six feet up. These magnificent trees are cut up into planks, and form the floating villages, which one meets with on the Rhine, on their way to Holland."

ABIES PICEA TORTUOSA—*Crooked-branched Silver Fir*.—This differs from the common, in having remarkably twisted or crooked branches and branchlets, which give it a rather peculiar appearance, and render it an interesting variety either for planting in collections or pleasure grounds.

Plants of this sort received from Messrs J. Booth and Sons, Hamburgh.

VIII. **ABIES BALSAMEA**—**BALM OF GILEAD, OR AMERICAN SILVER FIR.**

SPECIFIC CHARACTERS.—Tree medium sized, branches nearly horizontal, but more aspiring than those of the common Silver Fir, and forming a narrower pyramidal head; bark on the trunk generally thickly interspersed with little elevated vesicles, containing a clear limpid resin; leaves shorter, narrower, lighter green, and less silvery on the under side than those of *A. picea*, compared with which the male catkins are also more numerously crowded round the shoots of the preceding season, and more persistent; cones also of a deeper purple colour, more swollen in the middle, tapering to both ends, furnished with short and blunter pointed bractæ, and generally having at least one side sprinkled with white resin, which exudes from the point; seeds also nearly similar in shape, but not more than half the size of those of the common Silver Fir. Native of the northern provinces of North America.

In its native country, according to Michaux, the *A. balsamea* does not grow in masses like many others of the American Pine and Fir trees, but is found scattered amongst Black and Hemlock Spruces, and chiefly on the colder sides of mountains, in rather cold moist inferior soils, composed of clay and gravel. It seldom attains to more than forty feet in height, and its timber is light, soft, and even inferior to the Silver Fir. In this country the Balm of Gilead Fir often perishes when under twenty or twenty-five years of age; the symptoms of its decay are a seemingly overflow of sap, and overswelling or thickening of the terminal shoots, which may probably arise from being generally planted on too rich soils, and in too warm situations.

This species obtains the name of Balm of Gilead from a resin which is obtained from it in the same manner as that of the Silver Fir, having a supposed resemblance to the true extract of that name, which is derived from the *Amyris Gileadensis*. In this country the liquid resin of the Balm of Gilead Fir is known by the name of Canada Balsam.

ABIES BALSAMEA LONGIFOLIA—*Long-leaved Balm of Gilead Fir*.—Plants of this variety from Messrs J. Booth and Son, Ham-burgh; these differ from the common in having longer leaves and more upright or less horizontal branches.

IX. *ABIES FRASERII*—FRASER'S OR DOUBLE BALSAM FIR.

SPECIFIC CHARACTERS—Habit of growth dwarf and bushy, seldom exceeding the height of ten or twelve feet; leaves pretty regularly pectinate, crowded, straight, flattened, of a rather lightish green colour, silvery underneath, and with a deep notch (rarely entire) at their points; male catkins, at the extremities of the branchlets, compact, slightly oblong, and about half the length of the leaves; cones sessile, of a dark brownish colour, about an inch and a half in length, by nearly one inch in diameter at the middle, tapering from thence to the two blunt ends; bractæ twice the length of the scales of the cones, external half, broad, entire, reflexed, and terminated with very short points; seeds and wings of a dark purple shining colour, the former short, and proportionably rather thicker than those of the *A. balsamea*. Grows naturally on the higher mountains of Carolina and Pennsylvania, in North America. *A. Fraserii* is a hardy free growing plant, and although too small for a timber tree, it is well adapted for planting in shrubbery and pleasure grounds, along with and for the same purposes as *Pinus pumilio*.

X. *ABIES NOBILIS*—LARGE BRACTED FIR.

SPECIFIC CHARACTERS.—Tree tall; bark of a somewhat purplish-brown colour; leaves about an inch in length, inserted chiefly on the sides of the branchlets, curved upward or sickle-shaped, narrowed towards the base, acute pointed, plain on the upper side, with a furrow in the middle, opposite which the rib on the under side is very prominent, of a colour above lightish green, and silvery on each side of the rib; cones on the upper sides of the branches solitary, erect, cylindrical; sessile six to seven inches in length, by from two to

two and a half in diameter; bracteæ of a lightish brown colour, long and reflexedly imbricated, so as almost to conceal the scales, broad, membranous, and deeply jagged or rugged on the edges, with a long entire bent or hooked point in the middle; seeds about as large as those of *A. picea*, but more pointed, and lighter in colour; wing spreading almost equally to both sides, very light brown, and thin. Native of the north-west coast of North America; introduced in 1827.

This is one of the many discoveries of Mr D. Douglas on the west coast of America: it attains to a great size, and is likely to prove an important acquisition to the timber trees of this country, but is as yet very rare. It resembles *A. Fraserii* in having large reflexed bracteæ, but is much larger in all its parts.

XI. ABIES DOUGLASII—DOUGLAS'S FIR.

SPECIFIC CHARACTERS.—Tree tall, and of a pyramidal habit of growth; branches regularly verticillate, and rather aspiring when young, becoming afterwards horizontal, and slightly pendent, bark dark coloured, and often thickly interspersed with small elevated resinous vesicles, like those of the *A. balsamea*; leaves very loosely pectinate, from three quarters, to often nearly an inch and a half in length, narrow, straight, and somewhat acute-pointed, of a light or vivid green colour, and slightly silvery on the under side, which, however, almost disappears after the first season; cones five to six inches in length, very much resembling those of the cedar of Lebanon; margin of the very broad scales incurved and entire; bracteæ ovate, acuminate, rugged or torn on their edges, shorter than the scales; seeds about the same size, but more oblong than those of the *A. picea*; wings broad, thin, shining, and of a pale brownish colour. Native of the north-west coast of North America; introduced in 1827.

Douglas's Fir is so named in compliment to Mr D. Douglas, by whom it was discovered in California, and at first named *A. California*. It is sufficiently hardy for this climate, and generally takes on two growths in the season (*Loudon's Gard. Mag.* vol. ix. page 672). Mr T. Bishop, landsteward, Methven Castle, Perthshire, has found it to succeed admirably on a high muirland, without the least advantage from any artificial shelter; see his report on the introduction of certain new forest trees into the cultivation of Scotland, *Highland and Agricultural Society's Transactions*, vol. xi. page 121.

Abies Douglasii bears a considerable affinity to the *A. religiosa*, or Mexican Silver Fir, as described by Mr Lambert, except in the cones of the latter being much smaller. *A. religiosa* was first discovered on the higher mountains of Mexico, by Messrs Schiede and Deppe, who applied the above name to it, from the branches being used by the inhabitants to ornament their churches and places of worship.

XII. ABIES WEBBIANA—CAPTAIN W. S. WEBB'S, OR PURPLE-CONED HIMMALAYAN SILVER FIR.

SPECIFIC CHARACTERS.—Tree tall, of a conical pyramidal shape, similar to the *A. picea*, to which it bears a considerable resemblance generally, but has larger and broader leaves, also thicker branches, and much larger cones, which are also solitary and erect; the scales of these are entire, short, and broadly wedge-shaped, longer than the bractæ, and of a deep purple colour; seeds smaller, but of a longer and more sharp-pointed form than those of the Common Silver Fir, but similar in colour. Grows naturally at great altitudes on the Himmalayan Mountains.

In the former edition of Mr Lambert's description of the genus *Pinus*, &c. he named this species *A. spectabilis*, but afterwards restored it to that of *A. Webbiana*, as applied to it by Dr Wallich, in honour of Captain W. S. Webb, by whom it was first discovered. It has also been termed *A. tinctoria*, from its cones yielding a purple dye. The following is extracted from Mr Lambert's work, and was communicated to him by Captain Webb, through Dr Wallich of the Calcutta Botanic Garden:—"This Purple-coned Pine is called *Oumur*; it attains a height of eighty or ninety feet, with a diameter of the stem near the ground of three to four feet; the cone is produced on the extremity of the shoots; the leaves are about one inch long, of a beautiful light green, having a white stripe on the centre. The wood is used for planes, and even equals in the texture of its grain, and in odour, the Bermudas Cedar. The fruit is said to yield at full growth an indigo or purple pigment by expression. The silvery hue of its bark, the beautiful contrast of the leaves, with the rich purple of the cone, glittering with globules of transparent resin, produce in combination one of the most striking objects which can well be imagined, and entitle it to precedence for ornamental purposes."

By the Hon. W. Leslie Melville, through the Highland and Agricultural Society, seeds of *A. Webbiana*, collected near the verge of perpetual snow, on the Himmalaya, November 1835.

XIII. *ABIES PICHTA*—FISCHER'S OR SIBERIAN PITCH SILVER FIR.

SPECIFIC CHARACTERS.—Tree under the medium size, broadly, pyramidal, or somewhat bushy, bark smoothish, and of a dull grey-like colour; leaves loosely pectinate, or spreading widely on both sides of the branchlets, long, narrow, rounded, and almost imperceptibly notched at the points, of a light or rather vivid green colour, with scarcely any appearance of silveriness underneath, particularly after the first season. Native of the North of Asia; introduced to Britain in 1824.

The usual height of *A. pichta*, as given in some catalogues, is fifty feet, while in others it is stated as being a small tree or shrub. The few specimens which have been for several years in this country, seem of slower growth than either the Common Silver Fir or Balm of Gilead, and therefore it is more than likely that this species can only be valued for diversifying the appearance of Silver Firs, where ornament more than timber is the object in view.

An opportunity has not yet been afforded of giving any description of the flowers, cones, or seeds of this or the next species; they are therefore included in this division, from their leaves most resembling those of the Silver Fir.

XIV. *ABIES TAXIFOLIA*—YEW-LEAVED FIR.

SPECIFIC CHARACTERS.—Tree seemingly under the medium size, of a pyramidal habit of growth; branches nearly horizontal, rigid or stiff, bark smoothish, and dark coloured leaves, thickly pectinate, broad, and about or under an inch in length, rounded and notched at the end, like those of *A. Fraserii*, from which, however, they differ in being occasionally more waved, and, together with the bark and young buds, much darker in colour, also rather more silvery underneath, especially when more than a year old.

The above description refers to a species known under the name of *A. taxifolia* in the nurseries, and other collections in this country, but which differs very much from that found by Mr Menzies on the north-west coast of America, the wood and leaves of which are much more slender, and, as well as its habit of growth, cones and seeds, bear a greater affinity to *A. Canadensis*.

Plants in the Museum communicated by Messrs H. Ronalds and Sons, nurserymen, Brentford, London.

*** *Species which do not properly belong to either of the two preceding divisions.*

XV. *ABIES MENZIESII*—MENZIES OR WARTED-BRANCHED FIR.

SPECIFIC CHARACTERS.—Tree seemingly rather under the medium size ; bark of the branches and branchlets of a light brownish-grey colour, and becoming rough or warted-like ; leaves linear, straight or slightly curved, closely set, spreading nearly regularly on all sides of the branchlets, slightly rounded, and occasionally marked with two faint silvery lines on the exterior side ; plain-like, and more distinctly marked on the interior side ; general colour light, and somewhat glaucous green ; points hard, sharp, and brownish coloured ; cones three times the length of the leaves, or from two to three inches, cylindrical, and terminating abruptly at both ends ; scales loose, blunt, and rugged or torn-like on their exterior margin, longer than the acute lanceolate bractæ, which are consequently included. Native of the north-west of America ; introduced in 1827.

This species was discovered and named by Mr Douglas, in compliment to Mr Menzies, another indefatigable collector, and whose researches were also chiefly confined to the north-west of America. *A. Menziesii* seems to be of a close or compact pyramidal habit of growth, and not likely to attain any considerable height, but is, in a botanical point of view, extremely interesting, as serving to combine the Spruces (*Abies*) and Firs (*Picea*), having the leaves and habits of the one, with the cone and seeds of the other. Hence it is adduced as an example for retaining these in one and the same genus.

XVI. *ABIES CANADENSIS*—CANADIAN OR HEMLOCK SPRUCE.

SPECIFIC CHARACTERS.—Tree rather above the medium size ; branches numerous, large, and slender, forming a massy rather irregular conical or pyramidal head ; bark light coloured and smooth, except when very old, leaves pretty regularly distich or pectinate, broad, flat, about half an inch in length, serrated or rough at the edges, of a very light vivid green colour, with two silvery stripes underneath ; male flowers few together, forming a small head on a long footstalk ; cones pendulous on the extremities of the branchlets, nearly an inch in length, and of a light brown colour when ripe ; scales few, roundish, smooth, and entire on the margins ; seeds small, light brown coloured ; wings nearly white. Native of North America.

The Canadian or Hemlock Spruce is very abundant in the natural

forests of North America. It is found as far north as the fifty-first degree of latitude, in the vicinity of Hudson's Bay, but is most plentiful in the districts near Quebec; farther south it becomes more rare, and on the Alleghany, only occupies the higher grounds. Although generally found growing with the Black Spruce, the Canadian universally attains its greatest height (seventy or eighty feet), on soils which seem rather dry for the former, or where it assumes a somewhat stunted appearance. The Canadian Spruce, however, attains large dimensions on the banks of rivulets, and where the moisture is not stagnant. The timber is of little use, being very much given to warp, and when of great dimensions, the concentric circles are often separated at intervals, forming what are termed shakes, from the immense influence which the wind has in bending and twisting trees with such large dense tops; the bark, however, is nearly if not altogether equal to that of the oak for tanning leather, and is extensively used in some parts of America for that purpose. In this country the Canadian Spruce is only of importance as an ornamental tree, for which it would doubtless be more valuable if raised always from seed, instead of cuttings or layers, as such form more perfect plants, and it might also be an object of some importance to procure these seeds from such trees as grow in the colder parts or higher latitudes of North America.

The *A. Canadensis* is often included amongst the *Piceæ* or Silver Firs, but it differs so materially in general habits and appearance from these, that it is here separated. Of the following two, which bear a considerable resemblance to, and may, therefore, be included in the same tribe as the *Canadian Spruce*, specimens have not yet been received.

A. taxifolia, Yew-leaved Spruce Fir of Lambert, a native of the North-west of America; and,

A. dumosa, Eastern Alpine Fir, which grows naturally on the higher regions of Nepaul and Bhotan, and found by Dr Wallich's collectors on Gosaingothan, one of the lofty peaks of the Himmalaya.

CEDRUS—CEDAR.

The genus *Cedrus* may be considered as intermediate or forming the connecting link between the Firs, *Abies*, and the Larches, *Larix*. Like the former of these, the Cedars are evergreen, and similar to that

tribe designated Silver Firs, in the form and habit of their cones, while they resemble the latter in having the leaves of the young branches solitary or in bundles, and those of the old always many together in bundles, with a bud in the middle, from which arises a succession of leaves on either the male or female flowers.

I. CEDRUS LIBANI—CEDAR OF LEBANON.

SPECIFIC CHARACTERS.—Tree above the medium size of a conical or pyramidal form when young, but when old the branches spread widely and generally in a horizontal direction, which gives the tree a peculiar, broad, and often a flattened topped form; leaves straight, three-fourths of an inch to an inch and a half in length, nearly cylindrical or indistinctly angled, tapering to a broad hard point, of a dark grassy green colour, chiefly solitary and fasciculated on those of a year old, and on all the older fasciculated only, or very rarely solitary; male catkins and young cones appearing in October; ripe cones with short footstalks, erect, ovate, and from three to five inches in length; scales long, roundish-shaped, incurved on the margin, of a dusky brown colour, very firmly attached at their base, and scarcely opening when fully ripe; seeds of an irregular triangular form, nearly half an inch in length, lightish brown coloured, and forming an oblique angle, with the very broad membranous wing; cotyledons six. Native of Mount Lebanon, and other mountains of Asia, supposed to have been first introduced to Britain in 1683.

The Cedar of Lebanon is found naturally to succeed best on rich deep and rather moist soils, its timber is to appearance very like that of the Larch, but harder and much more ponderous. It, however, possesses so few of the remarkably valuable properties, particularly an agreeable smell and great durability, generally ascribed to Cedar-wood, that it seems more than probable it has often been mistaken for or confounded with that of very different trees. The peculiar habit of growth of the Cedar of Lebanon renders it valuable either for planting alone in pleasure grounds, near architectural lines, or for breaking the stiffness and regularity of other trees, particularly ever-greens on the outsides of plantations or masses.

By Mr Corbett, forester to his Grace the Duke of Buccleuch, Dalkeith, specimens of *C. Libani*, in flower November 1835, from fine large old trees at Smeaton. And by Mr James Smith, Hopetoun Gardens, a specimen of its timber grown at Hopetoun House, where are some of the largest Cedar trees in Scotland.

II. CEDRUS DEODARA—DEODAR OR INDIAN CEDAR.

SPECIFIC CHARACTERS.—Tree large, with a massy roundish or oval head; trunk straight or nearly so; branches large and spreading, horizontal or slightly aspiring next their base, and pendulous towards their outer extremities; leaves distributed either solitary or in bundles as those of *C. Libani*, from which they, however, differ essentially in being larger, of a dark green colour, and covered all over with a light glaucous bloom; male catkins upright, of a greenish light yellow colour; cylindrical, without footstalks, and about an inch and a half in length; cones about two together, stalked, upright, oval, from four to five inches in length, of a brownish colour, tinged with a purplish-like bloom; scales nearly the same shape and size as those of *C. Libani*, but falling off when ripe, like those of *A. picea* and others of the silver firs; seed light brown, about half an inch in length and irregularly triangular or wedge-shaped; cotyledons eight. Grows naturally in Nepaul and others of the Indo-Tartaric Mountains, at altitudes of ten or twelve thousand feet above the level of the sea. Introduced to Britain in 1822.

The wood of *Cedrus Deodora* is very compact, resinous, possessed of a strong turpentine smell, capable of receiving a high polish, and so durable that it has been supposed almost imperishable, in confirmation of which, amongst the instances of its great durability, one is given in Mr Lambert's work of the wood of the Indian Cedar which, after the taking down of a building in which it had stood two hundred and twenty-five years, was found so little impaired that it was again used in building a new house. Indeed, the timber of *C. Deodara* seems possessed of all the properties ever ascribed to that of *C. Libani*, compared with which the tree also seems equally if not more hardy or suitable for the climate of Britain, and has also the advantage of growing much more rapidly when young, so that it bids fair to become one of the most valuable (either as a timber or ornamental tree) of the *Coniferae* which have yet been introduced.

Seeds of *C. Deodara*, by G. R. Campbell, Esq. collected by him on the Himmalaya. Also specimens of cones, and seeds collected on the Himmalaya in November 1835, by the Hon. W. Leslie Melville, communicated by Charles Gordon, Esq. of Drimnin, Secretary to the Highland and Agricultural Society of Scotland, accompanied with the following extract from the letter received with them:—

“CALCUTTA, *January* 20, 1836.—These are probably the last seeds I shall dispatch this season, and I avail myself of the op-

portunity to offer a remark or two on the Deodar Pine, which has been my principal object in the several packages I have forwarded. I have not myself seen it of any size, but I am living among gentlemen on whose accuracy I can depend, and who have resided in the mountainous portion of the Himmalaya range of mountains, where it comes to perfection. They assure me that trees one hundred and fifty feet high, without branches, and thirty feet in circumference, are not at all uncommon; some are even larger, and the common size is not far short of the above dimensions. The timber is employed for roofing and other purposes, and if sheltered from the weather is very durable. It is found perfectly sound in the roofs of temples which cannot have stood less than two hundred years. For out of door purposes, I understand it requires paint, which, however, perfectly protects it. Regarding its rapidity of growth, I have different accounts; and we have perhaps scarce been long enough in possession of this mountain tract to speak with confidence on this point."

LARIX—LARCH.

The genus *Larix* is distinguished from all the preceding by having deciduous leaves, which are, like those of *Cedrus*, chiefly solitary on the young shoots, but always bundled or fasciculated on the old twigs, with a bud in the centre from which the future leaves or flowers proceed.

The Larches also differ from the Cedars in the scales of their cones being of a pretty regular round or oval form and of a much smaller proportionate breadth, and also from the genera *Pinus* and *Abies*, in having a hemispherical cupped glandular stigma, instead of the same being bifid or trifid.

I. *LARIX* EUROPEA—COMMON LARCH.

SPECIFIC CHARACTERS.—Tree tall and of a conical or pyramidal form; branches subverticillate and spreading horizontally from the straight trunk, occasionally, however, rather pendulous, particularly when old; branchlets also more or less pendulous; leaves linear, soft, blunt, or rounded at the points, of an agreeable light-green colour, single or fasciculated, in the latter case many together, round a central bud, spreading and slightly recurved; male catkins without footstalks, glo-

bular or slightly oblong, of a light-yellow colour, and, together with the female or young cones, appearing in April and beginning of May, the latter varying from a whitish to a bright reddish colour; cones of an oblong ovate shape, erect, fully an inch in length, and of a brownish colour when ripe; scales persistent, roundish, striated, and generally slightly waved but not distinctly notched on the margin; bracteæ, generally longer than the scales, particularly towards the base of the cones; seed of an irregular or ovate form, fully an eighth part of an inch in length, and more than half surrounded by the smooth, shining, persistent pericarp; cotyledons five to seven. Grows naturally on the Alps of Switzerland, and other mountainous countries towards the north of Europe, also in some of the northern parts of Asia. Introduced to Britain in 1629.

The quality of the timber of the Common Larch, and the uses to which it is in this country applied, are too well known to require of any particularization. The resinous matter which flows from the trees through holes pierced in the bark and sap-wood, is known in the shops of this country under the name of Venice Turpentine. In Russia a gum, known by the name of *Gummi Orenburgense*, which issues forth during the combustion of the medullary part of the trunks when the forests are burned, which often takes place either from accident or intentionally during the warmer summer months, and which is very glutinous and possessed of a sweet pleasant taste, is used as a substitute for gum Arabic, and also as food. A kind of Manna, *Manne de Breançon*, of the French shops, is collected from the leaves and points of the young shoots of the larch in the mornings before it becomes dissipated by the rays of the sun. And a globular-shaped kind of mushroom, known by the name of *Boletus Laricinus*, which in the northern parts of Europe grows on the trunks of old larch trees, affords a fine purple dye, and has been pretty extensively used in medicine.

Although some of the oldest Larch trees in Britain and particularly two planted at Dunkeld, Perthshire, in 1741, and which according to Miller have been mistakingly supposed the oldest in this country, are still healthy and vigorous, yet in different parts much younger trees and even whole plantations have been found to acquire a seemingly premature old age, and perish from the effects of a disease generally termed the Rot in Larch; to account for which, various hypothesis have been advanced, such as a degeneracy in the plants raised from seeds of diseased trees. Hence the Highland and Agri-

cultural Society of Scotland offered premiums for the most extensive introduction into this country of seeds from healthy trees in the native forests on the Continent. With what results the future growth of plants raised from these may be attended is of course as yet unknown; but in the seed-beds the produce of native trees bear a marked superiority over those raised from the seed of this country, in vigour, rapidity of growth, and the luxuriant healthy colour of their foliage.

Planting Larch after Scotch fir has been ascertained to be very detrimental to the health and success of the former, and the dry rot has also been ascribed to a neglect or bad management of the young plantations, to a too wet, as well as a too dry soil and subsoil. Also to a ferruginous soil, on all of which the disease may doubtless in some measure depend. Too deep planting is another reason given for the rot in larch, apparently, however, with less propriety than either of the preceding. The question, therefore, seems to be still involved in a good deal of obscurity. One fact, however, seems to be universally admitted, viz. that the disease generally, if not invariably, commences in the roots (either in the tap or laterals), and that it proceeds upwards first through such parts of the trunk as these roots more immediately influence, spreading from thence until the tree becomes completely destroyed, or at least rendered unfit for the generality of purposes to which the timber is applied. From thence it may be inferred, that as the Larch, like most others of the Pine family, has not the power, like many of the hard-wood trees, of reproducing either roots or young shoots; when these receive any very considerable check, that any material injury done to these, particularly the former, either from the effects of drought, moisture, or insects * destroying the functions of the leaves and consequently retarding the returning flow of proper sap to the roots and other parts of the tree, or any other cause whatever, must at first weaken the whole plant, and consequently render it less able to exist under repeated attacks arising from the same or different causes.

By Henry Home Drummond, Esq. of Blairdrummond, a transverse

* The insect which seems most injurious to Larch plantations in this country is the Larch Blight Bug, *Eriosoma Lariciæ*, which is of a dark colour but covered with a white mealy-like down, and often gives to whole plantations an almost snowy whiteness; they are always found most prevalent in sheltered places and in quiet warm summers which succeed on open winter; they are easily destroyed or dispersed by loud winds, or heavy rains, and leave the bark covered with a dark coloured excrementitious substance.

section from near the root of a larch tree, about sixty years of age, and three feet in diameter, grown on a clayey loam, incumbent on gravel, and not possessing the least tendency to decay. Cut in 1833.

By Mr A. Gorrie, Annat Gardens, transverse section, from a tree about twenty-six years old, grown on a strong black loam, incumbent upon a dry porous and ferruginous subsoil, shewing that the rot does not always commence in the centre of the tree, and that moist seasons, such as 1823, although accompanied with low temperature, produce annual layers of the greatest breadth, and also that those of very dry seasons, such as 1826, are not only narrower but that the first appearance of rot or decay commences in such, and spreads from thence gradually, but chiefly outwards. Also a transverse section of a tree planted at the same time, and in the immediate vicinity of the last, on a strong deep loam, incumbent on a brown moderately retentive subsoil, and likewise affected in the same manner as regards the breadth of annual layers in wet and dry seasons, but not presenting the least vestige of rot or decay. And also a transverse and a longitudinal section, from a tree ten years of age, planted after Scotch fir, the former shewing the lateral progress of the disease, and the latter the same in its ascent. The tree, from whence these were taken, was grown on a light black loam, on a dry bottom, at an altitude of five hundred or six hundred feet above the level of the sea, and trees grown on similar soil, at the same altitude, and planted at the same time, but not preceded by Scotch fir, were found not to be in the slightest degree affected by rot. These were all average specimens, selected from a large number grown under similar circumstances as the others, the qualities and defects of which they are intended to represent.

By Mr Blackadder, land-surveyor, Glammis, Forfarshire, specimens of branches and trunks of young larch trees, subjected to a disease apparently similar to that of the apple, known by the name of Canker or Cancer, and which, although very prevalent in some parts, particularly Strathmore, has not yet been satisfactorily noticed or accounted for. It is, however, very probably entirely owing to the soil.

The varieties of *L. Europæa*, have hitherto been little noticed. These are particularly conspicuous in the colour of their flowers, but whether such variations are attended with any difference in the quality of the timber, or hardness of the tree, has not yet been ascertained. There are, however, in plantations, two varieties very

distinct in their general appearance, together with others which seem intermediate and of less importance. The most prevalent of these is here, for sake of distinction, denominated,—

1. *LARIX EUROPÆA COMMUNIS*, COMMON EUROPEAN LARCH, having branches more aspiring towards their points; branchlets very numerous, and forming a dense conical or pyramidal top; foliage of a light grassy or vivid green colour; and bark rather more rugged than that of the other, which, as descriptive of its general appearance, may be denominated,—

2. *LARIX EUROPÆA LAXA*, LOOSE-HEADED EUROPEAN LARCH. True specimens of this variety may easily be distinguished from the others when in the nursery-rows, by their more rapid growth,—more horizontal and less crowded branches,—and by the darker green, or somewhat glaucous colour of their foliage. When the trees advance to a more mature age, they, besides their greater size, and the preceding peculiarities of the foliage, are easily distinguished by their larger, thinner, and more gracefully somewhat pendent branches; cones also larger, more tapering pointed, and less compact than those of the common sort. These remarks are from mere observation of the trees in a young state, but it would be a matter of some importance to ascertain the difference, if any, in the value of their timber.

3. *LARIX EUROPÆA PENDULA*, WEEPING EUROPEAN LARCH. This variety is much rarer, and more distinct than either of the last. It is distinguished by the very pendulous habit of its branches, somewhat resembling those of the true *Larix pendula*, from which, however, it is essentially different in its cones and other characteristics.

4. *LARIX EUROPÆA COMPACTA*, COMPACT OR CROWDED BRANCHED LARCH. This name is here applied to a very distinct kind of larch without any regard as to whether it should be allowed to rank only as a variety of *Larix Europæa*, or form a different species. Specimens of the cones and branches of which were received from Mr A. Gorrie, Annat Gardens, who had the seeds sent him about twenty years since, from Yorkshire, as those of the American black larch, *L. pendula*, to which, however, it does not bear the least resemblance. The trees at Annat Garden are growing on very su-

terior, rather heavy, deep, blackish soil, and the largest has not yet attained to more than sixteen feet in height, not being much more than half the size which common larch would have attained to under similar circumstances. In habit of growth the tree is conical or pyramidal, like the common, but its branches are very brittle, or easily broken from the trunk, numerous, horizontal, or slightly bent down near their base, aspiring afterwards, and the larger cones are finally erect towards their point, with pretty regularly verticillate branchlets; towards the centre of the tree, however, these are pendulous, and remarkably thickly interwoven with one another; the bark is very rugged or scaly, and thick; cones, often small, irregularly shaped, with very much waved and incurved or folded scales, but, when fairly grown, nearly as large as those of the common larch, than which, however, their scales are smoother, blunter pointed, considerably more incurved at the margins, and equally persistent; bractæ much shorter than the scales; seeds seldom perfected in this country; and the foliage is of a light grassy-green colour. Regarding the quality of the wood of this variety or species, little is yet known; but, from its slow growth, it does not appear likely ever to become of importance as a forest tree.

II. LARIX PENDULA—BLACK OR PENDULOUS BRANCHED AMERICAN LARCH.

SPECIFIC CHARACTERS.—Tree of medium size, slender, and generally bending towards the top; branches verticillate, few, remote, and pendulous; branchlets also thin, and more pendulous than the branches; bark smoothish, and very dark coloured, that on the youngest twigs of a dark purplish colour, inclining to grey; leaves like those of the common larch in shape, but rather longer, darker in colour, and arising from shorter and much darker coloured buds or sheaths; male and female catkins small and short, the latter generally tinged with reddish purple cones when ripe, easily detached from the branches, generally under three quarters of an inch in length; scales round, or slightly approaching to an oval shape, smoothish, of a dark brown colour, few, loose, and slightly incurved on the margins; bractæ much shorter than the scales, of a somewhat lyrate shape, waved on the margins, and tipped with a short, soft, acute point; seed considerably smaller than that of *L. Europæa*, and of an oblong

shape ; alæ, or wings, of a brownish purple colour. Native of North America. Introduced to Britain in 1739.

The *L. pendula* grows only in the colder parts of North America, being entirely confined to the northward of the 40th degree of latitude, and is found in greatest abundance in mountainous parts, on rather moist and inferior soils. The timber of *L. pendula* is of a darkish waved-like colour, very tough, durable, and, where it is plentiful, preferred for general purposes to any of the American pines or firs, which grow in the same parts.

Specimens of the wood of the Black American Larch, grown in Forfarshire, and presented by Mr Wedderburn, Pearsel.

III. LARIX MICROCARPA—SMALL-FRUITED OR RED AMERICAN LARCH.

SPECIFIC CHARACTERS.—Tree medium sized, upright, of a slender, conical, or pyramidal habit of growth, but not so much so as the last species ; branches horizontal, or slightly pendulous, except the upper, which are rather aspiring ; branchlets also pendulous, and, together with the branches, more numerous and dense than those of *L. pendula* ; bark smoothish, of a brownish grey colour, and light brown on the young twigs ; leaves of a vivid grassy green colour, and shorter than those of *L. Europæa* ; catkins very similar to those of the last ; but the bractæ of the female or young cones are more of a regular oval shape ; ripe cones about half an inch in length, easily detached from the branches, of an oblong shape ; scales also somewhat oblong or oval, light brown coloured, slightly incurved, and rougher, or more distinctly striated than those of the black larch ; seeds also shorter or more rounded, and together with the alæ, of a lighter brown colour. Also a native of North America ; and found chiefly in the same districts as the *L. pendula*.

M. Michaux, in his *Sylva Americana*, seems to have included both the Red and Black American Larches under the name of *L. Americana*. His figure is certainly that of *L. microcarpa*, although some parts of the description apply more properly to *L. pendula*. He says “that, in the United States, this tree is commonly designated by the name of *Hack Matack* ; and the descendants of the Dutch, in New Jersey, call it *Tamarack*. Whether, therefore, these names are really applied to one or both of the preceding species, seems uncertain ; but, at present, in this country at least, they are generally supposed to apply only to the *L. pendula*, or Black Larch. The

timber of both may be considered as about equal in quality ; that of *L. microcarpa* is, however, of a lighter, and more of a reddish colour. Neither of the American larches are found, under ordinary circumstances, to attain the same size in this country as the *L. Europæa*, but succeed much better than it, on damp or marshy soils ; which, together with the excellent quality of their timber, certainly entitles them to a partial share of cultivation ; and their peculiar habit of growth, particularly that of *L. pendula*, renders them very suitable in ornamental plantations.

By Mr Main, land-steward, Dalhousie Castle, specimens of the cones of *L. microcarpa*, grown at that place, on trees which were originally introduced by the Earl of Dalhousie, from North America. Although these cones seem every way perfect, yet none of the seeds which they contain are perfected, or capable of vegetating. This circumstance may partly arise from the trees being young, and partly from a deficiency in the climate or soil, compared with that of their native country.

Plants of the three following species are only recently received, and little else known of them except their names :—

IV. LARIX ARCHANGELICA—ARCHANGEL OR RUSSIAN LARCH.

Native of the north of Russia. Seems a hardy, compact, but not vigorous grower.

V. LARIX INTERMEDIA—INTERMEDIATE OR ALTAYAN LARCH.

This species seems naturally possessed of a very strong luxuriant habit of growth, with pendulous branches, and very large leaves ; but like many more Siberian, or northern continental plants, it produces its leaves on the first approach of spring, and is thereby very liable to be injured by the cold changeable weather to which this country, in the earlier part of the season, is so subject.

VI. LARIX DAHURICA—DAHURIAN LARCH.

Seems a stunted, bushy, and irregular grower ; which characteristics it may, however, have partly acquired from being generally propagated by cuttings or layers. Native of Dahuria ; from whence it was first introduced to Britain in 1827.

The preceding genera (*Pinus*, *Abies*, *Cedrus*, and *Larix*,) include all the coniferous trees belonging to the Linnean class *MONÆCIA*, which, in Britain, are considered deserving of cultivation for their timber alone. Several others, however, yield valuable timber, in countries better suited to their growth; and, as they occasionally attain to the size of small trees in this, when planted for ornament, for which they are well adapted, their wood may be applied to various useful purposes, and the following short notices regarding them are therefore considered not out of place.

CUPRESSUS—CYPRESS.

GENERIC CHARACTERS.—Male inflorescence in an imbricated catkin; calyx a scale; corolla none; anthers four, sessile. Female, in a short conical, or subconical catkin; calyx a one-flowered scale; corolla none; stigma two concave dots; scales, when ripe, coriaceous; nut or seeds angular; leaves not deciduous.

I. CUPRESSUS SEMPERVIRENS—COMMON CYPRESS.

SPECIFIC CHARACTERS.—Leaves imbricated, running down, or largely united to the branchlets, somewhat keel-shaped, the older one distant, diverging, and sharp pointed, the younger closely and subquadrangularly imbricated on the frond like branchlets; cones small and nearly globular, on the sides or extremities of the branchlets scales thick, fleshy, and green, when unripe. Native of the Levant, and other parts in the south of Europe; introduced to Britain about the year 1548.

The common cypress, in its native country, attains the height of from twenty to forty feet; it lives to a great age, and produces timber of a dark or brownish red colour, possessed of an agreeable sweet smell, it is said to resist the attacks of worms, and to be so durable that the doors of St Peter's Church at Rome, which are made of it, have lasted eleven hundred years; and the ancient Egyptians employed it for making their mummy chests. *C. sempervirens*, as well as *C. horizontalis*, Horizontal-branched; and *C. stricta*, upright cypress, which are generally considered as varieties of the first, have been long known in Britain as ornamental shrubs of the larger size. The last, from its straight, upright habit of growth, harmonizes well with, and should be planted near buildings

in which the prevailing architectural lines are horizontal. From their dark green sombre appearance, no plants are better suited than European cypresses for planting in church-yards and burying-grounds, a purpose for which they have been employed in all ages, in countries where they are known.

II. CUPRESSUS THYOIDES.—WHITE CEDAR, OR WHITE AMERICAN CYPRESS.

SPECIFIC CHARACTERS.—Branchlets or fronds compact and compressed; leaves in alternate pairs, ovate, with a small gland near their base, of a rather light green colour, compared with others of the genus, and closely imbricated; cones globular, dark brown when ripe, very small, being scarcely more than a quarter of an inch in diameter. Native of North America; introduced to Britain in 1736.

The *C. thyoides* forms immense masses in some of the maritime swampy districts of New Jersey, Maryland, and Virginia, which are overflowed by high salt water tides, and where it often attains the height of seventy or eighty feet, but seldom more than three feet in diameter. It is, however, of slow growth; as is ascertained by the great number of concentric circles contained in the transverse sections of the trunk. Its timber is light, soft, fine grained, of a rosy hue when properly seasoned; has a strong aromatic odour, which it retains as long as kept from humidity, and is very durable. It is applied to a great many useful purposes, such as covering houses instead of slates,—making and lining the bottoms of boats,—and, in Philadelphia, is so extensively employed in making of barrels, pails, washing-tubs, churns, &c., that it has given rise to a distinct class of mechanics called *cedar-coopers*. Farmers in the vicinity of the cedar swamps use the smaller trees for making field fences and rails, which are made by splitting the tree in two, and last from fifty to sixty years. In Britain the white cedar does not attain to near the same size as in its native country; but this is no doubt more owing to the soil and situation in which it is generally planted, not being congenial to its natural habits, than to the defects of climate.

III. CUPRESSUS LUSITANICA.—PORTUGAL CYPRESS, OR CEDAR OF GOA.

Habit of growth somewhat conical, until nearly at its full height, afterwards assuming a broad or flattened-like top, with large spreading, gracefully pendent branches; smaller branchlets or fronds

slender, thin, and diverging; leaflets compactly imbricated, in four rows, of a light, slightly glaucous, green colour; male catkins numerous, ovate, terminal, and of a yellow colour; cones subglobular, under half an inch in diameter; scales few, thick, recurved, and acute pointed. Native of the island of Goa; introduced in 1683.

The *C. lusitanica* obtains the name of Portugal cypress, from being pretty extensively grown in some parts of that country, particularly near Busaco; hence it is sometimes called the *Cedar of Busaco*; and, amongst nurserymen, has also been known by the names of *C. glauca*, and *C. pendula*. The true *C. pendula*, however, is a very distinct tree, a native of Japan, and, if at all introduced, is still very scarce in Britain. It is a taller growing tree than the *C. lusitanica*; its branches are also much more pendent, and may probably be found more suitable to this climate than the cedar of Goa, which, unless protected, is often irreparably injured by the winters even in the southern districts of Britain.

SCHUBERTIA—DECIDUOUS CYPRESS.

GENERIC CHARACTERS.—This genus, which has also been named *Taxodium*, is separated from that of Cupressus, to which it was referred by Linnæus, on account of the difference in the habit of growth, and particularly in the form and arrangement of the male and female inflorescence, the former of which is in long, loose, pendulous catkins, which are somewhat branched near their base, and the latter are scarcely apparent, and in small, almost sessile clusters.

I. SCHUBERTIA DISTICHA—NORTH AMERICAN DECIDUOUS CYPRESS.

SPECIFIC CHARACTERS.—Habit of growth conical when young, but when old widely spreading, and often flat topped; leaves from four to five inches long, consisting of a mid-rib, with two opposite rows of leaflets, which are straight, narrow, fine, and slightly concave on the upper surface, of an agreeable light green colour, changing in autumn to a dull red, and are shed soon after, the leaflets generally falling before the mid-ribs; cones, when full grown, globular, or nearly so, fully an inch in diameter; scales thick and woody, rounded or blunt at the outer extremity, and easily separated when ripe, which is generally in October; seeds small, hard, ir-

regularly round, and said to retain their productive powers two years ; cotyledons six or seven.

In the swamps of Louisiana, the Floridas, and other neighbouring districts of North America, south of latitude 39° , the Deciduous Cypress covers vast tracts, often of several thousand acres, which are there denominated *Cyprieres*; and on such soils as are of a deep miry nature, or where a new layer of vegetable mould is yearly deposited by the floods, the Deciduous Cypress, according to M. Michaux, attains its largest height, which is about 120 feet, and from 20 to 40 feet in circumference at their conical base, which, at the surface of the earth, is always three or four times as large as the continued diameter of the trunk, so that, in felling them, the Negroes are obliged to raise themselves on scaffolds five or six feet from the ground. The timber is of a reddish colour, when exposed to the light, very strong, elastic, and durable, although lighter and less resinous than that of the pines ; and, from its varied application, this is considered one of the most important of North American trees. In this country, however, the young shoots are liable to be injured by the frost ; and its cultivation can only be recommended on a limited scale, in collections and ornamental plantations.

II. SCHUBERTIA DISTICHA PENDULA.—PENDULOUS BRANCHED DECIDUOUS CYPRESS.

This, which is generally considered a variety of the preceding, is said to be a native of South America, and is as yet but little known in this country ; it seems, however, fully as tender as the preceding. Plants of this variety received from Messrs J. Booth and Sons, nurserymen, Hamburgh.

Mr Lambert mentions another species, under the name of *S. sempervirens*, discovered on the west coast of North America, by Mr Menzies, plants or specimens of which have not as yet been received.

THUJA—ARBOR VITÆ.

GENERIC CHARACTERS.—Male inflorescence in a small imbricated catkin, each flower having four petals, and four anthers, with a calyx composed of a single scale at the base. Female in a cone-like catkin ; corolla none ; nut or seeds surrounded by an edged wing ; evergreen.

I. THUJA OCCIDENTALIS—COMMON OR AMERICAN ARBOR VITÆ.

SPECIFIC CHARACTERS.—Branchlets or fronds numerous and regularly ramified, compressed, and spread horizontally; leaves or leaflets compactly imbricated in four rows, ovate, naked, and warted; cones obovate, small, about a third of an inch in length, and composed of very few sub lanceolate thin scales. Native of North America; introduced in 1596.

This is a common and well-known plant in Britain, but it seldom attains to the same height as it does in its native country. In North America it is found most abundant between the 45th and 49th degrees of latitude, on cool, rather moist soils,—as the rocky edges of rivulets, small lakes, and in swamps too moist for the Black and White Spruce, with which it, however, mixes on the margins, and its greatest height is from forty to fifty feet, with a trunk, thicker in proportion than most of the *Coniferae*. The wood is reddish, slightly scented, very light, soft, fine grained, and durable; it is chiefly used for agricultural fences, and posts made of it will last from thirty-five to forty years, and rails sixty; it is also employed in house-carpentry, and boat-building.

2. THUJA ORIENTALIS—CHINESE ARBOR VITÆ.—This species is easily distinguished from the preceding by its more compact habit of growth, by its compressed branchlets or fronds standing in an upright position, with their edge to the trunk of the tree, and by the much greater size of the cones, which are globular and have thick blunt scales. Native of China; introduced in 1752.

The Chinese Arbor Vitæ in its native country attains to about the same size as the preceding, but in this, is only important as an ornamental shrub, from its graceful and peculiar habit of growth.

The following species are more rare, and the heights to which they may attain in this country are not yet ascertained: they are all handsome growing plants, and deserving of a place in pleasure ground, particularly the first three, the others are rather tender and require protection in winter.

THUJA Plicata, *Plaited Nootka Arbor Vitæ.*

... DOLOBRATA, *Thick-leaved Japan Arbor Vitæ.*

... PYRAMIDALIS, *Pyramidal Italian Arbor Vitæ.*

... ARTICULATA, *Jointed Barbary Arbor Vitæ.*

... PENDULA, *Pendulous Tartarian Arbor Vitæ.*

... CUPRESSOIDES, *Cypress-like African Arbor Vitæ.*

Specimens of this last were presented by Mr Kidd, gardener, Rosie Priory, Perthshire, from a fine plant growing in the conservatory at that place, where also a smaller one has stood in the open air several seasons without protection.

II. Belonging to the class and order *Diaecia Monadelphica* of Linnaeus, and to the natural order *Conifera* of Jussieu.

ARAUCARIA—SOUTHERN PINE.

GENERIC CHARACTERS.—Male catkins imbricated ; anthers ten or twelve, united, and with a calyx of a single woody scale at their base ; Female catkins oval or cone-shaped ; calyx a lanceolate, two-flowered scale ; style none ; stigma two-valved ; nut or seed of a sub-cuneiform shape, having a hard woody shell surrounding the kernel, and more or less winged. All evergreens, and natives of the southern hemisphere. Hence the name of Southern Pine has been applied to the genus, in opposition to the true Pine, which, as before stated, is believed to be peculiar to the northern hemisphere.

I. ARAUCARIA IMBRICATA—CHILI PINE.

SPECIFIC CHARACTERS.—Male tree about from forty to fifty feet in height ; female often one hundred and fifty ; both with long trunks free from branches, except near the top where they are horizontal, and form a regular cone ; leaves lanceolate, about an inch and a half in length, and about a quarter of an inch in breadth near the base, sharp pointed, regularly distributed and imbricated around the branchlets, and remaining for a series of years ; male catkins terminal, yellow, oval, about two and a half inches in length ; scales numerous, imbricated, long, and recurved at the points ; female catkins or young cones oval ; scales numerous, imbricated, and cuneate, with narrowed oblong points ; stigma bivalved, thick, and swollen-like ; cones when fully ripe globular, and from eight to ten inches in diameter, of a dull brown colour ; scales easily detached, or falling off, and generally having their long sharp points broken off before they attain to maturity ; seeds more than an inch in length, two to each scale, cuneate, with a hard thick shell surrounding the eatable kernel ; alæ or wings short and obsolete. Native of Chili in South America ; introduced in 1796.

The Chili Pine forms large forests at considerable elevations in the Andes, and seems to delight in a rather moist soil ; the outer and inner bark of full grown trees are each about four or five inches in thickness ; the former of a light corky texture, with deep fissures, from which issue abundance of white resin. The timber is fibrous, yellowish-white, interspersed with beautiful veins, and capable of receiving a high polish, and well adapted for ship-building, especially for masts. This tree was first discovered by Don Joseph Pavon in 1782, on the mountains named Caramavida and Naguelbuta, and he published an account of it in the Memoirs of the Royal Academy of Sciences of Madrid. Many plants of it have now been raised in this country, and one at Kew Gardens, the seed of which was brought home by Mr Menzies, has attained a considerable size, has repeatedly flowered, and seems quite hardy, as do also several specimens in the neighbourhood of Edinburgh, particularly in the Royal Botanic Garden. There seems, therefore, every reason to believe that this tree, from its great beauty and singular habit of growth, is destined at no very remote period to form one of the best ornamental, if not timber, trees of this country.

The *A. imbricata* is the only species yet known, which is likely to succeed in the climate of Britain without protection, the others being natives of warmer regions, where they grow uninterruptedly during the whole season,—a circumstance to which they no doubt owe the peculiar property of having, unlike other dicotyledonous plants, little or no appearance of annual layers. From their unsuitability for this climate, the following brief notices are only given :—

II. ARAUCARIA BRASILIANA—BRAZIL PINE.

This bears a considerable resemblance to the last species when young, but it is of a more rapid growth, leaves more loosely imbricated, softer ; and when full grown it forms a large irregular-headed tree, with horizontal, pendulous, and aspiring branches, at the extremities of which the branchlets are collected into tufted masses ; the cones are rather smaller, more compact, and harder than those of *A. imbricata*, from which they also differ in the scales being thick, and furnished with small sharp recurved spines on their points. The seeds or nuts are eatable, and sold in the shops of Rio Janeiro, as an article of food.

III. ARAUCARIA EXCELSA—NORFOLK ISLAND PINE.

The Norfolk Island Pine has been known by the names of *Pinus*

excelsa, *Eutassa heterophylla*, *Cupressus columnaris*, and *Dombeya excelsa*. It was first discovered by the celebrated circumnavigator Captain Cook, in his second voyage, on Norfolk Island and New Caledonia, where it often attains the height of one hundred and sixty to one hundred and eighty feet, with a trunk free from branches to a height of eighty or one hundred feet. The leaves on young trees are linear, spiny, and diverging, but those on the adults are ovate, blunt pointed about half an inch in length, and closely imbricated, the cones are ovate, four or five inches in length, of a dark colour, and the timber is so heavy as almost to sink in water.

IV. ARAUCARIA CUNNINGHAMII—MORETON BAY, OR CUNNINGHAM'S PINE.

This Pine very much resembles the last, from which botanists did not venture positively to separate it from the want of proper knowledge of its characteristics, until it was examined in its native forest on the shores of Moreton Bay, and the banks of the Brisbane River, which falls into Moreton Bay, in New South Wales, by Allan Cunningham, Esq. in 1824. It there attains the height of from one hundred to one hundred and thirty feet; and from thence Sir Thomas Brisbane, Bart. brought home seeds of it to his estate of Makerstone, near Kelso several years since, whereby, together with small quantities brought home by other collectors from the same parts, specimens now exist in many collections in this country. The generic name of this and the last species has lately been changed to that of *Altingia*, by which they are now known in the newest catalogues.

Besides the Araucarias, or Altingias, the South Sea Islands, and New Zealand in particular, produce many valuable and interesting Coniferous trees, both Monœcious and Diœcious, as yet little known in this country, some of which, however, might, from the altitudes at which they are found, and distance from the equator, prove sufficiently hardy for the climate of Britain, particularly the *Dammara Australis* or *Kowrie*, which grows to a great height on the plains, as well as the mountains of New Zealand, and is considered one of the finest timber trees for naval purposes, &c., in those parts, and also yields a very useful resin in large quantities. Besides others of the same genus, several species of the following genera are also found, viz. *Dacrydium*, *Podocarpus*, *Phyllocladus*, &c., many of which are quite different in habits, foliage, flowers, and fruit, from any of the Coniferæ hitherto discovered in other parts of the world.

TAXUS—YEW TREE.

GENERIC CHARACTERS.—Flowers of the male plants each a four-leaved or parted perianth, united at the base ; stamens numerous ; anthers peltate, six to eight celled ; female flowers also four-leaved, pitcher-shaped ; seed one, in a fleshy drupe or berry, perforated at the end and scaly at the base.

I. TAXUS BACCATA—COMMON YEW.

SPECIFIC CHARACTERS.—Tree rather under the medium size ; branches large, and spreading nearly horizontally ; leaves thickly set, pectinate, or in two rows, on the young branchlets, flattened, soft, linear, and acuminate, of a dark green colour ; male receptacles, flat, berries scarlet. Native of Britain.

The Yew grows naturally in woods, where it is generally wholly or partly shaded by taller trees, and where the soil is of good quality, middling, tenacious, and damp. Its wood is hard, of excellent quality, and takes on a finer polish than any other of our indigenous trees. It was formerly much cultivated for making bows, but since the days of archery it has met with considerable neglect, from the great length of time it acquires to arrive at maturity, compared with other common forest trees. It is, however, admirably suited for growing as underwood, and the large price which can always be received for its timber certainly entitles it to more attention. It used to be planted in and near church-yards, as the cypress is in other countries ; hence some of the finest old specimens to be met with in this country are in such situations.

2. TAXUS BACCATA FOLIIS VARIEGATIS—VARIEGATED-LEAVED YEW TREE.—This variety differs from the common in being of slower or dwarfer growth, and having light yellow blotched or variegated foliage, and is only of importance as an ornamental tree or large shrub for pleasure grounds.

3. TAXUS BACCATA STRICTA—UPRIGHT OR IRISH YEW.—The Irish Yew, although here included as a variety of the common, is considered by some as a different species. Its principal distinguishing characteristic is the upright habit of its growth, which renders it very applicable for planting, along with the upright cypress in the vicinity of buildings, where straight horizontal lines predominate.

II. TAXUS CANADENSIS—CANADIAN YEW.

The Canadian or American Yew in its native country grows to about the same size as the common yew does in this. It is generally supposed a distinct species, grows more close and compact ; its leaves are shorter, more numerous, regularly pectinate, of a light green colour, and it seems altogether a handsomer growing tree than the *T. baccata*.

JUNIPERUS—JUNIPER.

GENERIC CHARACTERS.—Scales of the male catkins subpeltate, corolla and calyx wanting ; stamens from four to eight ; anthers celled ; scales of the female catkins few, united, fleshy, and forming a globular generally three seeded berry.

I. JUNIPERUS VIRGINIANA—VIRGINIAN JUNIPER OR RED CEDAR.

SPECIFIC CHARACTERS.—Leaves in threes, adnate, or longitudinally attached at the base, younger ones imbricated, older spreading ; male and female flowers small, or nearly inconspicuous, berries small, ovate, and of a bluish colour. Native of North America ; introduced in 1664.

The Red Cedar grows naturally most abundant on the banks of rivers, and seldom to a greater height than thirty or forty feet, with a thick trunk towards the base, which is covered with deciduous scaly reddish-coloured bark, and rendered irregular by numerous deep hollows or fissures under the stumps of the decayed branches. Its timber, except the sap-wood, is slightly odorous, reddish-coloured, close in texture, heavy, and very durable. It is used for all purposes in which durability is regarded, and for which it is fitted from the smallness of its size ; there are several varieties of the Red Cedar, differing slightly in their height and habit of growth, and one in particular which is now generally allowed to be a distinct species, termed *J. canadensis*, Canadian Juniper, which attains to about the same size, and yields wood about equal in value to *S. Virginiana*.

Specimens of the wood of Red Cedar, grown at Hopetoun House, by Mr James Smith.

II. JUNIPERUS EXCELSA—TALL SIBERIAN JUNIPER.

SPECIFIC CHARACTERS.—Trunk or stem upright ; branches slightly pendulous ; leaves opposite, imbricated in the middle. Native of Siberia ; introduced in 1806. As well as being one of the tallest, this

is one of the freest growers, it forms a very handsome small tree, particularly when planted alone on short grass.

The preceding species are the only truly hardy junipers that at all deserve the name of trees. The *Juniperus Barbadensis*, Barbadoes Cedar, and *J. Bermudiana*, Bermuda Cedar, grow to a considerable size, but require protection in winter, and it is the timber of the latter that is used for making pencils and odoriferous matches generally called Cedar wood, and mistakingly supposed to be that of the Cedar of Lebanon. The Dwarf or Shrubby Junipers which are numerous, are all evergreen shrubs, of various sizes from three or four to about twenty feet in height. Of the tallest growing may be mentioned *J. suecica*, Swedish Juniper; *J. Oxycedrus*, Sharp Cedar; *J. phœnicea*, Phœnician Cedar; and *J. lycia*, Lycian Cedar, which, as well as the humbler growing sorts, are of more or less importance for growing in shrubberies. They are all chiefly natives of mountainous places in different parts of the world, and some besides the common are esteemed for their fruit or berries.

Specimens of the Timber and Seeds of hardy trees not belonging to the natural order Coniferae, presented to the Museum.

By J. Robison, Esq. Secretary to the Royal Society of Edinburgh, acorns of *Quercus Ægilops*, Velonia Oak, from one of the Grecian Islands.

By Mr Alex. Wright, nursery and seedsman, Edinburgh, a very interesting collection of North American Tree and Shrub seeds.

By Mr James Smith, Hopetoun Gardens, specimens of the timber of *Platanus occidentalis*, American Plane, or Button Wood, grown at Hopetoun House, but destroyed in the winter of 1814; a transverse section of the trunk of a Portugal laurel, *Prunus lusitanica*, thirty-three inches in circumference; also timber of the Tulip tree, *Liriodendron tulipifera*, and of the Live Oak, *Quercus virens*, grown at the same place.

By Mr Spring, wood-forester, Hopetoun House, specimen of the trunk or stem of a plant of common ivy, *Hedera Helix*, eighteen inches in circumference.

By Mr James Slight, (of Messrs Slight and Co., engineers), curator of the Highland and Agricultural Society of Scotland's Museum of Models, specimens of the principal kinds of timber used in this country.

By H. Home Drummond, Esq. of Blairdrummond, timber of *Platanus occidentalis*, grown at that place, but, together with almost all the trees then in Scotland, destroyed by frost in the winter of 1814.

By Messrs R. Brown and J. M'Nab, a large collection of the woods of American trees, brought home by them in 1834.

By Messrs Havelaar and Taylor, Rotterdam, from the Hortus Botanicus at that place, a transverse section of *Protea argentea*, nearly two feet in diameter.

By Mr Arnott, Chapel, Fife, a curious excrescence, two and a half feet in diameter, grown on the trunk of an ash tree, *Fraxinus excelsior*, which measured only about six inches in diameter.

By Mr John Machray, overseer, Bush House, a very large and curious excrescence, grown on a Beech branch, *Fagus sylvatica*.

By William Tullis, Esq. of Mount Vernon, a very old plant of *Viburnum opulus*, Snow-ball tree, thickly interspersed on the trunk and branches with roundish and irregularly shaped prominent excrescences.

HORTICULTURAL PRODUCTIONS.

In this division of the Report such Plants, &c. specimens of which were presented to the Museum are only included ; and as the present publication is more of an Agricultural than a Horticultural nature, the same lengthened characteristic details of these are not gone into as in those plants comprised in the preceding divisions ; from which circumstance it is, however, by no means to be supposed that *Horticultural Productions* are considered merely as objects of secondary importance, the very contrary being in fact the case ; and at present experiments are in progress to admit of similar descriptive and other details being given of Horticultural Plants on a future occasion.

TREES AND OTHER PLANTS CULTIVATED FOR THEIR FRUITS.

PYRUS MALUS—APPLE TREE.

By Mr James Smith, Hopetoun Gardens, specimens of a very complete collection of the table and kitchen apples in cultivation, particularly such as are of recent introduction.

By Patrick Matthew, Esq. of Gourdiehill, Perthshire, a very interesting collection of superior hardy apples, grown in his extensive orchards at that place, and chiefly peculiar to some of the older orchards in the Carse of Gowrie and Clydesdale.

By Hugh Ronalds and Sons, nurserymen, Brentford, London, a collection of upwards of one hundred varieties, chiefly elucidative of the later sorts, figured and described in *Ronalds' Pyrus Malus Brentfordiensis*.

By Mr Stewart, gardener to General Durham of Largo, very fine large specimens of twenty superior varieties of table and kitchen apples.

By Mr A. Gorrie, Annat Gardens, Perthshire, a collection of the principal Carse of Gowrie and Clydesdale Orchard apples, and specimens of twelve new varieties raised by him from seeds.

By Mr William Turner, gardener to the Earl of Caithness, Denham Green, Edinburgh, specimens of the Golden Pippin, grown on a standard ; and of a very beautiful apple supposed to be the variety

known by the name of Queen of Devonshire. Also several very large and high coloured fruits of the Paradise Pippin, or Lady's Finger.

By Mrs Murray of Murray's-hall, Perth, a very beautiful seedling table apple; keeps till January.

By Sir Peter Murray Threipland, Bart. of Fingask, Perthshire, three specimens of Royal Codlin, and of Yorkshire-green, baking or kitchen apples; average weight of the former $18\frac{1}{2}$, and of the latter $15\frac{1}{4}$ ounces.

By Captain Hunter of Tynefield, East Lothian, two specimens of Stoup Leadington; weight of the largest 28 ounces.

By Major M'Kay of Bighouse, Berwickshire, several specimens, of the Bighouse Pippin or Seedling Apple, crop 1834, average weight 14 ounces; also crop 1835, average weight $13\frac{1}{2}$ ounces. This seemingly excellent variety is very large, and nearly of a globular form; light green coloured; keeps till February, is very juicy, and possesses an agreeable sweet taste.

By C. G. S. Menteith, Esq. of Closeburn, a specimen of the White Calville Apple, crop 1834, in high preservation on the 24th March following.

By Mr Carstairs, fruiterer, Howe Street, two specimens of Common Nonpareil, grown on a tree trained on a tile roof at Aberlady, East Lothian; weight of the largest $8\frac{1}{2}$ ounces.

By George Wright, Esq. Saxe-Coburg Place, two Everlasting Apples pulled from a tree at Millburn Lodge on the 5th of January 1835. This variety seems the same as that known by the name of *French Crab*, which will keep for two years.

By John Dickson, Esq. of Hartree, Peeblesshire, on the 2d of July 1835, a very beautiful yellowish-green apple with a brown side, grown the preceding season, and in high preservation; it was kept amongst oats, is a very superior variety for the table, and was originally brought from America by Sir Alexander Inglis Cochrane.

By Mr Dickson, stationer, High Street, two White Codlin Apples, joined or grown together; weight 13 ounces.

By Dr Craig, Ludgate Lodge, Ratho, three specimens of the Emperor Alexander Apple; weight of the largest $14\frac{1}{2}$ ounces. This is a large, hardy, and most beautiful orchard apple; it keeps till January, but is only of medium quality.

By R. Lowthian Ross, Esq. of Staffold-hall, Cumberland, three very large and high coloured specimens of Ribston Pippin, and three of the Staffold-hall, Leadington, a superior dessert apple, and excel-

lent keeper. Also a dozen of Pearmain Apples, of large size and good colour

By Mr John Ross, general agent, 92 Prince's Street, several specimens of the Brown Normandy Renet.

By John Burn Murdoch, Esq. of Coldoch, three specimens of a variety, the name unknown, in good preservation on the 17th of March.

By Mr Robert Arthur, Wall Tower Garden, North Berwick, several very fine specimens of Ribston Pippin, kept amongst sand, and in high preservation on the 16th April.

The following lists contain the names of very select assortments of apples, suited for small or farm gardens, arranged according to their time of ripening, and selected so as to afford a regular supply throughout the year.

1. *Select TABLE or DESSERT APPLES for growing as Standards in the milder or more favourable districts of Scotland.*

- | | |
|-----------------------------------|---------------------------------------|
| 1. Common or White Juneating. | 13. Miller's Margaret. |
| 2. Margaret or Striped Juneating. | 14. Hill's Seedling. |
| 3. Early Crofton. | 15. Wormsley Pippin. |
| 4. Common or Summer Oslin. | 16. Kerry Pippin. |
| 5. Thorle Pippin. | 17. Pow Captain. |
| 6. Kentish Codlin. | 18. Grey Leadington. |
| 7. Brown's Summer Beauty. | 19. Redstreak. |
| 8. La Fameuse. | 20. Doonside. |
| 9. Red Ingestrie. | 21. Ribston Pippin. |
| 10. Yellow Ingestrie. | 22. Moncrieff' or Gogar Pippin. |
| 11. Red Quarenden. | 23. Brabant Bellefleur or Iron Apple. |
| 12. Emperor Alexander. | 24. French Crab. |

2. *Select KITCHEN or BAKING APPLES for growing as Standards in the milder or more favourable districts of Scotland.*

- | | |
|----------------------|--------------------------|
| Keswick Codlin. | Potter's Large Seedling. |
| White Codiin | Duke of Wellington. |
| Carlisle Codlin. | Mammoth. |
| Hawthornden. | Tower of Glammis. |
| Spring Grove Codlin. | Yorkshire Greening. |
| Kentish Broading. | French Crab. |

3. *Select TABLE or DESSERT APPLES for growing as Standards in the colder or less favourable districts of Scotland.*

- | | |
|-----------------------|--------------------|
| 1. White Juneating. | 3. Summer Queening |
| 2. Summer Leadington. | 4. Tam Montgomery. |

- | | |
|------------------------|--------------------------------|
| 5. Kinnoul Codlin. | 15. Hill's Seedling. |
| 6. Kentish Codlin. | 16. Fair Maid of France. |
| 7. Nonsuch. | 17. Fulwood. |
| 8. Orange Pippin. | 18. Pow Captain. |
| 9. Kerry Pippin. | 19. Grey Leadington. |
| 10. Yellow Ingestrie. | 20. Paradise Pippin. |
| 11. Red Quaranden. | 21. Winter Strawberry. |
| 12. Emperor Alexander. | 22. Red Streak. |
| 13. Munches' Pippin. | 23. Moncrieff or Gogar Pippin. |
| 14. Miller's Margaret. | 24. French Crab. |

4. *Select KITCHEN or BAKING APPLES for growing as Standards in the colder or less favourable districts of Scotland.*

- | | |
|-----------------------|-------------------------|
| 1. White Codlin. | 7. Carlisle Codlin. |
| 2. Eve Apple. | 8. Royal Codlin. |
| 3. Maiden Apple. | 9. Norfolk Beaufin. |
| 4. Hawthornden. | 10. Tower of Glammis. |
| 5. Lemon Pippin. | 11. Yorkshire Greening. |
| 6. Kentish Broadwing. | 12. French Crab. |

5. *TABLE or DESSERT APPLES of the finest quality, but which, in most districts of Scotland, require the protection of a wall with a southern or westerly exposure.*

- | | |
|---------------------|-------------------------|
| 1. White Juncating. | 7. King of the Pippins. |
| 2. Bursaul. | 8. Court of Wick. |
| 3. Thorle Pippin. | 9. Loan's Pearmain. |
| 4. Aromatic Russet. | 10. Scarlet Nonpareil. |
| 5. Margil. | 11. Old Nonpareil. |
| 6. Golden Pippin. | 12. Ribston Pippin. |

6. *Select APPLES suited for the manufacture of Cider, and which may be grown as Standards in most districts of Scotland.*

Those marked thus *, are suitable for the Table, and thus †, may be used as Kitchen Apples.

- | | |
|--------------------------|------------------------------|
| † 1. Cockagee. | 10. Herefordshire Redstreak. |
| * 2. Courtpendu. | † 11. Siberian Harvey. |
| † 3. Longleat Redstreak. | † 12. Maiden's Blush. |
| * 4. Yellow Ingestrie. | * 13. Downton Pippin. |
| * 5. Red do. | * 14. Scarlet Golden Pippin. |
| † 6. Large Styre. | * 15. Whitmore. |
| * 7. Wheeler's Russet. | † 16. Old Red Must. |
| * 8. Grange Pippin. | * 17. Red Cluster. |
| † 9. New Red Must. | * 18. Green Cluster. |

PYRUS COMMUNIS—PEAR TREE.

By Mr James Smith, Hopetoun Gardens, specimens of twenty va-

ieties of new Flemish and French Pears, crop 1834, and of thirty new or rare varieties, crop 1835.

By Mr James Barnet, superintendent of the Caledonian Horticultural Society's Experimental Gardens, Inverleith Row, several specimens of the more rare or recently introduced superior French and Flemish Pears.

By Mr A. Gorrie, Annat Gardens, a collection of the principal Orchard Pears cultivated in the Carse of Gowrie; and also of the recently introduced garden sorts.

By Mr George Charlewood, seedsman, London, a collection of New Winter or Keeping Table and Kitchen Pears.

The following lists are arranged in a similar manner as those of Apples:—

1. *Select TABLE or DESSERT PEARS for growing as Standards in the milder or more favourable districts of Scotland.*

- | | |
|--------------------------------|------------------------------|
| 1. Lammas. | 10. Black Auchan. |
| 2. Crawford. | 11. Grey Auchan. |
| 3. Green Chisel or Pear James. | 12. Miller's Great Bearer. |
| 4. Royale d'Été. | 13. Gros de Lyons. |
| 5. Summer Bergamot. | 14. Passe Colmar. |
| 6. Yat. | 15. Winter Orange. |
| 7. Longueville. | 16. German Muscat. |
| 8. Hazel Pear. | 17. Beurré Rance. |
| 9. Galston's Muirfowl Egg. | 18. Bergamotte de Pentecote. |

2. *Select KITCHEN or BAKING PEARS for growing as Standards in the warmer or more favourable districts of Scotland.*

- | | |
|--------------------|---------------------------|
| 1. Early Christie. | 5. Pear Duncan. |
| 2. Kilwinning. | 6. Tresor. |
| 3. Barland. | 7. Catillac. |
| 4. Holmore. | 8. Uvendale's St Germain. |

3. *Select TABLE or DESSERT PEARS for growing as Standards in the colder or less favourable districts of Scotland.*

- | | |
|----------------------------|----------------------------|
| 1. Lammas. | 10. Grey Auchan. |
| 2. Crawford. | 11. Black Auchan. |
| 3. Green Chisel. | 12. Green Swan Egg. |
| 4. Summer Bergamot. | 13. Red Auchan. |
| 5. Gold Knap. | 14. Miller's Great Bearer. |
| 6. Benvie. | 15. Passe Colmar. |
| 7. Dutch Bergamot. | 16. Winter Orange. |
| 8. Hazel Pear. | 17. German Muscat. |
| 9. Galston's Muirfowl Egg. | 18. Beurré Rance. |

4. *Select KITCHEN or BAKING PEARS for growing as Standards in the colder or less favourable districts of Scotland.*

- | | |
|--------------------|---------------------|
| 1. Early Christie. | 5. Pear Duncan. |
| 2. Kilwinning. | 6. Pound Pear. |
| 3. Late Christie. | 7. Catillac. |
| 4. Elshinhaft. | 8. Black Worcester. |

5. *TABLE or DESSERT PEARS of the finest quality, but which require the aid of a wall with a southern or western aspect, in most parts of Scotland.*

- | | |
|-------------------|---|
| 1. Little Muscat. | 7. Duchesse d'Angouleme. |
| 2. Musk Robin. | 8. Green Beurré. |
| 2. Jargonelle. | 9. Crasanne. |
| 4. White Beurré. | 10. Chaumontelle. |
| 5. Styrian. | 11. Easter Beurré. |
| 6. Marie Louise. | 12. Lord Cheney's, or Holland Bergamotte. |

6. *Select PEARS suited for the manufacture of PERRY, for growing as Standards in most districts of Scotland.*

Those marked thus *, are also suitable for the Kitchen or Baking.

- | | |
|--------------|------------------------|
| 1. Barland. | 6. Old Field. |
| 2. Holmore. | 7. Teinton Squash. |
| 3. Huffcap. | * 8. Elshinhaft. |
| 4. Roughcap. | * 9. Double-blossomed. |
| 5. Longland. | * 10. Pear Duncan. |

MISCELLANEOUS FRUITS, SEEDS, &c.

By Dr Knapp, 9 Duncan Street, a very fine specimen of the fruit of the Quince, grown in Buckinghamshire.

By Mr Edward Sang, nursery and seedsman, Kirkaldy, Fife, several specimens of the Medlar, grown on a standard at that place.

By Lieut.-General Sir H. T. Montrison, Dunnehill, Canterbury, seeds of the Winter Grecian Melon. The fruit of this variety is of very superior quality, and if suspended in a fine net in a cool airy room when cut from the vine, it will keep several months.

By Captain Loch, Darnhall, several fine specimens, at different seasons, of the Long Green Prickly Cucumber, grown in the front of a viney, where the seeds are put into the ground about the middle of March, and the plants which are trained immediately within

the glass, yield a plentiful supply of fruit from about the middle of June until the fires are taken from the vines in the end of the season.

By the Very Reverend Principal Baird, a very large cucumber grown in the open air at Manuel.

By Mr David Stewart, gardener, Inch-House, several excellent specimens of different varieties of the Cucumber.

By Mr M'Naughton, gardener, Edmonstone, specimens of three varieties of Short Prickly Cucumbers grown in the open air, and several other sorts grown under glass. Also several varieties of Gourds and Vegetable-marrow.

By Mr D. Brewster, gardener, Balcarres, Fife, a very fine Cucumber eighteen inches in length.

By Mr David Stewart, gardener, Inch-House, a large Green Gourd, weight 91 lb. ; and an interesting collection of different varieties of Gourds, Pumpkins, and Vegetable-marrow.

By Mrs Marshall, Wellington Place, Stirling, two specimens of the Pear-shaped Vegetable-marrow.

By Miss Gilchrist of Ospisdale, Sutherlandshire, Peaches and Almonds grown in the open air at that place, 1834.

By the Hon. Lord Cockburn, a very interesting collection of seeds from the Mauritius.

By Messrs R. Brown and J. Macnab, fruit of the *Maclura aurantiaca*, Osage Orange, with seeds of several other American trees and shrubs, collected and brought home by them in 1834.

By Mr M'Naughton, Edmonston, fruit of *Solanum Lycopersicum*, Love-apple.

By Mr Rennie, gardener, St Colms House, a plant in fruit of the Purple Egg-plant, or beef-steak plant of the Americans, *Solanum melongena* variety.

By Mr Stewart, gardener to General Durham, Largo, fruit of the white egg plant, *Solanum melongena* variety.

By Sir Peter Murray Thriepland, Bart. of Fingask, Perthshire, fruit of the common Passion flower, *Passiflora cærulea*, grown in the open air at that place.

By R. Lowthian Ross, Esq. of Stafford Hall, specimens of the Stafford Hall Damson Plum, a new variety propagated by suckers.

By Mr James Barnet, Experimental Gardens, a collection of new or rare varieties of *Brassica oleracea*, consisting of greens, cabbages, broccoli, kohl rabi, &c.

By Mr M'Naughton, gardener, Edmonston, two stalks of very

fine Brussels Sprouts, for which he obtained the first prize at the Horticultural Society's Show, November 1835.

By Mr David Brewster, gardener, Balcarres, Fife, a very fine large head of Sulphur Broccoli.

By Mr Barron, gardener to the Earl of Harrington, seeds of a new large hardy early cabbage of superior quality.

By Alexander Falconer, Esq. seeds of a new Canadian Kale, a very fine hardy variety for using in spring, procured from Dr Langworthy of Boy, Bath. And seeds of a new variety of cabbage, which remains good a considerable time after it attains full size.

By Messrs Hay, Anderson, and Sangster, seedsmen, London, several very large specimens of Kohl Rabi, grown on rather moist tenacious soil.

By Mr James Smith, Hopetoun Gardens, a bunch of very excellent forced Asparagus on the 5th of December 1834, and another on the 22d of the same month.

By Mr William Turner, gardener, Denham Green, several very fine heads of forced Asparagus on the 5th and 20th of January 1835.

By Mr Alexander Temple, Falkland, two large specimens of Manchester Celery.

By Mr D. Stewart, gardener, Inch House, five Red Onions, aggregate weight 2 lb. 3 oz. ; five Brown Portugal Onions, 2 lb. 15 oz. ; and five Globe Onions 2 lb. 12 oz.

By R. W. Ramsay, Esq. of Lixmount, three white Spanish, three Brown Portugal, and three Globe Onions of the following aggregate weights, 1 lb. 2¼ oz. ; 1 lb. 3½ oz. ; and 1 lb. 4½ oz.

By Messrs Hugh Ronalds and Sons, Brentford, three Tripoli Onions, average weight 16½ oz. ; twelve white Spanish, average 12½ oz. ; and twelve Globe Onions, average weight 11½ oz.

By Mr McNaughton, gardener, Edmonstone, six Globe Onions, weight of the largest 10½ oz. ; four Portugal, average weight 12¼ oz. ; three Blood-red Onions, aggregate weight 26 oz.

By Mr Wm. Moyes, gardener, Seggieden, Perthshire, several Tripoli Onions, largest 18½ inches in circumference, weight of the same 18¼ oz.

By Mr David Brewster, gardener, Balcarres, Fife, several large fine specimens of Portugal, Strasburg, Globe, and Blood-red Onions.

By Mr James Carstairs, gardener, Restalrig, four specimens of Strasburg Onions ; aggregate weight 3 lb. 2½ oz.

By Messrs W. and J. Noble, seedsmen, London, very large specimens of Globe and Portugal Onions.

By Mr McNaughton, gardener, Edmonstone, four Scotch Leeks; circumference of the largest $9\frac{3}{4}$ inches.

By Mr Thomas Handasyde, seedsman and florist, Fisherrow, specimens and seeds of the new Musselburgh Leek; a very superior and improved variety, raised by him.

By Mr David Thomson, gardener, Balbirnie, Fife, on the 12th January 1835, a quantity of very fine Mushrooms, grown on shelves, with the aid of artificial heat, after the manner recommended by Mr Oldacre, in his treatise on the Growth of the Mushroom.

IMPLEMENTS AND MODELS.

Since the establishment of the Museum, the Directors of the Highland and Agricultural Society of Scotland have, in each season, favoured Mr Lawson with the use of their interesting and beautifully constructed models, (made by Messrs James Slight and Co.,) of the most improved implements and machinery, at present used in the practice of husbandry in the best cultivated districts of Scotland, and for many of which the premiums of the Society were awarded to the inventors. These models are on a scale of three inches to the foot, and exhibit representations of carts, barrows, ploughs, grubbers, or cultivators, sowing machines, harrows, rollers, hoeing machines, and machines for reaping, thrashing, winnowing, cutting or chopping straw, slicing turnips, steaming food for live-stock, felling trees, pressing peat moss for fuel, grinding bones, and aiding in the manufacture of cheese and butter.

Model of an improved waggon and drag for inclined railroads; also models of two improved (a single and double) Closeburn Limekilns; on a scale of an inch to the foot. By G. C. S. Menteith, Esq. of Closeburn.

Model of a non-condensing steam-engine, for applying to a thrashing machine. By Mr Joseph Smeal, jun. Millburn Tower.

Models of three cross-cutting saws,—a churn driven by means of a pendulous lever, and a new powerful cheese-press. By a Lover of Mechanics.

Model of a cradle-churn, used in the dairy of A. W. C. Hamilton,

Esq. of Beltrim. By Mr Cranstoun, formerly gardener at Beltrim, near Omagh, Ireland.

Model of a newly invented portable machine for weighing carts, cattle, grain, &c., to which the name of the Gart Weighing Machine has been given in compliment to Captain Houston Stewart of Gart, Callander. The entire weight of the full-sized machine is under three cwt., and it is capable of weighing about three tons, but may be increased to any size and strength. By Messrs Davidson and Co., ironmongers, 123 High Street.

Two new kinds of mole-traps,—one with a spiral, and the other a common thick wire, iron spring ; and pattern draining tiles of various sizes ; together with a model of a brick wall, calculated to save expense both in the building and material, made by Mr Robert Kay, Shiphorough. By Messrs Drummond and Sons, Stirling.

Pattern mole-trap, with steel-spring, used on the property of His Grace the Duke of Buccleuch, and found more efficacious than the common mole-trap with wooden springs. By Mr Shaw, Dalkeith Park.

A new improved self-acting rat-trap. By Messrs B. and W. Noble, seedsmen, London.

Patterns of various dairy utensils, sieves, &c., made of zinc, which is found not liable to rust. By Mr J. Clark, zinc manufacturer and slater, 38 George Street, and 14 Crosscauseway.

A machine for cutting the verges of grass borders, walks, &c. By Mr J. Horsburgh, veterinary surgeon, Dalkeith.

A very tasteful and neatly executed model of a rustic mosshouse. By Mr James Henderson, apprentice at Alva Gardens, near Stirling.

A *cascroum*, an implement formerly extensively and still used in some parts of the Highlands and Western Islands of Scotland, for digging or turning over the soil. By Mr James Bishop, surveyor, Beaufort Castle, Inverness-shire.

Three vases, copies of the Florence, Warwick, and Egyptian ; also patterns of ornamental flower-pots, made of a new discovered white clay on the estate of Garnkirk. They are found to resist alike the action of water, fire, and frost, and are admirably adapted for decorating pleasure grounds ; and the flower-pots are also very favourable to the growth of plants, being remarkably porous. Also, sample specimens of draining-tiles and water-pipes, made at the Garnkirk manufactory. By Mark Sprot, Esq. of Garnkirk.

Patterns of *Terra Cotta*, ornamental flower-pots, vases, &c. in great

variety. These are naturally of a brick colour, very porous, and made at Lowesby, in Leicestershire. By Mr J. Purden, Lowesby Depot, London.

MISCELLANEOUS.

By the Very Reverend Principal Baird, specimen of the wool of the Lama-sheep. These animals were imported from the Andes by Mr Stephenson of Oban, and seem perfectly suitable to the climate of this country.

By David Falconar, Esq. of Carlowrie, specimens of a very complete collection of the genus *Narcissus*, named and arranged according to the system adopted by Haworth in his work on that beautiful and interesting portion of hardy Amaryllidæ.

By Messrs Willmott and Company, nursery and seedsmen, Lewisham, Kent, a branch of *Ficus elastica*, Indian Rubber Tree, grown in their hothouses.

By Mr James M'Nab, Botanic Gardens, several specimens of cloth made from the bark of trees by the South Sea Islanders.

By Henry Stephens, Esq. Red Braes, a curiously wrought tunic or coat, made by the Chinese from the leaves of sedges.

By Mr James Smith, Hopetoun Gardens, cocoons of the silk-worm, *Bombax mori*, of a light yellowish colour; the worms were fed on mulberry leaves at that place.

By Mr George Carstairs, South Bridge, cocoons of the silk-worm of various shades of colour, a circumstance said to depend much upon the kind of food with which the worms are fed.

By Dr Knapp, 9 Duncuan Street, a small collection of native plants, some of them very succulent, preserved or dried so as to retain the original colour both of their flowers and foliage.

By Mr John Machray, overseer, Bush House, cloth made from the bark of trees by the natives of Otahcite; and an old work, with plates, on the Ancient Gardens of Italy.

By Mr Robert Fairbairn, Freeman Cottage, shoots grown in one season, eleven feet in length, of the Common Elder (*Sambucus nigra*.)

By Robert Innes, Esq. of Thrumster, Wick, specimen of marl found at that place, in beds varying from three to five feet in thickness. Also a blue aluminous clay, found immediately under

the marl, and a hard rocky subsoil, called Pan, which is found, immediately under peat, and not only prevents the roots of plants from penetrating it, but destroys them, by producing canker, &c. and is therefore particularly unsuitable for the growth of trees.

Many specimens, which have been presented to the Museum since the divisions to which they belong were in the press, are unavoidably omitted, but will appear in the next Supplement.

We have again to express our thanks to the numerous contributors who have favoured us with their donations, and hope that if any of such are neglected in the present report, they will pardon the oversight. Corrections will be thankfully received and acknowledged at a future opportunity.

The present Report will at least impart an idea of the description of articles—specimens of which are at all times acceptable for the Museum, which is daily open for the inspection of the public, from the middle of October to the end of May.

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ERRATA.

- Page 15, line 10 from bottom, *for* became *read* become
51, line 10, *for* one-seeded *read* one-sided
170, lines 8 and 9, *for* and one or a half *read* one or one and a half
217, under title Fold of Increase, omit *Feet*.
253, lines 17 and 19, *for* Woodhall *read* Wellhall
275, line 5 from bottom, *for* URTICEÆ. *read* URTICA.
301, line 19, *for* died. *read* dyed.
318, line 1, *for* CORIANDRINUM, *read* CORIANDRUM.
319, line 7 from bottom, *for* Anthusa Cynopium *read* Æthusa Cynapium,
337, lines 12 and 13, *for* 1828, 1830, *read* 1828 and that of 1830,
359, line 9, *for* healthy *read* healing
371, line 3, *for* accountable *read* unaccountable
399, line 7 from bottom, *for* S Virginiana. *read* J. Virginiana.

SUPPLEMENT

TO THE

AGRICULTURIST'S MANUAL.

SUPPLEMENT

TO THE

AGRICULTURIST'S MANUAL,

CONTAINING DESCRIPTIVE NOTICES OF

AGRICULTURAL PLANTS

INTRODUCED WITHIN THE LAST SIX YEARS.

BY

PETER LAWSON & SON,

SEEDSMEN AND NURSERYMEN TO THE HIGHLAND AND AGRICULTURAL
SOCIETY OF SCOTLAND.

WILLIAM BLACKWOOD AND SONS,
EDINBURGH AND LONDON.

MDCCCXLII.

A close attention to those Agricultural Plants which have been introduced or brought into notice since the publication of our AGRICULTURIST'S MANUAL in 1836, has enabled us to lay before the Public this our first *Supplement* to that Work, in which will be found noticed numerous important additions to the formerly cultivated Cereal Grains Hay and Pasture Grasses, Turnips, and other plants suited for field culture.

EDINBURGH, }
1st August 1842. }

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SUPPLEMENT

TO

LAWSON'S AGRICULTURIST'S MANUAL.

GRAINS.

CEREAL GRASSES.—*GRAMINEÆ*.

I. AVENA FATUA OF *Linnaeus*—OR WILD OAT.

1. MARKEL OR MARKLEY *Bearded Oat*.—Like its progenitor the Wild Oat, this variety has very long straw, with an unusually large panicle; its grains are also larger, better filled, and generally of a blackish colour, but shew a tendency to become lighter under cultivation. They are readily distinguished from those of all other dark-coloured cultivated oats by the presence of a beard or tuft of hairs at their base, which is the principal characteristic of the species. This oat is grown in some of the higher central districts of England for feeding, and in some of the northern parts of Scotland for meal; it was introduced to the Carse of Gowrie from Yorkshire some years since by Miss Yeman Spence of Murie, where its culture was, however, immediately discontinued, that being only, if at all, advisable in very late situations.

II. AVENA SATIVA OF *Linnaeus*—OR CULTIVATED OAT.

2. BARBACHLAW EARLY *White Oat*.—This variety is said to have originated on the farm of Barbachlaw near Bathgate, and has long been esteemed by cultivators in the higher districts of the Lothians, from its hardiness, earliness, and adaptation to elevated, moorish, and wet soils. It is productive both in straw and grain; but the latter forms only an inferior sample, being long, thin, and often very bristly, so that it is principally in demand for feeding.

3 & 4. *BERLY, BERLIE, or BARLEY, Whit Oats*.—Under these names there are two varieties known in Scotland, which are farther distinguished by the terms Scotch and English. The Scotch Berlie is supposed to have been cultivated in Aberdeen and neighbouring counties for at least upwards of half a century, and the other was introduced to Aberdeenshire as a seed-oat from England about ten or twelve years since, when it more than probably received its present appellation.

The *Scotch Berlie Oat* more resembles the Kildrummy, page 4, than any other variety now cultivated in the north-eastern districts of Scotland. It differs, however, in its straw, which is said to be preferred to that of any other sort by cattle; being fully longer and less firm in texture; it is also a few days later in ripening, and its grains are rather longer awned as well as whiter coloured. It is particularly adapted for growing on light early soils, is very prolific, not easily shaken, and meals well.

The *English Berlie* is fully as early as the early Angus oat (page 46 of Ag. Manual), and about as easily shaken by winds when ripe; but its straw is firmer and not so readily lodged or broken down, its grains also are in general heavier, less awned, and of a fine light yellow colour. This variety is well adapted for rich, heavy, and clay soils; and its prolificacy, combined with its other merits, is such as to render it a favourite with growers, so that its cultivation has extended rapidly in the districts where it is known.

For genuine samples, with descriptions, of the Berlie oats, and several other varieties, cultivated in the district of Strathbogie, we were indebted to Mr William Murray, lately farmer at Slioch.

5. *CHURCH'S or CHURICK'S White Oat* is a large-grained and thick-skinned sort, allied to the Georgian (page 45 of Ag. Manual), but possessing these characteristics in even a higher degree, the smaller seed of the spikelet being generally entirely imbedded in the thickened skin of the larger; so that it is not likely ever to receive increased cultivation. We were favoured with a sample of this sort in 1838 by Messrs Banks and Son, Haddington, but have not obtained any particulars relative to its origin.

The description of a variety under the name of Church's Early Oat is recorded in the 4th vol. of the Highland Society's Transactions, published in 1816, which appears to have been a totally distinct sort from the present, and was originally received from Scotland by a Mr Church in Northumberland, who first sowed sixty grains of it in 1776, the produce of which he cultivated for twenty-five years on the same farm, without its exhibiting any symptoms of degeneracy. Towards the

end of last century it was much grown in the North of England and Berwickshire, but appears to have been ultimately superseded by the potato oat, which it somewhat resembled, but produced a longer thicker-skinned grain and inferior sample.

6. **CLELAND EARLY *White Oat*** was exhibited by its originator W. Dalrymple, Esq. of Cleland, at the Highland and Agricultural Society's Show at Glasgow, September 1838, who described it as being "hardy, prolific, and from a fortnight to three weeks earlier than the potato oat." The Cleland seems to resemble the next variety in several characteristics, but produces a shorter grain and heavier sample; some growers report it as being rather liable to sedge-root, but farther trials are yet necessary to ascertain its real merits.

7. **CUMBERLAND EARLY *White Oat***. This variety, as its name implies, originated in the County of Cumberland, and is the produce of a single plant, which, from its earliness, first attracted attention in 1833 or 1834. In 1836, Thomas Crisp, Esq., Hawkhill, Alnwick, communicated a sample in grain for the Museum, with the following particulars of an experiment made by him to ascertain the relative merits of the Cumberland potato and Hopetoun varieties, which were sown in equal quantities, and on adjacent ridges, measuring the same extent of surface.

"The Hopetoun Oat produced, of clean corn,		17 bushels and 2 pecks.
Do.	do. of light corn	0 do. and 2 do.
The Potato Oat produced, of clean corn,		15 do. and 3½ do.
Do.	do. of light corn,	2 do. and 1½ do.
The Early Cumberland produced, of clean corn,		20 do. and 3½ do.
Do.	do. of light corn,	3 do. and 2 do.

The Early Cumberland was cut exactly a fortnight before any of the others, and on being thrashed and cleaned up it was found to weigh about the same as the Hopetoun, and 2 lb. lighter than the other."

The last three years' experience has shewn this variety to be decidedly earlier than the potato oat, also longer in straw and less liable to be shaken by high winds; but its grain being light and very inferior in quality, cultivators are generally discontinuing its growth.

8. **DUTCH EARLY *White Oat*** was introduced from Holland, some years since, by Mr William Milne, Bolton, near Haddington, who finds it to be as early as the potato oat, while it is more prolific; and on inferior soils it succeeds better and yields more straw than any other variety with which he is acquainted. In sample it approaches that of the Hopetoun, but is a shade darker coloured.

9. **DYCK'S EARLY *White Oat***.—For the introduction of which to general notice, the Highland and Agricultural Society of Scotland

awarded their silver medal in January 1840 to Mr John Watson, Ledmore, Brechin ; was originally raised by a Mr Dyock, near Aberdeen, and has been grown in the vicinity of Brechin for the last seven or eight years, where it is also known by the name of James Davidson's Oat, it having been first cultivated in that quarter by a grocer and small farmer of that name. Mr Watson, to whom we are indebted for our first sample of this oat, considers it early, hardy, very prolific, and exceedingly well adapted for the higher corn lands. Its grains are rather long, somewhat awned, and form a medium sample, that received weighing $41\frac{1}{2}$ lb. per bushel. As it is rather liable to shake in rough weather, it should be cut before being fully ripe.

10. FLEMISH EARLY *White Oat*.—This variety has been long known, although never extensively cultivated in Scotland, and may be described as yielding a good sample, having longish straw, and being a hardy free grower, bearing in its general characteristics a considerable relation to the Early Dutch, No. 8.

11. IRISH OR STRATHALLAN *Early White Oat* (page 46 of Ag. Manual.) This variety is more commonly known by the former than the latter name, in the higher parts of Strathearn and west of Perthshire, where it is most extensively cultivated ; which name is generally supposed to be a corruption of Earish or Earlyish, in allusion to its early ripening property, and not indicative, as some have supposed, of an Irish origin.

Mr R. Sharp, jun., Blackford, Auchterarder, reports that, “on the higher parts of his farm, about 400 feet above the level of the sea, it succeeds well on a considerable variety of soils ; but on such as are of a rich or superior description, it is very apt to become lodged from its great length of straw. At that altitude a Scotch acre sown with 7 bushels of seed, will yield on an average from 30 to 36 bushels, weighing each 36 to 39 lb. It is less liable than several of the finer sorts to suffer injury from the grub or other enemies ; and in harvest it is well calculated to withstand rough, windy, and wet weather ; but its culture is only advisable in exposed and late situations.

12. KILDRUMNY *White Oat*.—This variety did not, as formerly stated in the Manual, page 47, originate in Kildrumny in the north of Aberdeenshire, where, however, it has been long and extensively cultivated ; and where a tradition exists, that, nearly a century ago, after a bad season in which the oats of that district did not ripen sufficiently for seed, it was brought from the Mains of Halkerton, south of the Grampians ; and that, in the Mearns and neighbouring districts of Angus, it was then known by the name of Halkerton Oat. Since the introduction of Sandy's Oat, No. 15, the cultivation of the Kil-

drummy is decreasing in the Garioch, Strathbogie, and adjoining districts; that variety producing a firmer straw, being about a week earlier, and better adapted for damp, heavy, and rich soils. On those of a poor or inferior nature, the Kildrummy Oat, however, yields fully as good a crop in early seasons, but its sample, although of a fine, clear, silvery colour, is in general 2 lb. to 3 lb. per bushel lighter than the other.

13. LANCASHIRE WITCHES EARLY *White Oat*.—This variety would seem, from its name, to have originated in Lancashire, but was introduced to Scotland from Northumberland in 1837. Experiments made in E. Lothian shew it to be fully four days' earlier than the Early Angus, while it is rather longer in straw, considerably more prolific, and superior in quality; its grains being larger, more plump and heavier; qualities which must render it a desirable acquisition to cultivators in late districts.

14. ORLEANS EARLY *Brown Oat*.—*Avoine Joanette* of the French; is a very early variety, which, on that account, and its producing a good sample, has been pretty extensively cultivated of late years in the department of Orleans in France. It bears a greater resemblance to the Black or Brown Riga Oat (page 50 of Manual) than to any other in the collection; but is lighter, or more of a brown colour, rather larger in grain, and heavier in sample. No proper trial has as yet been made of this sort in Scotland, but it seems worthy of attention. Another variety received from M. Vilmorin, Paris, along with this, under the name of the *Three Month Black Oat*, he at first considered to be synonymous, but which, on farther trial, he found to be the same as the *Black Oat of Brie*, page 50 of Manual.

15. SANDY'S OR RHYNIE EARLY *White Oat*.—This estimable variety was discovered in 1824 or 1825, on the Farm of Milltoun of Noth, in the parish of Rhynie, Aberdeenshire, then occupied by Mr Pirie, who, in the winter and spring preceding, had occasion to cut a number of ditches throughout his pastures. On a bank formed by the earth which had been taken out of one of these, his cow-herd *Sandy* or Alexander Thomson observed, in course of the summer, an oat plant of extraordinary luxuriant growth, which Mr Pirie carefully preserved for seed, considering it to be different from any of the varieties then grown in the country, and so rapidly did it increase under his management, that, in a few years, the produce was not only sufficient to sow his own farm, but also to supply many of his neighbours. Mr William Murray of Slioch, from whom the above information was derived, farther states, that Sandy's oat bears a considerable resemblance to a variety formerly known in that part of the

country by the name of the Red or Lord Chief Baron's Oat, having like it a reddish tinge, when fully ripe, but Sandy's produces more straw, is not quite so early, and yields a fuller crop on inferior ground. Compared with the potato oat, the qualities of which are so universally known, Sandy's is much hardier, produces a heavier crop of straw, which is much firmer in texture, and not liable to get lodged or broken down in rough weather; it also yields a heavier and more bulky crop of grain in bad seasons, ripens more regularly, and is not nearly so subject to shake in a gale of wind; but the best evidence which can be adduced of the superiority of Sandy's oat is, that, in its native district, its culture has now almost superseded that of the potato oat; and there, instances have been known of its weighing as much as 46 lb. and 47 lb. per bushel, but 43 lb. or 44 lb. is considered a good average weight. A sample communicated by Mr Walker, farm-manager to his grace the Duke of Richmond at Gordon Castle, and grown there in 1839, weighed 47 lb. per bushel.

16. *SIBERIAN EARLY White Oat*.—This variety was received in autumn 1839, through Messrs J. G. Booth & Co. of Hamburgh, from the north of Europe; who reported having, by actual experiment, found it to be fully a fortnight earlier than the potato oat, while its produce in straw is about a third heavier than that of the Hopetoun. In sample, it has somewhat the appearance of the Georgian Oat, page 45 of the Manual, to which tribe (*Avena sativa georgica* of Zuccag.) it evidently belongs, having large and thickish-skinned grains, which, however, both weigh and meal well; qualities which, together with its hardness and prolificacy, seem to shew that it will yet be found a highly suitable variety for the later districts of this country. Trials of the Siberian Oat, in various parts, especially the north of Scotland in 1840-41, prove it to be from a fortnight to three weeks earlier than the potato, while, in other respects, its merits, as stated above, are not over-rated.

17. *TAM FINLAY'S White Oat* is a variety held in considerable esteem by cultivators, both in the high and lower parts of Ayrshire, as well as in the neighbouring counties, where it was formerly named the Old Poland Oat, but acquired that by which it is presently known, from having been brought into general notice by Thomas Finley, a person who was in the habit of renting old pasture lands for the purpose of breaking them up and taking two crops of oats, for which he universally used this sort, and with very considerable success. It is very hardy, ripens about a week later than the potato oat, and produces a greater quantity of straw than any of the older early sorts; its sample possesses rather an inferior appearance, and is chiefly in demand

for feeding, but is said to yield a greater quantity of meal in proportion to its weight, than any other of those sorts generally termed Long Grained Oats. For the history and authentic samples of this oat, we are indebted to James Campbell, Esq. of Craigie, near Ayr.

18. *TUSCANY EARLY White Oat*.—A sample of this oat was received in spring 1841 from the Editor of the “Genesee Farmer,” Rochester, North America; which in the following summer produced a slender, tough, and rather short straw; with plump, short, thickish skinned, bright coloured grains, but it seems less productive than some of the better known sorts; although farther trial is still required to prove whether it is worthy of extended culture.

19. *WINTER Dun or Grey Oat* (page 50 of Manual). This variety is now cultivated to a considerable extent in some of the southern and midland sheep counties of England, and such trials as have been made in Scotland prove it to be very hardy, in having withstood the late severe winters without injury. It is known in some districts by the name of Winter Feed Oats, from its use in affording a rich pasturage for sheep in the earlier spring months, which treatment is of essential benefit to the after-growth of the crop, especially on light dry soils; from the sheep droppings acting as a manure, combined with the consolidating of the soil by their treading. Archibald Hamilton, Esq. of Blackstone, who has grown the winter oat at Rozelle, near Ayr, for the last five or six seasons, reports, that “it ripens about a fortnight sooner than, and is fully as prolific as, any of the spring sown sorts, and weighs about 42 lb. per bushel.” Other growers, however, in different parts of the country, have found it to be deficient in the produce of both grain and straw, and it is only when intended for feeding sheep that its growth is advisable.

I. HORDEUM DISTICHON OF *Linnaeus*—OR TWO-ROWED BARLEY.

1. *BLACK'S SUPERLATIVE Barley*.—This is an early variety, approaching to the Dunlop (No. 3, and page 40 of Manual), which was introduced to Perthshire from England by the same parties, where, after several years' cultivation, the stock ultimately fell into the hands of the late Mr Black, farmer at Rosiehill, in the Carse of Gowrie, whose name it bears in that district, he having been its only grower for several years, until its merits attracted the attention of neighbouring cultivators, especially that of Sir John Richardson, Bart. of Pitfour, who, in the beginning of August 1839, cut a field of it about a week before harvest was commenced elsewhere in that part of the country, and who found it to possess the additional qualifications of prolificacy and superiority of sample.

2. BROWN'S *Barley* bears the name of its originator, the late Mr David Brown, farmer, Fornought, Perthshire, and is a hardy, early, and prolific variety; at present much esteemed by growers in that and the neighbouring county of Forfar, especially in the Carse of Gowrie and Strathmore districts, where it has been known for the last six or eight years, and although belonging to that class generally termed long-grained barleys, it is found to weigh well, and is much esteemed by maltsters. A sample grown on a field of good clay manured with rape-dust in 1840, and communicated by Mr George Bell, Inch-michael, Errol, weighs $55\frac{7}{8}$ lb. per bushel; the produce being at the rate of $9\frac{1}{8}$ quarters per Scotch acre, and the average length of straw 4 feet 8 inches.

3. BUTE *Barley* is a variety selected two or three years since by Mr Samuel Girdwood, Isle of Bute, in a field of Chevalier Barley, who is of opinion that it will be found to be considerably earlier than that sort, as well as hardier and more prolific; another year or two experience is, however, still wanted to ascertain its actual merits. In form of spike, it bears a considerable resemblance to the Italian barley No. 5, but is considerably darker in colour as well as smaller grained.

4. DUNLOP or DUNLOP'S *Barley* (page 40 of Manual), acquired its name in Perthshire from having been sent to the late William Dickson, Esq. of Kinnoul nurseries there, by a Mr Dunlop from England; in some counties of which it is termed Chevalier Barley,—a name, however, more universally applied to a very different variety (see page 39 of Manual), which, from its lateness, is only suited for the earlier districts of Scotland; while the earliness of the Dunlop especially recommends it to the attention of cultivators in the later districts and higher altitudes at which barley is grown.

5. ITALIAN or GOLDEN *Barley* (page 41 of Manual). For some years after its introduction, this variety received a rapidly extended cultivation on account of its earliness, beauty of sample, and prolificacy; but of late some growers begin to entertain a belief that it is rather an impoverizing crop for the soil, and are consequently discontinuing its culture; regarding this there is still, however, a considerable diversity of opinion, and a year or two longer will be requisite to ascertain the true amount of its merits.

The following are the results of an experiment conducted in 1837, and kindly communicated by James B. Fernie, Esq. of Kilmux, Cupar-Fife, for the purpose of ascertaining the comparative merits of this and the three other sorts mentioned.

“ With the view of comparing the two kinds of barley previously grown on my farm, viz. Chevalier and early English, with the two

recently introduced sorts, Italian and Annat, I selected a part of a field of uniform quality for that purpose, which had been cropped with potatoes the preceding year. The soil was a good, sound, dry-loam, situated about 400 feet above the level of the sea, and received the seed furrow in the autumn immediately after the potatoes were taken up: before sowing, which was done on the 11th April, four separate lots, containing one Scotch acre each, were measured off, on which four bushels of the respective kinds of barley were sown. The Italian and early English were reaped on the 30th August, when both were rather over-ripened, and ought to have been cut three or four days sooner. The Chevalier and Annat were not cut till the 5th of September, which shewed these two to be about ten days later than the others. All the parcels were carefully thrashed in February 1838, when they were found to measure and weigh as under. The prices attached are calculated at the rate of twenty-six shillings per quarter for 52 lb. per bushel, deducting at the rate of one shilling per pound per bushel, below that weight.

<i>Italian</i>	produced	6	quarters,	4	bushels,	weighing	49½ lb.	£7	12	9
<i>Annat</i>	do.	6	do.	1	do.	weighing	50 lb.	7	7	0
<i>Early English</i>	do.	5	do.	6	do.	weighing	51½ lb.	7	6	7½
<i>Chevalier</i>	do.	5	do.	3	do.	weighing	49½ lb.	6	6	3½

6. LORD WESTERN'S *Barley*. For some years past, a variety of English origin has been grown under this name in East Lothian; the characteristics and history of which have not been obtained; but it does not seem to have received much attention from the generality of cultivators.

7. NOTTINGHAM LONG-EARED *Barley*. Some years since this variety was very favourably noticed in several English agricultural periodicals; and in spring 1838, a sample was received from William Courtney, Esq., Newton Stacey, Hampshire, who reported its having yielded very large returns in that and neighbouring counties. It does not as yet, however, appear to have attracted much attention in Scotland; and, in as far as can be judged of from its merits, when grown in small quantities along with others in the collection, these do not appear to be in any way superior. Its ears are long, but being loose or open, do not contain more than the usual number of grains, which are rather above an average size, and, when well harvested, form a bright yellow-coloured sample.

8. POMERANIAN or GERMAN *Barley*, a variety lately imported, and which has, for the last two or three years, been grown very successfully in different parts of Scotland, especially in Ross and other northern counties. It is early and prolific, produces a tall firm straw, with long narrow ears, each usually containing upwards of thirty

longish-shaped, but thin-skinned and light-coloured grains, which weigh well, and form a superior sample.

9. POTTER'S or ZEALAND *Barley*, is named in compliment to Mr David Potter, of Hundon in Suffolk, its first grower in Britain, who obtained about half a wine-glass-full of it out of a cargo imported to Ipswich from the north of Europe six or seven years since: he reports that the success attending the growth of it has been such, that it is now the most generally cultivated variety in that neighbourhood. It was introduced from England to the north of Scotland some years since, by Sir Francis Mackenzie, Bart. of Gairloch, who has found it to produce as much as nine quarters per acre, and to yield a superior sample. It has also been known for the past two or three years in Northumberland and Berwickshire, where it is held in high esteem by cultivators.

10. PROVIDENCE *Barley* is an English variety, the first plant of which is said to have been found by a person at Lytchett Heath, Wiltshire, growing in the corner of his garden, in the years 1835 or 1836, which ripened thirty to forty ears in June, and the root being left, is reported to have produced other two crops the same season. The account of its farther culture by a Mr Hanville of Blandford, extracted from the Wilts Independent, was published in the Gardeners' Gazette for 22d February 1840. He sowed a quantity of it in April 1838, whereas it should have been sown in February; yet he reaped two crops that same season, and found it to be not only a prolific variety, but its grains were also of large size and superior quality. In Scotland, the true merits of this variety have not yet been ascertained, nor is it ever likely to realize expectations founded on the above flattering description of its merits; yet its earliness alone would claim for it a fair trial.

11. SUFFOLK or NORFOLK SHORT-NECKED *Barley* is a leafy stalked strong awned variety, which has been grown for several years in the eastern districts of Strathmore; where it is held in considerable repute by some growers, from its capability of withstanding rough weather; while others have discontinued its growth, from finding it to be eight or twelve days later than the common sorts, and also more liable to sprout in wet weather. It was first introduced to these parts from the Earl of Leicester's property, who was in the practice of cultivating it on his higher grounds. In good seasons it yields a heavy crop and superior sample; but in Scotland it can only be recommended for seaward and other early districts much exposed to wind. Samples in grain and straw were first received for the Museum in 1839, from Robert Scott, Esq. Laurencekirk.

II. HORDEUM VULGARE OF *Linnaeus*—BIG OR BERE.

12. NEPAL OR HIMALAYAN NAKED *Big* or *Bere*.—(Page 36 of Manual.) The peculiar deformed appearance of the awns in this variety has induced many botanists to consider it a distinct species, which Sweet named *Hordeum Nepalense*; Shultz, *H. Himalayense*; Seringe, *H. trifurcatum*, &c. We were, however, formerly induced to consider it a variety of *Hordeum vulgare*, from the arrangement of its florets, and the tendency it exhibited of producing perfect awns under cultivation in this country. Since then we have been favoured by Mr John Anderson, Kinnoul Nurseries, with specimens exhibiting its still farther transformation into a distich or two rowed barley, with all the intermediate forms; thus tending to shew that the cultivated varieties of *Hordeum distichon* and *H. vulgare* may have originally been the offspring of the same species, although they now possess a seemingly distinct permanency of character.

13. VICTORIA new *Big* or *Bere*.—The introduction of this may be considered as the first step to the acquirement of superior varieties of the old Big or Bere, compared with which it produces longer straw, is longer eared, often containing 70 to 100 grains in each, more prolific, and produces a finer sample, instances having been known of its weighing as much as 56 lb. per bushel; and Mr Thomas Imrie, Nursery and Seedsman, Ayr, from whom samples for the Museum were first received, reports his crop of 1839, which was grown on good croft land in the vicinity of that town, to have been thirteen quarters per acre. Samples in grain and straw have also been communicated by Mr Alexander Henderson, Long Niddry, East Lothian, and Mr A. Gorrie, Annat, Perthshire, the latter grown about 500 feet above the level of the sea, both of whom agree in considering it a most promising acquisition, and their experience tends to shew its adaptation for either low and fertile, or elevated and late, districts. The merit of bringing the Victoria Bere under the notice of cultivators in this country is due to Mr Fulton, a farmer near Maybole in Ayrshire, who first obtained a few ears of it from the Belfast Botanic Gardens five or six years since.

III. HORDEUM ZEOCRITON OF *Linnaeus*—SPRAT OR BATTLEDORE BARLEY.

14. FLUCK-WHEAT *Barley*. This variety was selected in a field at Knockandū, near Ballandalloch, Banffshire, and differs from the common Sprat Barley in having a narrower spike, with shorter grains, and consequently superior sample. It does not appear likely to de-

serve extensive cultivation, but is interesting as serving, together with the *Bute* and *Italian Barleys* (Nos. 3 and 5,) to connect the forms of the two reputed species, *Hordeum distichon* and *H. Zeocriton* of Linnæus.

PENICILLARIA SPICATA OF *Willdenow*—EGYPTIAN MILLET.

Generic Characters.—Panicle, crowded; involucre, many bristled and one or two flowered; glumes, containing one fertile and one barren floret, the latter being the shortest.

Specific Characters.—Panicle somewhat cylindrically spicate; bristles of the involucre rough and equal in length with the florets; joints and upper part of the stalk villous; ripened grain somewhat similar to very small wheat. *Holcus spicatus* of Linnæus; *Panicum spicatum* of Roxburgh, &c.; Annual. Native of Egypt and the East Indies.

Although long known to botanists this plant was only recently brought into notice as a cereal grass, by Sennor M. Molon of Madrid, who found it to ripen earlier than the Broom corn, *Holcus* or *Sorghum vulgare*, and to succeed best on light chalky ground; experiments which he made on deep rich soils having failed from the over-luxuriance of the plants, and the decaying anthers adhering to the crowded panicle so thickly as to retain the moisture, and thereby prevent the development of the young grains. M. Vilmoren of Paris, from whom we, last spring, received seeds, considers that the Egyptian millet may be better suited for some parts of France than the Broom corn, but there seems little probability of its ever becoming useful in this country, although it might be beneficially introduced into the Polynesian and other colonies.

SECALE CEREALE OF *Linnæus*—OR RYE.

MANY-STALKED RUSSIAN OR GREAT NORTHERN *Rye*.—A cut sample of this variety, measuring upwards of eight feet in height, was received in 1839 from M. Vilmoren, who first obtained it from M. Molle, Professor of Agriculture, &c., under the name of *Seigle multicaule de Russie*. It most resembles the Midsummer rye (page 32 of Ag. Manual), but differs from it in having much more luxurious and darker green coloured foliage, considerably taller straw, larger grains, and in being a few days earlier in ripening. Another variety introduced from Saxony to, and recommended for cultivation in France, under the name of *Seigle multicaule*, has been proved by frequent trials to be scarcely if at all different from St Jean, or Midsummer rye above alluded to.

TRITICUM—OR WHEAT.

From the great diversity of form in the numerous cultivated varieties of *Triticum*, and the proximity of those arranged under separate heads to one another, much uncertainty and confusion exists in defining the limits of the different species; hence the multiplicity of specific names which some botanical authors have adopted, many of which are, to say the least, of questionable utility; amongst which may certainly be classed some of those formerly used in the *Agriculturists' Manual*, which were then adopted in deference to the opinions of several eminent botanical authorities; and while it has not in the present instance been deemed expedient to attempt any definite classification of species, yet it has been thought advisable to follow the authority of Linnæus and others in preference to that of Host, by including under *T. spelta* all the beardless and bearded slender or open-spiked, adhesive, chaffed, wheats; while those with flat, compact, or square ears, are, with the exception of *T. monococcum*, reckoned as varieties of the following species, viz:—

I. TRITICUM AMYLEUM OF *Seringe*—OR STARCH WHEAT.

Specific Characters.—Spike laterally compressed; spikelets closely imbricated and two to four seeded; glumes smooth and navicular, with a prominent keel or nerve terminating in a short mucronated point having a notch at either side; external palea either terminated by a short bristle or long awn, and, together with the internal one, adhering to the grain after being thrashed.

It will be seen from the above description, that Nos. 78 to 82 inclusive, in pages 28 and 29 of the *Manual*, will now be considered as varieties of *T. amyleum*, that having been deemed preferable to the other names which have been given to it by botanists, such as *T. dicoccum*, or two-grained wheat, applied by some authors to the whole species; and by others to the long-eared section of it Nos. 78, 79, and 80, while under that of *T. tricoccum* those last included the broad spiked sorts, Nos. 81 and 82 of the *Manual*, and also the first of the present arrangement.

1. YELLOW BROAD-SPIKED *Starch-Wheat* is a variety intermediate in colour between the white and red sorts, to which it is similar in other respects; and in common with all the adhesive-chaffed sorts, whether varieties of *T. amyleum*, *T. spelta*, or *T. monococcum*, the grain of this is occasionally termed spelt.

II. TRITICUM COMPACTUM OF *Host*—OR COMPACT-SPIKED, WHEAT.

2. DUCK'S-BILL *Yellow-Wheat*.—Young plants very hardy ; straw short, stout, and upright ; ears two, to two and a half inches long, by about three quarters in breadth and remarkably compact, the joints of the rachis being from 10 to 12 in the inch ; spikelets very easily detached when ripe, so that the grain is apt to be lost, even by slight winds ; chaff thin, smooth, and yellowish or cream coloured ; grain medium sized, oblong, plump, lightish yellow, and transparent.

We are indebted for this sort to Colonel Le Conteur of Jersey, to which island it was first introduced from Keil in the Baltic, where, as well as in Newfoundland, it is much grown, being very prolific, and well suited for these climates ; but it is said to yield an inferior flour.

The name Duck's Bill wheat has been applied, and seemingly with less propriety, to a totally different sort, belonging to the species *T. turgidum* of Linnæus,—see Miller's Gardener's Dictionary, &c.,—which has almost no characteristic in common with *T. compactum*, a reputed species, separated from *T. hybernum* of Linnæus by Host, an Austrian botanist, who founded its characteristics chiefly on the compact form of the spike ; but of late, several varieties, as Hickling's, the Cluster Wheats, &c., have been introduced, which in form seem to unite it with the latter, and shew that the most compact and open spiked sorts, are merely the extreme forms of the same species ; and, as Linnæus's name, *T. hybernum*, has been disallowed by modern botanists, the compact wheats might, with greater propriety, be included under the more applicable one of Lamark, viz., *T. sativum*.

III. TRITICUM COMPOSITUM OF *Linnæus*—COMPOUND-HEADED WHEAT.

3. AMERICAN THUMB *Wheat*.—This resembles the Egyptian wheat in having a large compound head or ear with long and very thick solid straw, but differs in having white woolly chaff and lighter-coloured grains. An ear received in 1838 from Wm. Courtney, Esq., Newton-Stacey, Hants, contained 13 branches, and he reports his crop to have yielded at the rate of one hundred bushels per acre. Very flattering accounts of this variety have appeared in course of the two past seasons in various agricultural periodicals ; but, like the Egyptian and Turgid wheats, to which it is closely allied, it yields a coarse and inferior sample, especially in a warmer climate like that of this country, and is only suited for latitudes such as the south of Europe.

IV. TRITICUM DURUM OF *Desfontaines*—HARD-GRAINED WHEAT.

4. *ISHMAEL Hard Wheat*.—Straw short, rigid, and solid; ears erect, densely square, short and thick; chaff long, whitish coloured, and slightly downy; awns blackish, or dark brown towards their base, long and spreading; grains large, oblong, and of a light yellowish transparent colour. This sort was received in 1839 from M. Vilmorin & Co., Paris, and is easily distinguished from the four varieties described, page 26 of Ag. Manual, by its very dark coloured grains. It is one of those sorts which are cultivated extensively in the North of Africa; but although early and suited for spring sowing, it is not likely ever to be considered worthy of culture in countries adapted for the more valuable varieties of *T. sativum*.

5. *MANFRIDONIA Hard Wheat*.—Straw short, rigid, and generally quite solid; ears erect, square, and pretty compact; chaff lightish brown, hard, and smooth; awns long, and similar in colour with the chaff; grains large, oblong, hard or flinty, and of a light yellow transparent colour. This variety approaches in character to the *hard Sicilian wheat*, page 26 of the Ag. Manual, but may be considered as a still more decided variety of *Triticum durum*, and was presented in spring 1840, along with a sample of its flower, which is used for making macaroni; by Miss Walker of Drumsheuch, who had it from Italy.

6. *NEPAL Hard or Villous Wheat*.—Straw short, erect, slender, and slightly hollow; ears about $2\frac{1}{2}$ inches long, and somewhat compressed; spikelets close set and very regularly alternate, two-seeded, and adhering firmly to the rachis which is furnished with tufts of wool at their insertion; chaff regularly and densely covered with thick down, firm in texture, and of a light brown colour; awns long, erect, and blackish or dark brown; grains of more than ordinary size, oblong, very hard, and of a lightish yellow transparent colour. This sort was sent from Nepal to the Highland and Agriculture Society of Scotland in 1839 by Dr Rolland, and was distributed amongst growers in various parts of Scotland for trial the following year, when the produce was so much affected with mildew and rust as to render these experiments almost a total failure, a circumstance not of an unusual occurrence with foreign samples the first year of their growth in this country, consequently another year or two will be requisite to test its qualities. It is not, however, likely to merit much attention, farther than as being a variety so very distinct from the

other known sorts as seemingly to constitute a different species, although for the present it is included amongst the varieties of *T. durum*, on account of the similarity of its grain; and it is not unlikely that this may be referred to the *T. villosum* of *Beauvois*, when opportunity offers of examining the smooth and downy varieties of Hard Wheat.

V. TRITICUM SATIVUM of *Lamarck*—Most generally CULTIVATED WHEAT.

7. BARBARY THICK-CHAFFED *Bearded Wheat*.—Straw rather under the medium length, slender, but remarkably firm and tough, being generally perfectly solid; ears short and slender; spikelets remote, and seldom more than two grained; chaff white, smooth, very thick and rigid; awns fully longer than the ears; grains large, oblong, lightish-yellow coloured and somewhat flinty, bearing a considerable resemblance in sample to some varieties of the last species. Although an early spring wheat, this is not likely to meet with attention from British growers, unless its peculiarly-formed straw should be found useful in some branch of manufacture.

8. BELLEVUE TALAVERA *White Wheat*. The young plants are hardy, and produce remarkably broad upright foliage, which is often of a yellowish or somewhat sickly hue in spring, but recovers rapidly afterwards; straw rather short and flexible, but becoming brittle when over ripe; ears of a loose open habit, long, and tapering upwards; spikelets remote and spreading, generally 3 and occasionally 4 seeded; grains unusually large, oblong, thin skinned, and very white, forming a superior sample.

Colonel Le Conteur of Bellevue Villa, Jersey, who has bestowed unprecedented attention to the selection, cultivation, and improvement of this genus of the cereal grasses, and author of a highly useful work “on the Varieties, Properties, and Classification of Wheat,” selected a plant of this variety in a field of the common Talavera, the produce of which he first offered to the public in autumn 1838. It is decidedly the earliest beardless variety presently cultivated in this country, and consequently well adapted for spring sowing. Some cultivators, however, who have chiefly grown it as a winter wheat, assert that it is deficient, both in produce of straw and grain, to the more common sorts, and that it is only as a spring wheat that it is entitled to attention; or as a winter wheat on high lands.

9. BOIS-HALL *Red Wheat*.—Young plants very hardy; straw rather short, stout, and rigid; ears erect, usually about two and a half inches long, very compact, or closely imbricated, especially toward

their points, in this respect approaching to the compact wheats, page 19 of Ag. Manual; spikelets often 4 grained; chaff thin and hard, of a bright reddish-brown colour, slightly streaked; grain of medium size, forming a good lightish-red sample. In 1836, this variety was sent to the Museum by Messrs Field & Child, seedsmen, London, who had it from the original grower Mr Smoothy of Boishall, since which it has been tried by several cultivators in Scotland, who agree as to its being hardy, rather more than ordinarily prolific, and well suited for rich alluvial soils, as it is not apt to get lodged; but it is rather liable to sport or degenerate into subvarieties, which will prove an obstruction to the extension of its culture.

10. BRANCHING SMOOTH-EARED *Red Wheat*.—An ear of this sort was received in spring 1840 from M. Vilmorin & Co., Paris, which may be described as bearing the same relation to the beardless varieties of *T. sativum*, that the Egyptian wheat does to the downy-eared sorts of *T. turgidum*. Several grains from this ear were carefully sown when received, the produce of which possessed very little of the branching habits of the original, but whether this arose from a liability to degenerate, or was the effects of spring sowing and a want of sufficient vigour in the plants, still remains to be ascertained. At best, however, this is likely to be regarded more as a singular variety than for any real merits.

11. BRODIE'S *White Wheat*.—Is so named in compliment to its discoverer, the late Mr Brodie, who, in 1821, picked a single ear of it in a field on his farm of Orniston, and afterward propagated the same at Fernhirst in Roxburghshire. The size and beauty of the original ear was such as to attract particular attention, but before sowing he accidentally lost all its grains, except thirty-two; the produce of which in 1826, or after being five years cultivated, was twenty-six Roxburghshire bolls of six bushels each. The beauty of sample, and success attending the early culture of *Brodie's Wheat*, rendered it a favourite with neighbouring growers, whose opinions of its merits were enhanced from finding it not only superior in sample to *Hunter's* (page 3 of Ag. Manual), but also more productive, taller in straw, and about a week or ten days earlier; which latter property especially suits it for spring sowing. Of late years its culture has been pretty extensively practised in Berwickshire, the Lothians, and other wheat countries, where it is generally liked.

A variety introduced from England in 1839, called the *Oxford Prize Wheat*, from having obtained the first premium at the English Agricultural Society's show, held there that season, bears such a near

resemblance to *Brodie's* that several good judges have been induced to consider them the same, only slightly altered by the influence of climate, &c. ; and this appears the more likely from its having been ascertained that the late Mr Brodie was in the practice of sending his seed-wheat to several acquaintances in that district of England.

12. *BURWELL Red Wheat* is so named from having originated in the parish of Burwell, Cambridgeshire, a district famed for its red seed wheat, which is still held in considerable esteem by growers in the higher wheat districts of the central and northern counties of England, where in many parts it has entirely superseded the old red wheat, from its being considerably hardier and much earlier, as well as more prolific, and less liable to suffer damage in adverse seasons. Its straw is long, firm, and reddish coloured ; ears largo and thin set, having scarcely 3 spiculæ in the inch ; chaff of a dark reddish-brown colour, large, hard, and closely surrounding the grain, which is also large, longish shaped, and of a deep reddish colour, forming a goodish sample.

13. *CAMBRIDGE Brown Wheat*.—Straw of medium length, slender, tough, and flexible ; ear long, open, loose, and generally bent or drooping ; chaff large, rigid, and of a reddish brown colour ; grains deep brown, large, oblong, and tapering towards the point, forming a good sample. This variety was received in 1836 from the late George Baker, Esq. of Elmese Hall, Durham, whose crop of it that season averaged 60 bushels per imperial acre, and he farther characterized it as being early, hardy, and a sort which he always found to tiller or spread well in spring.

14. *CAUCASIAN Bearded Yellow Wheat (Froment de Caucase barbu* of the French).—Straw long, coarse, and soft, consequently liable to lodge in wet seasons ; ears long and heavy ; grains large, oblong, yellowish coloured, and rather thick skinned, forming a good heavy sample. This variety was received last year from Messrs Vilmorin & Co. Paris, and is of recent introduction to France, where it is found to succeed either as a spring or winter wheat ; but although reported to be more than usually prolific, farther experience is still required to ascertain its true merits.

15. *CHEVALIER TEN-ROWED White Wheat*.—Straw of fully more than medium length, firm, stout, and not liable to lodge ; ears erect, rather short, but very compact ; spikelets often containing four, and occasionally five grains, which are of medium size, short or roundish, thin skinned, and form a superior, heavy sample.

Of the origin of this variety, which is also known by the name of

Brown's Chevalier, a correct account has not been obtained ; it, however, bears a considerable resemblance to a sort which has been long known in the south of England by the name of Salmon Wheat, No. 35, of which it is very likely an improved variety. It has been grown in Scotland for the last four seasons ; and although it presents rather a weakly appearance in the winter months, yet it is found to recover rapidly in spring, and is, on the whole, reckoned hardy, as well as prolific, and deserving of general cultivation in good wheat districts.

Under the name of Chevalier, several reputed varieties have been of late years brought into public notice,—as Fullard's Chevalier, Chevalier Prolific, Courtney's Chevalier, &c., the last of which will be found farther noticed under the name of Hickling's Prolific. No. 26.

16. CLOVER'S *Red Wheat*.—The young plants are of vigorous growth, hardy, and tiller well in spring; straw rather long, very thick, and stout, not being liable to lodge even when grown on rich soils ; ears very large, pretty close set, and generally only slightly bent to the one side ; chaff firm and strong, of a bright brownish colour ; grains large, oblong, and lightish red coloured, forming a very good sample.

This variety was selected by Mr John Clover, farmer at Kirtling, near Newmarket, Cambridgeshire, about fifteen years since, from a field of wheat in that neighbourhood, which was known by the name of Suffolk red wheat ; and its culture is now very general in that and surrounding counties, where it is even displacing the *Burwell red*, No. 12, for which it is often substituted by the seed-growers of that long esteemed sort. With a bag of this variety, weighing 66 to 67 lb. per bushel, Mr Clover gained the Highland and Agricultural Society of Scotland's premium for the best red wheat, at Berwick-on-Tweed, 30th September 1841.

17. CLUSTER DWARF *White Wheat* is a remarkably short and firm strawed variety, which chiefly distinguishes it from the next, and especially suits it for rich soils where the common sorts are apt to acquire too great a length of straw, and, in consequence, become lodged. It may be termed medium hardy, tillers well in spring, and yields a good return both in quantity and sample.

It was first imported from England to E. Lothian in 1838, where the name of cluster was applied to it on account of the thick and dense form of its ears, which, from the rigidity of its straw, are more than usually erect.

18. CLUSTER TALL *White Wheat*.—Straw tall, of medium strength, but rather apt to lodge when grown in rich soils ; ears generally un-

der 3 inches in length, square, and very compact, the joints of the rachis being usually 8 in an inch ; spikelets generally 4-grained, chaff short, hard, smooth, and white ; grain rather small, short, and of a dullish white colour, but forming a good heavy sample. This variety was introduced from England under the name of Dudney wheat in 1837, by Arch. Scott, Esq. of Southfield, E. Lothian, who changed it to that of tall cluster, from its similarity in form of ear to the last.

19. COL. LE COUTEUR'S COMPACT *White Wheat*.—This is a seedling raised in 1832 by Colonel Le Couteur of Bellevue, Jersey, and named *Triticum hybridum Coturianum compactum*, in compliment to him, by his friend Professor La Gasca, Curator of the Royal Gardens at Madrid. It is hardy and tillers remarkably well in spring ; produces fine firm straw, rather under the medium length, and, consequently, not liable to lodge even on the richest lands ; the ears are short and compact ; grains of ordinary size, oblong, and rather thick skinned, usually three or four in the spikelet, and forming a good sample. In addition to these characteristics, Col. Le C. finds it to be rather early, highly productive, and not at all liable to shed its seeds in high winds, even when very ripe ; and his crops in 1826 averaged 58 bushels per imperial acre. Several trials on a limited extent have been made with this sort in Scotland, none of which seem to have been attended with any remarkable results, but further experience is yet requisite to define its actual merits

20. COL. LE COUTEUR'S ROUND *White Wheat*—*Triticum album densum* of La Gasca. An illustrative figure of this variety, along with that of the last and others, is given by Col. Le Couteur in his work "on the varieties, properties, and classification of wheat," in which work he expresses an opinion that it may be the same with the white Hungarian wheat, page 7 of Ag. Manual, he having been only acquainted with the latter by description. The results of two or three years' cultivation proves them, however, to be essentially different, the only characteristic common to both being the small size and round shape of the grain ; Col. Le C.'s having a shorter ear and shorter straw, while it yields a thicker skinned, inferior sample, and is not deserving of cultivation except for straw-plait, for which its firm, tough, and very white straw seems, in an especial manner, to recommend it.

21. COL. LE COUTEUR'S JERSEY DANTZIC *White Wheat*—*Triticum candidum epulonum* of La Gasca.—The young plants are hardy, tiller remarkably well in spring, and bloom before most other sorts ;

straw of more than usual length, slender, and somewhat liable to lodge on rich soils; ears moderately dense, and drooping or bending to one side when ripe; chaff thin, smooth, and white; grains generally three but sometimes four in the spikelet, of an oblong shape and transparent light colour, forming a medium sample. Col. Le C. applied the name of Jersey Dantzic to this from having obtained it out of a cargo of wheat imported from Dantzic; it is not, however, to be confounded either with the following or the white Dantzic, page 6 of the Ag. Manual; to neither of which it bears much resemblance. From experiments which the Colonel made with this sort, he found that 18 lb. of the flour yielded 24 lb. of bread, which was of superior quality, being dry and white coloured; and his crop in 1836 yielded 52 bushels of 63 lb. each per imperial acre. In 1839 several quarters of this wheat were grown on the farm of Long Niddery, E. Lothian, by Alex. Henderson, Esq. who found that the return it yielded, and apparent quality of its sample, were not such as to warrant a continuance of culture.

22. COL. LE COUTEUR'S, No. 5. JERSEY DANTZIC *White Wheat*.—Straw softish and of medium length; ears long, slender, and generally a little bent or curved; spikelets very remote, and usually containing two or three large, oblong, thickish-skinned grains, which form rather an inferior sample. Col. Le C. selected this variety as well as the last, and some others, from a cargo of Dantzic wheat, and was induced to cultivate it on observing its hardiness and early habits, qualities which he considers may render it alike important for growing as a winter wheat in elevated late districts, or as a spring wheat in more genial situations. As yet this sort has not been sufficiently tried in Scotland to warrant an opinion as to its real merits.

23. COL. LE COUTEUR'S VELVET OR DOWNY *White Wheat*.—*Triticum Koeleri* of La Gasca.—A sample of downy white wheat, to which we have applied this name, was received from Col. Le C., along with the preceding four, and others; which having been sown along with the common white woolly wheat for comparison, was found to produce shorter straw, with smaller ears, and otherwise to appear quite distinct, but seemingly inferior, both in quality and produce, to that variety, page 6 of Ag. Manual.

24. ECLIPSE *White Wheat*.—Young plants hardy, and becoming bushy or tillering well in spring; straw of more than ordinary length, thick, and firm in texture; ears upright, or very slightly drooping when ripe, regularly formed and compact; chaff very white, thin, and hard; grains usually four in the spikelet, of a round or slightly

oblong shape, very white and thin skinned, forming a very superior sample. This sort was introduced to Scotland from the south of England in 1838, but, like many others of the finer varieties from that quarter, its produce for the last year or two has been found to decrease in quality, thus tending to justify a very prevalent opinion, that, in order to grow the finer wheats to the greatest perfection, it is occasionally necessary to procure a change of seed from a more favourable climate.

25. *HEDGEHOG Yellow Bearded Wheat*—*Blé Herisson* of the French; straw very short and rather brittle; ears also very short, crowded, and thickly furnished with long spreading and somewhat tortuose awns; chaff smooth, and varying from a dull yellowish-brown to a whitish colour; grains reddish or deep yellow, very small, hard, and of an oblong shape, forming an inferior sample. This variety is recommended by the French as being hardy, prolific, and fitted either for autumn or spring sowing; but experiments in this country shew that it is only deserving of attention from its being a distinct and curious variety for collections.

26. *HICKLING'S PROLIFIC Yellow Wheat*.—Young plants tiller well in spring, and yield a broad healthy foliage; straw of fully more than ordinary length, strong, and not liable to lodge; ears of a large size and beautiful dense square form, the joints of the rachis averaging about nine to the inch; chaff white; grains of a short or somewhat roundish form, and a deep yellow or reddish colour, forming rather an inferior sample. This variety was formerly noticed under the name of Heckland's wheat, page 12 of *Ag. Manual*, and is the produce of a plant with three ears, which was discovered in 1830 by Mr Samuel Hickling, in a field at Cawston, near Aylsham, Norfolk; these contained 293 grains, from the produce of which he, in 1835, sowed a breadth of 18 English acres. It was introduced into the Lothians in the following year, and received a rapidly extended cultivation in the various wheat districts of Scotland, as well as in England and Ireland. Its culture is now, however, considerably on the decrease, from the circumstance of dealers offering only a secondary price for it, as they consider it inferior for baking to most of the older red wheats, amongst which it is generally classed, notwithstanding the whiteness of its straw and chaff.

Samples of wheat under the names of King William, Thickset, Incledon's prolific, Courtney's six-rowed Chevalier, Norfolk, &c. have been at different times received from various parts of England, between Hickling's, and which no difference apparently exists, except

such as may be attributed to the difference of climate, soil, &c. in which they had been grown.

27. *HOPETOUN White Wheat* is the produce of a single ear of unusual size, which was discovered in 1832 on Mr James Reid's farm of Drem, E. Lothian, by his steward Alexander Douglas, who presented it to Mr Patrick Sheriff, originator of the well known Hopetoun oat, and then occupier of the neighbouring farm of Mongoswells. From the original ear Mr Sheriff carefully extracted the grains, ninety-nine in number, without disfiguring its appearance, and afterwards presented it to the Messrs Drummond, Stirling, in whose agricultural museum it is still preserved. Mr S. having left Mongoswells in 1836, gave the whole produce of his Hopetoun wheat, then amounting to about five bushels, to Mr James Reid, who has since grown it with much success; and within the last two years it has been pretty widely distributed amongst growers, who generally consider it an improved stock or subvariety of Hunter's, page 3 of Ag. Manual.

28. *INDIAN White Wheat*.—Straw short and stout; ear rather under the medium size; chaff very white, remarkably short, and rounded or blunt-pointed; spikelets generally containing three or four grains, of a somewhat transparent whitish colour, ordinary size, and good quality. This peculiar chaffed variety was received from M. Vilmorin, Paris, in 1839, with no particulars as to its history or quality, except that it was obtained from the E. Indies; and it is extremely doubtful whether it will ever deserve the attention of growers, unless perhaps, in warm climates.

29. *MALAGA White Beardless Wheat*.—Straw of medium length, fine, and rather brittle; ear erect and thin, the spikelets averaging five to the inch, and generally three or four seeded; chaff short and rounded at the point, very white coloured, thin, and brittle; grains large, somewhat oblong, white, and thin skinned, forming a superior sample. This variety was received in autumn 1840 from London, along with the Barbary thick chaffed wheat formerly noticed, but judging from one year's trial, together with its general characteristics, it appears too tender and fine for the climate of this country.

30. *MARIANAPOLI Red Beardless Spring Wheat*.—Young plants vigorous and hardy; straw tough, firm, and erect; ears of medium length, thin, and slender, the spikelets being at most only three seeded, and the joints of the rachis about five in the inch; chaff thickish and firm, bright brownish coloured, and furnished, towards the point of the spike, with a few scattered awns, from one-fourth to three-fourths of an inch in length; grain rather under the medium size, oblong,

thin skinned, and of a bright reddish colour; forming a superior sample compared with most other red spring wheats. This variety was obtained in 1839 from M. Vilmorin, Paris, who received it from the department of Vaucluse, as being an early and deserving winter sort; but from trials made by him, he is of opinion that it will answer better as a spring wheat in the north of France. A sample sown with the others in our collection last autumn stood the winter well, appeared less liable to disease, and ripened as early as the generality of the spring varieties, but seemed very deficient both in produce of straw and grain.

31. *NAPLES Bearded White Wheat*.—Straw short and somewhat tender; ears rather shorter, but fully more compact, than the generality of bearded spring wheats; chaff and awns white and brittle, the former scarcely enclosing the grains, which are large, oblong, and of a dark brown transparent colour, forming a rather coarse-looking sample. This sort was received in 1839 from France, where it is rather scarce, and does not seem possessed of any qualities to recommend it in preference to the more common kinds.

32. *NARBONNE Red Spring Bearded Wheat*.—Straw short and tough; ears long and thin, the joints of the rachis being four to five in the inch; spikelets large, spreading, and often four-seeded; chaff large and firm; of a dark brown colour at the sides, and lighter towards the centre of each spikelet; awns brownish, long and spreading; grains of medium size, long shaped, and forming a dark-coloured, rather inferior sample. This sort appears to be rather subject to disease, and seems possessed of no property to entitle it to culture in this country.

33. *PAINTED-STALKED White Wheat*.—Straw short, tough, and of a beautiful reddish or purple colour; ear under the medium size, erect or slightly inclined, and whitish chaffed; grains of medium size, slightly oblong shape, thinnish skin, and forming a good sample. This variety was received from France in 1839, under the name of *Blé Pictet*, and is found to retain the characteristic colour of its straw under cultivation, but has no other real property to recommend it.

34. *PEARL White Wheat* was imported from Middlesex to Leith in 1838, by John Watson, Esq., corn-merchant there; and was then considered as being very closely allied to the Uxbridge (page 3 of Ag. Manual), and more recently many growers were of opinion that it was identical with the Oxford prize, or an improved variety of Brodie's wheat (No. 11.), compared with which, it is, however, shorter and smaller in grain, as well as heavier and superior in sample; it

also ripens fully earlier, and produces stiff and rather longer straw. Archibald Scott, Esq. of Southfield, one of its first growers in this country, gained the premium at the Haddington Show with this sort, in autumn 1839, which had been sown in the previous spring, and weighed 64 lb. per bushel; and in 1840 he again carried the prize with it, sown in the previous autumn. Weight 66 $\frac{1}{4}$ lb.

35. SALMON *White Wheat*.—Straw stout and rather under the medium length; grain of ordinary size, somewhat oblong in shape, thin skinned, and of a transparent whitish or salmon colour, forming a superior sample. In some of the southern counties of England, where this sort is pretty extensively grown, it is considered as being both hardy and prolific; but although introduced at various times, growers in Scotland do not seem to have found these properties so prominent, or its characteristics so distinct, as to have led them to give it more than a very limited cultivation.

36. SARK *Yellow or Red Wheat*.—Straw rather short, but tough and firm; ears brownish coloured, slender, and slightly curved; grains three and sometimes four in the spikelet, of a thin oblong form, and dull yellowish colour. Col. Le Couteur, Jersey, from whom this variety was received, first obtained it from the island of Sark, which he reports as being much visited by storms, and where the fields receive no artificial shelter, consequently he presumes that it may be advantageously grown in cold and late districts; but the results of one year's culture in this country tend to shew that hardness is its only property, as it is neither prolific nor does it yield a good sample.

37. SAUMUR *Yellow Wheat*.—Straw tall, erect, thickish, somewhat soft, and, as well as the chaff, of a whitish colour; ears large, and medium compact; grains large, oblong, thinnish skinned, and light red or yellowish coloured, forming a good sample. This variety is said to have originated in the valleys of Anjou; and its culture has, of late, increased rapidly in the districts of Orleans, La Beauce, vicinity of Paris, and other parts of France, from having been found fully a week earlier, as well as more prolific, than the commoner sorts; but the unusually severe spring of 1838 proved it to be also more tender. Small quantities grown in this country shew it to be a healthy and free grower; but seemingly possessed of no qualities to recommend it in preference to the sorts in general cultivation.

38. TOUZELLE *Red Wheat*.—Under this name a variety has recently been received from M. Vilmorin, Paris, without any accompanying description; it has a longish and rather thin dark reddish-coloured spike, with large firm chaff, and largish, well-filled, thin-skinned, reddish grains.

39. *TRANSPARENT Red Bearded Spring Wheat*.—Straw longer than that of most spring wheats, firm and flexible; ears long and very slender; chaff of a transparent lightish brown colour, large and hard; grains two or three in the spikelet, largish sized, somewhat hard or flinty, and of a transparent reddish or yellow colour, forming a medium sample. Compared with the other French spring wheats, this seems to yield a more bulky crop of straw, and is also a more hardy and free grower; but its produce in grain is too scanty to render it worthy of attention.

40. *TREMOIS Black Jointed White Bearded Wheat*.—This variety has strong broad foliage, and the young plants tiller remarkably in spring; its straw is of medium length, thick, but soft, and brittle when ripe, generally a good deal kneed or bent at the large blackish joints; ears of ordinary size and pretty compact, furnished with long spreading awns; grains usually three and sometimes four in the spikelet, of medium size, oblong shape, and whitish colour; forming a goodish sample. A sample in straw and grain was sent to the Museum, in 1838, by Mr A. Gorrie, Annat, Perthshire, who had it from Col. Le Couteur, through Dr Hamilton of Plymouth, and J. C. Loudon, Esq., conductor of the Gardeners' Magazine, &c., as an early spring or three month wheat, as its name implies. In Perthshire it has proved, however, to be fully as late as the common winter wheats, and on the whole does not seem possessed of any properties to recommend it for cultivation in this country.

41. *TUNSTALL White Wheat*.—Several varieties have been grown under this name in different parts, including even the *white woolly-eared* or *hedge wheat* (page 6 of Ag. Manual); and one was brought into notice by Sir Francis A. M'Kenzie, bart. of Gairloch, at the Highland and Agricultural Society of Scotland's Show at Inverness in 1839, under the name of *Tunstall thick-chaffed wheat*, which he recommended for cultivation in that district, but further particulars regarding it have not been received.

42. *VILMORIN'S White Wheat*.—Straw long and thick, but not firm in texture, consequently liable to get lodged in very rich soils; ears very long, compact, and generally curved or waved; spikelets short, and often four-seeded; chaff hard, glossy white, and completely enveloping the grains, which are short or roundish shaped, and of a light cream colour; forming a very superior sample. This seemingly superior variety was communicated by Col. Le Couteur, in 1839, who had it originally from M. Vilmorin of Paris, in compliment to whom he has named it; which name is here retained in consequence of its ap-

pearing quite distinct from any of the numerous named sorts which have at different times been received from M. Vilmorin. From the limited trials which have been made of it in this country it appears well deserving of farther attention.

43. **WATERLOO Red Wheat.**—This variety produces a strongish straw, yields a good sample, and is of medium fecundity; it may be farther described as bearing a considerable resemblance to the Burwell red, No. 12, but does not seem possessed of sufficient properties to induce growers to cultivate it in preference to the more generally known kinds. This sort was received in autumn 1836, from Messrs Jacob Wrench and Sons, seedsmen, London; and was originated by a Suffolk farmer some years previously.

44. **WHITTINGTON'S White Wheat.**—Young plants bushy and hardy; straw very long and of softish texture; ears unusually large, and drooping; spikelets large and spreading, often four, and not unfrequently five-seeded; grains large, oblong, thin skinned, and forming a very superior white-coloured sample. This well known and highly prolific variety is named after Mr Whittington, land agent and valuator, at Whitmore House, near Ripley, Surrey, and is the produce of three ears received from Switzerland by him in 1830. In 1836, he first offered a limited quantity of its seed for sale, since which its cultivation has spread rapidly in the different wheat districts both of England and Scotland. In the latter country it has of late, however, somewhat fallen in the estimation of growers, from the unfavourableness of the seasons, and its being liable to lodge on rich soils, where its culture has been attempted by many, contrary to the advice of its originator, who recommends it for thin or inferior soils only, for which it is particularly suitable, and has also been found to succeed well as a spring wheat, being fully earlier than the commoner sorts.

A sample received along with the last variety (Waterloo red wheat) from Wickham, Suffolk, under the name of *Wellington*, and another from London called *Eley's gigantic* white wheat, said to have been discovered in 1832 by Mr Charles Eley, Sion Hill, Islesworth, have been grown for the last three seasons along with Whittington, between them and which no difference can be detected: these may therefore be considered as synonyms.

45. **WHITWORTH White Wheat.**—Straw of medium length, slender and firm; chaff thin, firm, and of a whitish colour, tipped with light brown; grains oblong, tapering towards the point, white and thin skinned; forming a superior sample. In the county of Durham and neighbouring districts this variety has been a good deal sought after

of late years for spring sowing, it being about a week or ten days earlier than the common sorts. It was first introduced to these parts by Gilbert Wood, Esq. of Whitworth, who received it from the south of England without a name.

A sample procured in autumn 1838, from the London market, under the name of *Eltham wheat*, seems to be identical with the Whitworth, neither can we detect the least difference between it and another procured in 1839 from M. Vilmorin and Co., Paris, named *Early striped chaffed wheat*, which was originally sent to them from England by Mr Samuel Taylor.

TRITICUM TURGIDUM, L.—TURGID WHEAT.

46. AFRICAN *Turgid Wheat*.—Straw very long, stout, and nearly solid; ears long and more open than is usual in the varieties of this species; chaff hard, slightly downy, dark brown on the margin, and shaded off to a light yellowish colour inwards; grains medium sized, yellowish, and somewhat transparent, of a short and irregular roundish shape. This and the three following varieties were recently received from M. Vilmorin and Co., Paris, and like others of the same species, there is little probability of their ever being grown with advantage in the climate of Scotland; their lateness and other peculiarities suiting them better for such as the southern countries of Europe.

47. GARAGNON *Black Bearded Turgid Wheat*.—Straw long, very thick, stout, and nearly solid; chaff large, rigid, smooth and white, forming a striking contrast with the long black awns; grains very large, lightish coloured, and of an oblong irregular shape.

48. TAGANROCK *Black Bearded Turgid Wheat*.—This variety resembles the last in having long black awns, and smooth white chaff, but its ears are much shorter and more compact; chaff larger and more hard or firm in texture, and its grains are still larger, and of a more oblong shape, forming a sample resembling that of the varieties of *Triticum durum*, p. 25 of Ag. Manual.

49. ST HELENA *Giant Turgid Wheat*, page 24 of Ag. Manual. Some years since a reputed superior turgid wheat was brought under the notice of French cultivators by a M. Barand of Louisiana, under the name of *Blé Nonette de Lausanne*, which was found to be the same as the Giant St Helena Turgid wheat, a sort now esteemed one of the best for the richer soils of the middle and south of France; and in this country it appears to ripen rather earlier, and produces a better sample than most others belonging to this species.

ZEA MAYS of *Linnaeus*.—MAIZE or INDIAN CORN.

Since the publication of the Agriculturist's Manual, numerous varieties of Indian corn have been added to the collection, but as they are of comparatively little importance to the British farmer, the following short notices of the principal sorts have been deemed sufficient.

1. AMERICAN POP or SNAP *Indian Corn*.—Length of the spike or ear seldom exceeding 7 inches, and average diameter of the same about $3\frac{1}{2}$ inches; grains usually in twelve rows, very small, roundish or slightly compressed, and of a blackish purple colour. Cultivated in the northern states of the Union, and chiefly used for parching. This variety was received in 1840 from Mr M. B. Bateman, proprietor and editor of the "Genesee Farmer," Rochester, N. America, along with specimens in ear of Nos. 2, 3, 4, 5, 12, and 13.

2. CANADIAN EARLY YELLOW *Indian Corn*.—Ear usually 8-rowed, and 7 to 9 inches long by from 4 to $4\frac{1}{2}$ inches in circumference; seeds small, bright yellow coloured, and oblong shaped. Much grown in Canada and the northern states.

3. CHINESE TREE *Indian Corn*.—Average length of the ear about 9 and circumference $5\frac{1}{2}$ inches; seeds in 12, 14, or 16 regular rows, rather under the medium size, considerably compressed, and whitish coloured. This sort was highly recommended in some of the American agricultural periodicals some years since, but it is found to be suited only for the southern or warmer districts.

4. DUTTON or 12-ROWED *Indian Corn*.—Ear from 9 to 12 inches long, and $5\frac{1}{2}$ to 6 inches in circumference; grains generally in 12 somewhat irregular rows, of medium size, roundish shape, and light yellow colour; esteemed the best and most generally grown variety in the northern states and some parts of Canada. Specimens of this sort were also received from Mr C. P. Bosson, editor of the "Yankee Farmer," Boston, in 1841, along with those of Nos. 6, 8, 9, 10, and 11.

5. EARLY RED-BLAZE *Indian Corn*.—Ears generally 8-rowed, and about 8 inches in length, by $4\frac{1}{2}$ to 5 in circumference; grains of medium size, much compressed, of a whitish colour in the more concealed parts of the spike, and varying to a light pink and deep reddish brown colour where exposed to the sun or light through openings in the sheath. A good early sort, and somewhat extensively grown in the same districts as the last.

6. EARLY SMALL 8-ROWED *Indian Corn*.—Average length of ear about 7 inches, and circumference $4\frac{1}{2}$ to 5 inches; seeds usually in 8

regular rows, large, very much compressed, and of a bright yellow colour. Only cultivated in districts where there exists an uncertainty of the larger and more productive sorts ripening.

7. **EARLY VARIEGATED *Indian Corn*.**—Ears generally under 6 inches in length, by about $3\frac{1}{2}$ inches in circumference; seeds usually in 8 somewhat irregular rows, rather small, slightly compressed, and varying in colour from almost entire white to a deep red or lake, while others in the same spike have a deep purple or bluish tinge. Received in spring 1841 from Germany, and said to be fully as early as either the Egyptian or Cobbet's Maize, page 57 of the Manual. Many of the other varieties occasionally produce variegated ears, which, however, do not retain that permanency of character which seems to attach to this.

8. **NANTUCKET LARGE WHITE *Indian Corn*.**—Average length of ear 8 to 9 inches, and circumference 5 to $5\frac{1}{2}$; seeds in 8 very regular rows, very large, a good deal compressed, and of a transparent whitish colour. This bears a considerable resemblance to a late sort called in France, the large white Maize, but appears generally to have fewer rows in the spike, with fully larger and more oblong-shaped grains.

9. **PEARL *Indian Corn*.**—Ear seldom exceeding 6 inches in length, and 3 in circumference; grains in 8 rows, very small, roundish shaped, and of a transparent whitish or pearl colour. A rather late and unproductive variety.

10. **RICE-SEEDED *Indian Corn*.**—Circumference of the ear usually exceeding its length, which is seldom more than 4 inches; seeds very small, roundish, or conically pointed, of a transparent whitish colour, and so irregularly inserted in the spike that the rows can only be traced in portions of some specimens. Altogether the appearance of this is so distinct from that of other varieties that it may ultimately be found to constitute a distinct species.

11. **ROCKY MOUNTAIN OR LEAFY-SPIKED MAIZE.**—An ear of this sort received from Mr Bosson, of Boston, United States, and reported to have been originally brought from the Rocky Mountains, is 12-rowed, and measures about 7 inches long, with an average circumference of about 6 inches; and its grains, which are of medium size, whitish colour, and slightly compressed, are entirely enveloped by the large, foliaceous, two valved calyx, which gives to the spike the appearance of being composed of closely imbricated small leaves; so that this may even be considered better entitled to rank as a distinct species than the last.

12. *SUGAR Indian Corn*.—Average length of ears about 7, and circumference $4\frac{1}{2}$ inches; grains in 8 regular rows, compressed, a good deal wrinkled, and of a lightish transparent colour. Chiefly used for the table when green.

13. *VERMONT EARLY Indian Corn*.—Ears about 7 to 8 inches long and $4\frac{1}{2}$ inches in circumference; grains in 8 regular rows, medium sized, a good deal compressed, and of a deep yellow colour. An early variety, cultivated in the northern states and Canada.

In addition to the preceding, several other less distinct yellow-seeded varieties were received from America, under the names of Connecticut, New Hampshire, Pomroy, Twin corn, &c., descriptions of which have not been given, as they appear to be merely local names.

ZIZANIA AQUATICA of *Linnaeus*, or CANADIAN RICE.

GENERIC CHARACTERS.—Inflorescence paniced; barren and fertile florets distinct, the former usually six-stamened; corolla of the latter a two-valved hooded and awned glume; seeds solitary and enveloped in the plaited corolla.

SPECIFIC CHARACTERS.—Panicle effuse; spikelets drooping; barren and fertile florets mixed; seed included in the awned corolla; from a half to three quarters of an inch in length when ripe; cylindrical shaped, dark brown coloured, and hard or flinty. Annual. Native of N. America.

Seeds of the Canadian Rice were communicated to the Museum by John Haldane, Esq., Haddington; and also by Mr C. P. Bosson, editor of the "Yankee Farmer" newspaper, Boston, United States; all of which had, however, lost their vitality,—to retain which they require to be brought home in an air-tight vessel, among mud or water. From several trials which have been made to grow this plant in Great Britain, it appears that the summers are, in general, not of sufficient warmth for bringing its seeds to full maturity, although it grows abundantly at considerably higher latitudes in the north and north-west of America; where, in shallow streams, and by the margins of lakes, it attains a height of from 6 to 10 feet, and affords food for the wandering natives, as well as for the vast numbers of aquatic fowls which abound in the less frequented regions of that continent.

LEGUMINOUS GRAINS—*Leguminosæ*.FABA VULGARIS ESQJINA of *Loudon*.—HORSE or FIELD BEAN.

1. ANNFIELD *Field Bean*.—Height of plant usually about $4\frac{1}{2}$ feet, pods $3\frac{1}{2}$ to 4 inches long, and generally containing 3 or 4 beans, which are of a large size, somewhat flattened, and most commonly tapered to a small roundish point. This variety is of medium earliness, and rather productive, especially when grown in superior early soils. No particulars as to its origin have been received, but it may be described as bearing a near relation to the Early Mazagan, page 64 of *Ag. Manual*, and consequently is one of the largest class of field beans. A sample was first sent to the Museum in 1837 by Claud Alexander, Esq. of Ballochmyle, Ayrshire, from a crop grown on a black moorish soil, at an altitude of 400 feet above the level of the sea; which was sown on the 7th Feb., and reaped on the 24th Sept. of that year. Produce per acre about 34 bushels.

2. HELIGOLAND *Field Bean*.—Height averaging about $3\frac{1}{2}$ feet; pods small, straight, cylindrically shaped, and very numerous, as many as 50 being occasionally found on a single plant; beans 3 or 4 in each pod, well-filled, of a roundish or slightly oblong shape, and very small, forming a superior and heavy sample. This is an early and hardy-growing sort, and consequently suited for the higher classes of bean soils, but many growers who have given it a fair trial are beginning to discontinue its culture, from finding that the smallness of its seeds causes a deficiency in the actual bulk of produce, notwithstanding its unusual fertility. A sample, the produce of carefully selected seed of Heligoland beans, was received for the Museum in spring 1837, from Mr John Clark, Long Sutton, and we have also been indebted on several occasions for samples, both in grain and straw, to William Ewing, Esq., Concraig, Crieff, Perthshire, who cultivates two varieties, the one having white and the other black eyes, which he selected from the stock first brought to that district from Lincolnshire by the Right Honourable Lord Willoughby d'Eresby, and finds it to be decidedly preferable to the common sort,—his crop in 1838 having weighed 69 lb. per bushel, and yielded 64 bushels per Scotch acre.

3. PROLIFIC PURPLE *Field Bean*.—Height 4 to $4\frac{1}{2}$ feet; pods numerous, usually containing 4, occasionally 5, seeds, which are rather smaller in size, but similar in form to those of the common tick bean,

page 63 of Ag. Manual ; of a bright purple or reddish colour when ripe, and becoming much darker afterwards. This variety was introduced to Scotland from Mark Lane some years since, and although found to succeed well in good early districts, its culture has been almost entirely discontinued, from a prejudice existing amongst dealers against the colour of its sample.

4. WINTER *Field Bean*.—Since the publication of the Agriculturist's Manual, it has been ascertained that this variety is perfectly distinct from the Heligoland bean, No. 2 ; and although it has been cultivated with considerable success in various parts of the country, growers generally seem to agree that it is only in very favourable autumns that its sowing can be profitably attended to.

Of Garden beans not noticed in, or introduced since the publication of, the Agriculturist's Manual, the principal one is *Marshall's new early dwarf prolific*, besides which several sub-varieties of the older sorts have been brought into partial notice, a description of which has, in the present instance, been deemed unnecessary.

PISUM SATIVUM ARVENSE of *Linnaeus*—FIELD PEA.

1. GREY DANTZIC *Field Pea*.—This name has been applied to a small round dark grey seeded variety, lately imported to Leith from the Baltic, which in appearance of sample very much resembles large tares ; but nothing farther is as yet known of its characteristics or merits.

2. HIMALAYAN SMALL GREY *Field Pea*.—Straw from 18 inches to 2 feet in length, weak and straggling ; blossoms always solitary ; pods generally under an inch and a half in length, well filled, curved or scimitar shaped, and usually containing five or six peas, which are, when ripe, of a dull greenish colour, speckled with brown, and not larger than common tares or vetches. In our collection containing 73 sorts of field and garden peas grown in 1840, this was found to be the earliest, smallest seeded, and the least productive. Its seeds were sent from the Himalaya by the Hon. W. Leslie Melville, under the name of Kullao, and being from a district of Asia which is supposed to have produced many others of our most useful cultivated plants, it is not improbable but that it may be the origin from which all the improved varieties of the pea at present in cultivation have been derived.

3. WHITE PODDED SUGAR *Field Pea*.—Average height from 5 to 6 feet ; pods whitish, irregularly shaped when full grown, and composed

of a thick fleshy skin without endocarp ; peas of largish size and light dun colour, slightly speckled, and forming a superior sample. Although somewhat early and fully more than usually prolific, this sort is never likely to be much grown as a field pea, the want of the endocarp rendering the pods easily broken in harvesting, and it is also inferior in quality for culinary purposes to the sugar or skinless peas usually grown. Samples have at various times been received from Messrs Vilmorin & Co., Paris, and also of crop 1841, from Charles Guthrie, Esq. of Tay Bank, Dundee, along with those of Nos. 6, 7, and 63 of Ag. Manual.

Several superior varieties of the garden pea, as well as considerable numbers of improved or slightly altered subvarieties of the older sorts, have been introduced since the publication of the *Agriculturist's Manual*, descriptions of which, in this Supplement, have been deemed inexpedient. The following list of names of the principal sorts alluded to may, however, be acceptable to some, viz. *Auvergne pea*, *St Heliers new wrinkled marrow*, *Bedman's improved dwarf imperial*, *Victoria tall*, *Turkey white crown*, *Adelaide royal dwarf*, *Knox's new champion*, *Rising Sun*, *Waterloo new early frame*, *Thomson's early dwarf*, *Sultana sugar pea*, &c.

PHASEOLUS VULGARIS of *Linnaeus*—DWARF KIDNEY BEAN.

The culture of kidney beans in this country being almost exclusively confined to the garden, the descriptions of the lately introduced sorts are here dispensed with, as in the case of Garden Beans and Peas. The following are, however, the names of the principal of these, *Thousand to one kidney bean of America*, *Canary*, and *Black Belgian*.

HERBAGE AND FORAGE PLANTS.

I. GRASSES.—GRAMINEÆ.

1. ALOPECURUS NIGRICANS of Horneman—*Blackish headed-Foxtail Grass.*

Specific Characters.—Inflorescence forming a cylindrically spiked panicle, tapering slightly towards the base, and of a darkish colour; glumes villous and fringed, about half as long as the awns of the palæ: Perennial, 3 to 4 feet high. Native of Europe and the north of Asia.

This grass somewhat resembles the meadow foxtail; but besides the darker colour of its panicles, it differs in being of a much more luxurious and rigid habit of growth; it also comes into use rather earlier in spring. The results of several trials to grow its seeds in Scotland seem to indicate an unsuitability in the climate for that purpose, but as these are now beginning to be grown on the continent, a few years will be sufficient to test its real merits. It was first brought into favourable notice in Loudon's *Gardeners' Magazine* for May 1839, page 301, by a correspondent, who says, "I have some new grasses of which I entertain great hopes: One from Siberia (*Alopecurus nigricans*) seems to be valuable for its bulk and earliness beyond most grasses which we have hitherto had in cultivation."

2-4. CYNODON DACTYLON, *the creeping Cynodon*. DIGITARIA HUMIFUSA, and D. SANGUINALIS, *spreading, and slender spiked Finger-grass* or *Polish millet* are all remarkable for the peculiar arrangement of their inflorescence, which is formed by 3, 4, or more spikes, radiating from the top of the culm or stalk. The first is a creeping perennial, found in some parts of the South of England, particularly about Cornwall; it grows abundantly in France and others of the southern countries of Europe, where it may be said in many instances to occupy that place in their vegetations which is done in this by the *Poa annua*, springing up like it by the waysides, and filling the inter-spaces amongst the stones of causewayed streets, &c. It is, however, of little interest to the agriculturist, unless from its proximity to *Cynodon linearis*, the famous Durod or Doob-grass of the Hindoos,

for which the seeds of *Digitaria humifusa*, a plant of annual duration and humble growth, have of late years been imported from the continent; and is there found in similar localities with the first. Another species, however, of *Digitaria*, viz. the *D. sanguinalis* or Polish millet, also found in some parts of the south of England, is much superior to either of the preceding in produce of herbage, but is chiefly esteemed for its seeds, which, in various parts of Europe where it abounds, are boiled with milk and eaten like rice.

5. *DACTYLIS GLOMERATA GIGANTEA* of Booth—*Gigantic Cocksfoot-Grass*. This is one of the results of an increasing attention which has of late years been bestowed upon the improvement of the natural grasses, by selecting and propagating from varieties possessed of superior properties. It is distinguished from the common form of the species, by its being of a much more vigorous growth, attaining to a considerably greater height, and producing larger sized seeds. This variety was first grown by Messrs J. G. Booth & Co., Hamburg, and introduced from thence by us in 1841.

6. *ELYMUS GENICULATUS* of Linnæus—*Jointed Lime-Grass*.

Specific Characters.—Spikes long and slender, often jointed or bent down as if broken; spikelets three, flowered, pubescent, and remote; perennial, grows naturally on sandy sea shores, but not common on those of Britain.

This plant bears a considerable resemblance to the *Elymus arenarius* (page 131 of Ag. Manual); but differs in its foliage being narrower, and in its spikes, as well as general habit, being more loose or open. In addition to being useful for similar purposes with the other, its large oat-like seed afford good food for wild-fowl; and, from growing in large tufts, to the height of from 4 to 6 feet on almost any sort of soil, it may be beneficially employed as a cover for game, especially in rabbit warrens, and sandy or gravelly links.

7. *FESTUCA DURIUSCULA* of Linnæus, *Hard Fescue-grass* (page 121 of Manual.) Attention has of late been directed to the cultivation of improved and permanent varieties of this variable but highly useful grass, by Mr Thomas Bishop, Methven Castle, who, from many others, has selected and grown for some years the following four.

8. *F. DURIUSCULA PRÆCOX*, or *Early Hard Fescue*. A purplish coloured, very early, and consequently useful variety for spring pastures.

9. *F. DURIUSCULA PURPURATA*.—*Purplish Hard Fescue*. So named from its general colour, and that of its stems and panicles in particular. This Mr B. considers by much the most productive of

the Hard Fescues, and exceedingly well adapted either for hay or pasture lands.

10. *F. DURIVUSCULA SERRATA* or *Saw-leaved Hard Fescue*, so named from possessing in a greater degree than the others, a particular roughness on the margin of its leaves. Sheep are found to manifest a partiality for this sort; and the pleasing green colour of its foliage which it retains in an unusual freshness throughout the winter, renders it especially applicable for lawn pastures.

11. *F. DURIVUSCULA URL.* *Bishop's Creeping Rooted Hard Fescue* (page 121 of Manual.) From the creeping tendency of this, it might perhaps with more propriety have been included under *Festuca rubra*, from which, however, it differs in other particulars; its principal value depends on the deep and creeping habit of its roots, which suits it in an eminent degree for withstanding severe drought, and, in the opinion of its originator, would render it a valuable acquisition to colonists in such climates as Australia.

12. *FESTUCA ELATIOR GIGANTEA*, of Booth: *Gigantic Tall Fescue-Grass*.—This name has been very appropriately applied by its originator to a very strong growing variety of Tall Fescue-grass lately introduced and distinguished like the Giant Cocksfoot-grass, No. 5, by its gigantic growth, and large size of seeds; in addition to which properties, it is also more prolific in seed than some of the commoner varieties of *Festuca elatior* (page 120 of Ag. Manual).

13. *LOLIUM ARVENSE*, *Annual Beardless Darnel*.—The Beardless Darnel of Hooker, and other British Botanists (page 112 of Manual), is the *Lolium speciosum* of continental authors, and is distinguished by being of larger size, more rough and stout in its habit than the true *L. arvense* (page 113 of Ag. Manual), a plant not hitherto discovered in Britain, and described as being of a slender habit of growth, spikes nodding or drooping from the weight of their seeds, when approaching to maturity; spikelets shortly oblong, beardless, and generally exceeded in length by their solitary appressed glumes.

14. *LOLIUM ITALICUM* of the "Bon Jardinier." *Italian Rye-grass* (page 106 of Ag. Manual).—This species is synonymous with the *Lolium Bouchianum* of Kunth, who in his *Agrostographia* thus describes it. "Spikelets about thrice as long as their glumes; and each containing five to ten awned florets; root perennial; native of Italy." And farther, that "this species differs from *Lolium perenne* in its florets being awned; from *L. arvense* and *L. temulentum* in the glumes being so much shorter than the spikelets, as well as in its being of more perennial duration, by which last property it also dif-

fers from the next and more nearly allied species, *L. multiflorum*, from which it is also farther distinguished by having in general smaller spikes, and fewer florets in its spikelets."

An experience of 10 years since our first introduction of the Italian Rye-grass to Britain, enables us now to give a more decided description of its habits than formerly. In respect to duration it may be termed a subperennial, beyond which title even the most permanent varieties of *Lolium perenne* have no claim. In most instances, two seasons of Italian Rye-grass are all that can, with any degree of certainty, be depended upon; and in very wet, cold, spongy soils, it will often exhibit a thin stock the second season. Instances have, however, occurred in which as many as five and even six successive years' produce have been reaped from the same field, but this has arisen more from the ground having been resown in course of reaping the seed, than from the actual duration of the original plants; the seeds being remarkably easily separated from the hay, even although not perfectly ripe, which will always render the harvesting of them an operation attended with considerable care and difficulty.

Although the natural tendency of the Italian Rye-grass is to produce many stalks or stems from the same root, yet, from its upright habit of growth, it by no means forms a close turf; hence the propriety of sowing it with a mixture of other grasses of a different habit, which, by filling up the interstices, will add considerably to the weight of produce.

Different opinions are still entertained as to the real merits of Italian Rye-grass, but, perhaps, the best proof of its excellence is the great and yearly increasing demand for its seeds. In addition to its uses for hay or pasture it has been very successfully employed as a substitute for tares, a practice described and highly recommended by Mr Thomas Bishop, Methven Castle, in a communication to the Highland and Agricultural Society of Scotland, published with their Prize Essays and Transactions, March 1839. His experiments were at first, 1837, confined to about $2\frac{1}{2}$ imperial acres of heavy red loam, which on the 4th of May he sowed with 4 bushels of Italian Rye-grass, and 20 lb. of crimson clover, but as he wished the crop to form a basis for permanent pasture, he added 8 lb. of Timothy-grass, $4\frac{1}{2}$ pecks of Fescue-grasses, 8 lb. of red, and 12 lb. of white clover. All the seeds vegetated rather slowly, on account of the dry cold weather that followed; but on the return of moist weather they grew with astonishing rapidity, so as to be in condition for mowing as food for horses on the 15th of August, and they con-

tinued to yield an abundant supply until the end of October, part having been cut a second time. Many of the Italian Rye-grass stalks measured upwards of five feet in height; the Timothy-grass came partly into flower, and the crimson clover was much earlier than the common red, but both gave good returns. The horses that were fed on the mixture got into better condition than they had been during the previous part of the season, although employed at the time in subsoil ploughing moor-ground. The weight of green produce cut on the 26th of September was at the rate of ten tons seven cwt. per imperial acre—and in hay two tons three cwt. The greater part of the Italian Rye-grass was killed during the winter by the long continued snow-storm; but that which remained, was the first ready for mowing in spring, and with the other grasses, and white and red clovers, yielded an excellent crop of hay in course of the summer.

Like all other plants subjected to artificial culture, the Italian Rye-grass is productive of numerous sub-varieties, as a proof of which, we received in 1838 specimens of no less than 50 distinct spikes, from Mr Robert Arthur, which he collected in a field near North Berwick. In this country no attention has, however, as yet been devoted to the selection and cultivation of any variety possessing permanency and superiority of character.

15. *LOLIUM MULTIFLORUM* of Lammaroux, *Many-flowered Annual Rye-grass*.—This differs from the Italian Rye-grass in being of less duration, or strictly annual, and is thus described by Reichenbach in his *Flora Germanica*. “Spikelets many-flowered, compressed, about twice as long as their glumes; awns longest on the florets of the terminal spikelets, and occasionally wanting towards the base of the spike; root annual.” Under this species the following two varieties fall to be included, seeds of which were received from France in 1837; but as they were not found superior to the common in quality or bulk of produce, while they were both so strictly annual as to yield no grass after being cut for seed, their cultivation was discontinued.

16. *LOLIUM MULTIFLORUM*, var. *Brittany many-flowered Annual Rye-grass*.—This variety seems to possess the most common forms of the species, and is indigenous to the province of the same name in France, where it was first taken notice of in 1835 by M. Rieffel, Director of the Agricultural Establishment of Grand Jouan, who finds it particularly useful for growing as a single crop, it being only of annual duration, and eminently suited for such soils as he farms, viz.

high wet moorish lands of considerable tenacity, and such as do not retain the clovers throughout winter. He recommends sowing it in September at the rate of 40 lb. per acre, and finds it to yield enormous crops of herbage and hay.

17. *LOLIUM MULTIFLORUM* *submuticum* of the "Bon Jardinier." *Bailliy's Short-awned Annual Rye-grass*.—Was brought into notice by a celebrated agriculturist of that name in the department of the Loire, also about 1835, and differs from the last in having only those seeds towards the extremity of its spikes slightly awned, which circumstance, together with the form and great weight of the seeds, as well as its shortness of duration, gives it the appearance of a hybrid between *Lolium italicum* and *L. arvense*. Besides having much heavier seeds, it is shorter in growth, as well as thicker in straw, and finer in foliage than No. 16, and M. Bailly reports having reaped as much as 5000 or 6000 lb. of seeds per acre.

18. *MILIUM EFFUSUM* of Linnæus—*Wood Millet-Grass*.

Generic and Specific Characters.—Inflorescence panicked; panicle large and regularly diffused; glume without a keel, smooth, beardless, and two-valved; paleæ equal in size, less than the glumes, and closely enveloping the seed. Perennial; grows naturally in old woods and copses, and most frequently on rich vegetable soils composing the shelving and sloping banks of rivers, where it usually attains a height of 4 to 6 feet.

The merits of this the most elegant of British grasses have long been overlooked. Some years since the following description of it appeared in the *Floragraphia Britannica*. "The panicles of this graceful and pretty grass are sometimes found near a foot long, and eight inches wide; the seeds are a favourite of numerous birds, and the abundance which it produces, together with its naturally preferring to grow in the cool and shade of trees, sufficiently recommend it as a grass of great utility in game preserves; and its elegance and soft green colour would form an ornament of no inconsiderable beauty in the shade of plantations and pleasure-grounds, where but few other plants will grow."

A communication by Mr A. Gorrie, Annat Cottage, appeared in the Quarterly Journal of Agriculture for March 1839, which it is hoped may be the means of farther extending the usefulness of a plant seemingly possessed of more than ordinary merits. He mentions that "its broad lively green grass, which resembles luxuriant young wheat, appears early in spring. In June it sends up numerous stems 4 to 6 feet in height; and in July the panicles are richly stored with ripe millet-like seeds, which are greedily eaten by young pheasants. Every

part of the grass is relished by cattle, and the aftermath comes away freely, even after the first crop has been allowed to ripen seed."

If sown in woodlands at the rate of about 6 lb. to the acre, a sufficiency of plants will be produced for ultimately stocking the ground; and although autumn is the natural period for that operation, yet, if performed in February or March, less opportunity will be allowed for birds picking up the seeds, besides the plants from such as would vegetate in autumn are liable to perish under the falling foliage of that season. For very thick shady woods, and especially places where falling leaves usually collect, a preferable method of rearing it is to sow the seeds in a nursery bed, and afterward stransplant the plants when they have attained to a sufficient size.

19. PANICUM MAXIMUM of Jaquin.—*Many-flowered Tall Millet*, or *Guinea-Grass*. This species was formerly described under the name of *P. altissimum* (page 146 of Ag. Manual), in deference to the authority of the Bon Jardinier; but as that name was employed with more propriety by Meyer, a German botanist, to designate an annual species which, in the West Indies, climbs to the tops of trees, it is now considered more expedient to follow Jaquin's authority. Its characteristics are—height varying from 5 to 10 feet; panicle much branched and spreading, its length being often $1\frac{1}{2}$ foot, and diameter at base 1 foot; branches and branchlets slender and roughish; florets somewhat oblong and sharpish pointed, coloured, smooth, and slightly nerved; leaves numerous, long, flat, and, together with their sheaths, smooth; root perennial, and somewhat creeping. Naturalized in the West Indies and Southern States of America, to whence it is said to have been brought from the coast of Africa. Although it is found to endure the winters of this climate, yet it is by no means suitable for culture, being late in spring, and easily injured by autumn frosts; but it might form a valuable acquisition in such countries as Australia and New Zealand.

20. POA ABYSSINICA of Aiton.—*Abyssinian Meadow-Grass*. In the last edition of the Bon Jardinier, this grass is mentioned as having been so highly recommended by travellers who had opportunities of witnessing the immense returns that it yields in its native country, that several trials have of late been made, with a view to ascertain how far it might be advantageously grown in the climate of France; the results of which rather tend to shew that, although in ordinary seasons it will ripen its small millet-like seeds in the latitude of Paris, yet its culture for forage or herbage is likely only to be profitably practised in the southern provinces. Seeds were this season (spring 1842)

received from M. Vilmorin, Paris, which have been subjected to different sorts of treatment, with a view to ascertain if this grass is at all worth the attention of colonists going to, or resident in, warmer climates.

20. POA FERTILIS of Host.—*Fertile Meadow-Grass*, and the *Poa serotina*, or late flowering meadow-grass of Willdenow and others.

Specific Character.—Root somewhat creeping and knotted; culm often decumbent, swollen at and branching from the lower joints; panicle large, thickly diffused, and drooping slightly to one side; perennial. Native of Germany and other parts of the Continent, where it grows naturally in meadows and rich moist soils.

This species somewhat resembles the Wood Meadow-grass (page 124 of Ag. Manual), but is a stronger growing plant, and much more fertile in the production of seeds, properties which have rendered it the subject of experiments; but from the lateness of its growth in spring, and its producing little or almost no aftermath, their results have been by no means satisfactory.

22. POA NEMORALIS GIGANTEA of Booth—*Gigantic Wood Meadow-Grass*.—This is an improved variety of the original species, also like the Gigantic Cocksfoot and Tall Fescue-grasses, Nos. 5 and 12, introduced by Messrs J. G. Booth & Co., Hamburgh, but having been more recently brought into notice than these, sufficient time has not yet been obtained for properly testing its merits.

23. POA NEMORALIS SEMPERVIRENS, *Evergreen* or *Hudson's Bay Meadow-Grass*.—Is more generally known by the less applicable name of *Poa nervosa*, in consequence of its original cultivator, Mr Thomas Bishop, Methven Castle, having received it with that appellation from Mr Stewart Murray of the Glasgow Botanic Garden, about 10 or 12 years since. In a communication, however, from Mr Bishop to the Highland and Agricultural Society, published in March 1839, he states that Mr Murray has now no recollection of having a grass under that name, and considers that it must have been inadvertently applied to this variety, which was a short time previously received along with some others from North America.

The recommendatory characteristics of the Hudson's Bay meadow-grass are its greenness in winter, earliness in spring, and the rapidity with which it reproduces leaves and stems after being eaten or cut down; in addition to which, its thick growth, fineness of foliage, and capability of growing under the shade of trees, like the common *Poa nemoralis* (p. 124 of Manual, from which it cannot be considered specifically distinct), render it a most desirable grass for lawns and ornamental parks.

24. POA NERVATA of Willdenow.—*Nerved-seeded Meadow-Grass*.—In the description formerly given (p. 125 of Manual), this grass and the preceding are confounded together from the similarity of their names; and not having at that time had specimens of the true *P. nervata* to compare with the other, from which, as well as all the cultivated sorts, it differs essentially, and may be specifically described, as having somewhat creeping roots; numerous barren stems $\frac{1}{2}$ to 2 feet long, thickly furnished with two rows of alternate leaves; thick, softish, slightly furrowed, and angular culms; large equally, and widely diffused panicles; five to seven flowered spikelets; and short, blunt-pointed, and distinctly seven nerved florets, which are usually of a dark brownish colour. A native of North America, generally attaining a height of $2\frac{1}{2}$ to 3 feet.

The unusual manner of growth of this grass, in producing long leafy stems, particularly in the aftermath, seems to recommend it as deserving of a place in mixtures of permanent grass. It appears to thrive best in rich and rather moist soils of medium texture; but farther experience is requisite to ascertain its actual merits.

25. TRIPSACUM DACTYLOIDES of Linnaeus.—*Gama-Grass*.

Generic and Specific Characters.—Inflorescence monœcious and spiked; spikes solitary, or several together; fertile next the base, and barren towards the extremity; barren spikelet two-flowered, the outer male and interior neuter; fertile florets with two styles, solitary and surrounded by a single involucrial leaf; seeds when ripe so completely immersed in the receptacle, as to give the spike a cylindrical ossified-like form. Spikes in this species usually three together, by which it is distinguished from the only other allied one *T. monostachyon* or Single-spiked Gama. Native of the south-eastern coasts of North America. Perennial.

The Gama-grass is said to be so named in honour of a Spanish gentleman who introduced its culture into Mexico; and it is reported to have been first brought to this country from Virginia in 1640, but its usefulness does not appear to have been noticed until, through the medium of Loudon's *Gardeners' Magazine*, vols. x. and xii., from the last of which the following extract is made:—"Various accounts are given of the produce of this grass, from 70 to 90 tons of green hay, and from 20 to 30 tons of cured hay to the acre, are said to have been grown in North Carolina. The flower-stems attain a height of 7 or 8 feet; and the editor of the *American Farmer* says, 'a blade sent to him in a letter measured $31\frac{1}{2}$ inches in length.' One of his correspondents observes, 'When all surrounding vegetation was burnt up,

the Gama-grass was green and flourishing ; and during the month of July it grew 43 inches. It was cut on the first day of every month, ranging from $3\frac{1}{2}$ to 4 feet in height.' It is said to grow well in both sandy and clayey soils ; to taste like the leaves of Indian corn, and that in the neighbourhood of New York it is considered the best of all grasses for soiling."

In 1836 a few seeds of the Gama-grass were kindly sent to us by Sir Charles G. Stuart Monteath, Bart. of Closeburn, from which, by cracking their outer coats previous to sowing, we succeeded in growing several plants within three weeks thereafter ; their hard and impervious nature being such, that, unless aided by like means, they will lie in the ground for a twelvemonth or longer before vegetating. Part of these plants were put out in the south front of a garden wall where they grew luxuriously until autumn, when their foliage was killed to the ground by the first frost ; the roots, however, remained uninjured, and late in the five past springs have continued to send up strong foliage, but hitherto have not shewn any indications of producing seed-stalks. A plant, however, which has been all along kept in a greenhouse, and allowed plenty of root-room, among rich soil, ripened seeds in September 1840 and 1841, its stems attaining a height of from 9 to 10 feet, while some of its root-leaves measured upwards of 6 feet in length. Whatever may be the value of the Gama-grass in its native climate, that of Britain seems unsuited for its proper development, but its natural habits, and particularly its capability of withstanding excessive drought, entitles it in an especial manner to the attention of settlers in the Polynesian Colonies.

HERBAGE AND FORAGE PLANTS.

II. COW PARSNIP, CLOVERS, VETCHES, &c.—

UMBELLIFERÆ and LEGUMINOSÆ.

HERACLEUM—*Cow Parsnip*.—The gigantic growth of several species of *Heracleum*, and the early period of spring at which they develop their umbrageous foliage, have led to trials for the purpose of ascertaining how far they might be beneficially used as cattle's food ; and, notwithstanding many highly favourable reports of the results which have from time to time appeared in the newspapers and other periodicals, still their true merits are by no means ascertained. Like

many others of the same natural order, *Umbelliferae*, most of the species possess a peculiar aromatic taste, which is relished by some animals, while others cannot be induced by almost any means short of starvation to partake of them.

The following are the two sorts principally deserving of notice, both having of late years been recommended to growers.

1. HERACLEUM ASPERUM of Bieberstein—*Rough-Seeded* or *Siberian Cow Parsnip*.—Stem usually about 6 feet high, with numerous branches terminated by large white-flowered umbels; root-leaves 3 to 4 feet long, deeply lobed, serrated, somewhat heart-shaped, and downy underneath; seed subrotund, and rough or scabrous; perennial; native of the North of Asia, &c. This species was first brought into notice, by Mr J. Smith, Ayr, who exhibited it at the Highland and Agricultural Society's Show there in 1835.

2. HERACLEUM PANACES of Linnæus.—*Giant* or *woolly-jointed Cow Parsnip*.—Stem usually 6 to 10 feet high, with fewer branches, and more dull-coloured flowers than the last, and very shaggy or hairy joints; leaves 3 to 5 feet long, palmated, downy underneath and rough on the veins; seeds smoothish; perennial; native of the North of Asia and America.

3. MEDICAGO MACULATA of Linnæus.—*Spotted Medick*, or *Hedgehog Plant*.

Specific Characters.—Stems reclining or trailing, and much branched; leaflets generally with a large dark spot in their centre; flowers small, yellow, and generally in pairs; pods cochleate or closely spirally twisted, so as with the sharp curved spines, which are thickly arranged on their exterior margin, to form globular bristly balls slightly flattened at the ends. Annual; native of Britain, Europe, South America, &c.

The sandy grounds towards the sea in many parts of South America, which, in the dry season, present the appearance of sterile wastes, are, on the return of rain, almost immediately covered with the luxuriant verdure of this and other allied species, so as to form rich sheep pastures, but their spiney pods often prove a considerable annoyance to the animals, by becoming so completely enrolled in their wool, as only to be separated by considerable labour in picking. Edward Wilson, Esq. of Abbot Hall, Kendal, was kind enough, in 1837, to communicate a specimen of *M. maculata*, 3 to 4 feet in length, which was known in that neighbourhood by the name of American clover, from its pods being imported in large quantities among wool, from Buenos Ayres and Monte Video, and their seeds being, along with other refuse of the manufactories, used as manure for turnips and

other farm crops, they vegetate and grow freely amongst these, seemingly not at all influenced by the change of climate.

4. *MELILOTUS LEUCANTHA* MAJOR, *Bokhara Clover*.—This plant formed the subject of a paragraph which in 1838–39 went the round of the agricultural and several other periodicals, titled “New Era in Agriculture,” and describing it as a *Tree-Clover*, a few seeds of which had just been brought to England from Bokhara by a gentleman, who stated that, in that country, it attained a height of fourteen feet, and yielded several cuttings per annum of highly nutritious food for cattle and horses; also that its bark yielded a fibre similar to and used for the same purposes as that of hemp, &c. The Bokhara clover is now ascertained to be a large growing variety of the *Melilotus leucantha* (page 146 of *Ag. Manual*), which was known in the south of Russia, and other parts of the Continent, for some years prior to its introduction to Britain, under the name of *M. leucantha major*. In September 1840, a plant was exhibited at the Highland and Agricultural Society’s Show at Aberdeen, which was grown in Perthshire by Mr Archibald Gorrie, who had the seeds from its introducer through J. C. Loudon, Esq., London, and which had 6 or 8 stems measuring about $10\frac{1}{2}$ feet in height, each of these being furnished with numerous side branches, and clothed with a profusion of white flowered racemes having a slight agreeable odour, and seemingly much sought after by bees. Its bark, although fibrous, seems, however, very deficient in that property when compared with that of hemp; and when intended for feeding, the plants should be cut when little more than a third of their full height, as their stems afterwards become very hard or woody. Like the other more common species of *Melilot*, this should be treated as a biennial, and sown or planted in rows not less than a foot distant and fully 9 inches apart in the rows.

5. *TRIFOLIUM ELEGANS* of Savi.—*Elegant Clover*. In the *Bon Jardinier* for 1842, this species is noticed as having been found indigenous, and for some years past cultivated, in the Department de la Nièvre, under the name of *T. hybridum* (see *Ag. Manual*, page 153), to which it bears a considerable resemblance, but is described as being of weaker growth, and less in all its parts; having a dull rose-coloured flower, and pale green foliage; the leaflets being also marked like those of the common white and red clovers. These two species also differ in the soils which they naturally inhabit, *T. elegans* being only found on those of a poor siliceous, or stiff ferruginous nature, while the *T. hybridum* seems to delight in those of a rich aluminous or calcareous description. As seeds of *T. elegans* have

only been received for the first time this spring, it is impossible to say how far it may prove suited for cultivation in Britain.

6. *TRIFOLIUM INCARNATUM* TARDIF of the French, or *Late Flowering Crimson Clover*.—This variety was first brought into notice by a M. Juery of Toulouse, five or six years since. Its characteristics are lateness of flowering, and tallness or vigour of growth; qualities which must recommend it to growers of the common Crimson Clover, for succession or late crops.

Sir John Robison has the merit of first introducing this variety to Scotland, having in 1837 communicated a quantity of its seeds, as well as those of the common Crimson and Moliner's clovers, to the Highland and Agricultural Society; the results of a comparative trial with which were, that the plants of this came into flower, when those of the common were nearly over, and on being cut their produce was fully a third heavier than either of the others.

7. *TRIFOLIUM RESUPINATUM* of Linnæus—*Annual Strawberry-headed Clover*.

Specific Characters.—Stems creeping or reclining; leaflets obovate, acute; heads roundish; flowers resupinate or inverted in position; calyx inflated after flowering, membranous and downy; native of various parts of Europe; found sparingly on light sandy soils in the south of England.

Having received seeds of this species from the Rotterdam Botanic Garden in 1838, we were so struck with the remarkable vigour of their growth, as to consider it highly deserving of culture. The autumn of that season was, however, so wet, that although the plants grew to about four feet in length, forming, with their reclining branching stems, a dense mass of vegetation, and producing a long continued profusion of their light reddish flowers; no sufficiently ripened seed was obtained to perpetuate or continue their growth, and the same results attended the produce of a farther supply received from the same source in 1840. Parties, however, located in more favourable climates, might find it worth their attention to make farther trial for the purpose of cultivating this species as an annual clover, which might either be grown alone as tares, or sown where blanks may occur in hay crops.

8. *TRIFOLIUM SUAVEOLENS* of Willdenow—*Sweet-scented or Affghanistan Clover*. Seeds of this were received along with those of the last in 1838, the plants produced from which so closely resembled those of the other, that they were only ascertained to be different towards the end of the season, from their calices not becoming inflated after flowering. In 1840 another small sample of seeds was

received from Mr G. Holst, seedsman to the Imperial Agricultural Society of Moscow, who reported that it was then beginning to be cultivated in that vicinity, having been brought from Central Asia some years previously. In 1840 and 1841 seeds were sent to the Highland and Agricultural Society of Scotland by the Honourable the Directors of the East India Company, through Dr F. Royle, from Affghanistan. And though all of these parcels produced an abundance of plants, which generally commenced flowering about the end of August, and ultimately attained a length of from four to five feet; none perfected seeds. So that, on the whole, this, as well as the last species, seems better fitted for warmer, and very probably drier, climates than that of Scotland.

9. *VICIA SATIVA FLORE ALBO*—*White-flowered* or *Hopetoun Tare*.—This variety bids fair in a short time to supersede the old summer tare; from a field of which it was selected a few seasons since by Mr Patrick Sheriff, late of Mungoswells, the originator of the Hopetoun oat, and several other improved varieties of cereal grains, who, in the beginning of winter 1838, kindly sent to the Museum about twelve seeds of this new vetch, several of which were sown the following spring; and the produce, both in seeds and bulk of haulm, compared with any of the other varieties which were grown alongside, was fully double. Its seeds are of a light bluish or green colour, and possesses little of the strong taste peculiar to the common tare, so that, in addition to its other properties, these may become at least equally useful with the white-seeded variety or Canadian lentil for culinary purposes.

10. *VICIA SATIVA CANADENSIS* of Zuccagne.—*Canadian Vetch* or *Tare*.—This variety was received in spring 1840, from Mr George Shepherd, seedsman and nurseryman, Montreal, and is distinguished from the commoner varieties, by the dull pale or pinkish colour of its flowers, as well as smooth shining light green foliage, and dwarf bushy habit of growth, which, together with its being later in flowering, must preclude its being cultivated in preference to the others.

PLANTS CULTIVATED FOR THEIR ROOTS.

I. BETA VULGARIS *campestris*—MANGEL WURZEL or FIELD BEET (page 258 of Ag. Manual).

1. WHITE GLOBE or TURNIP-ROOTED *Mangel Wurzel*.—Although still comparatively little known, this variety has been occasionally grown in the southern counties of England for some years past, and is found to be a hardier or better keeper than any of the other sorts, but considerably deficient in weight of produce to either the following or *red turnip-rooted*.

2. YELLOW, or ORANGE-GLOBE, or TURNIP-ROOTED *Mangel Wurzel*.—Compared with the *Red Turnip-rooted* variety (page 260 of Ag. Manual) this is of still more recent introduction, attains to fully as large a size, and generally possesses a more symmetrical form. It is also reputed to keep better than the *long-red* or common sort, and is especially suited for shallow soils; on which the globular-rooted kinds invariably produce heavier crops than the others.

II. BRASSICA CAMPESTRIS *rutabaga* of Decandolle— SWEDISH TURNIP (page 237 of Ag. Manual.)

1. FETTERCAIRN GLOBE *Swedish Turnip*.—Seeds of this were received in 1841 from Sir John Stewart Forbes, Bart. of Pitsligo and Fettercairn, who finds it superior to any other sort which he has grown, inasmuch as it yields a more regular crop, while its roots are fully above an average size, and possess a beautiful symmetrical globular form, without neck, and are in colour a shade lighter than the *common purple topped*.

2. LAING'S IMPROVED *Purple-Top Swede*.—This differs from all other hitherto known varieties of Swedish Turnip, in having large entire cabbage-like leaves, which, by their horizontal growth, form a

thick covering to the soil, thereby materially checking the vigour of autumnal weeds. It bears the name of its originator, Mr Alex. Laing of Duddo, near Berwick-on-Tweed, who first offered its seeds to the public in 1839, and numerous parties who have since grown it, bear testimony to its superiority in attaining to a large size, being of a fine globular shape, extremely hardy, and about a fortnight later in running to seed in spring, than any of the other sorts.

3. SKIRVING'S *Purple-Top Swede*.—Specimens of this sort exhibited by its originator, Mr Wm. Skirling, Seedsman and Nurseryman, Liverpool, at the annual Shows of the Highland and Agricultural Society in 1837-8, were of unusual dimensions, considering the period of the season, and seemed to possess in a high degree the properties of solidity and firmness of texture, so peculiar to the Swedes when grown to a large size, but showed no other characteristic sufficient to distinguish it from the *common Purple-topped*, than what might have been attributed to careful selection of the stock.

4. SKIRVING'S IMPROVED *Purple-Top Swede*.—This is a more recent introduction, and possesses the characteristics of size and solidity of texture to fully a greater extent than the last; compared with which, it is also less flattened at the crown, and grows more above ground. For some years past this variety has been a good deal cultivated both in England and Scotland, but several eminent growers in the Lothians, as well as other districts where the culture of *Swedes* is extensively practised, have found that it does not resist injury from frost so well as the common purple-top, page 238 of Ag. Manual.

5. THORPLAND *Globe Swede* (see foot-note, p. 293 of Ag. Manual).—In symmetry of form this variety is inferior to none of the others, being of a beautiful globe shape, without the least appearance of neck so frequent in turnips of this class; it is, however, smaller in size than the more commonly cultivated sorts, and consequently would seem best suited for garden culture. Unfortunately its characteristics of colour are by no means permanent, inasmuch as seeds saved with the greatest care from selected roots, vary in their produce to all the shades of colour from a deep purple to a light green, which causes an appearance of mixture in the crop, generally disliked by growers.

6. VICTORIA NEW *Pink-Top Swede*.—In general character and appearance, this has nothing to recommend or distinguish it from a good stock of the common purple Swede, except that it is lighter coloured on the upper surface, which gives it the appearance of being a cross between the purple and green top varieties. It

was first raised by Messrs Mackie & Ewing, seedsmen, Norwich, (from whom seeds were received in 1839), where it is held in considerable repute; but although its merits were even more decided, yet its indistinctness of colour would tend much to prevent its becoming a favourite with Scotch growers, many of whom are too apt to think any variety approaching to the green as being just so far degenerated from their generally esteemed *Purple topped Swede*.

III. BRASSICA RAPA of LINNÆUS.—COMMON TURNIP (Page 240 of Ag. Manual.)

1. POLLEXFEN'S *Green Top Yellow Bullock Turnip*.—This name is applied to a selected and improved stock of the Aberdeen yellow bullock (page 243 of Ag. Manual), which has been grown for some years by Thos. Pollexfen, Esq., Kirkwall, Orkney, and which is considered fully larger in size, rather hardier, and more symmetrically formed than the ordinary stocks of the variety from which it derived its origin.

2. SCOTT'S HYBRID *Purple Top White Turnip*.—This variety was raised by Archibald Scott, Esq., farmer at Southfield, East Lothian, in 1838, and is characterized as being large sized, well formed, hardy, and a late keeper, qualities which have of late obtained for it a considerable demand both among Scotch and English growers.

3. SNOWBALL *White Globe Turnip*.—This name is applied to a sub-variety of white globe, perhaps the most perfect in regard to form or symmetry of any sort hitherto cultivated, being of a true globular shape, with a remarkably small root and top. It is of English origin; and the produce of seed received from Messrs Charlwood, Covent Garden, in 1839, was found to be deficient in weight, as well as more easily injured by frost than either the common or Pomeranian white globes, page 246 of Ag. Manual, so that it may be more properly regarded as a garden than as a field turnip.

4. HUNGARIAN *Red Top White Turnip*.—Is a very distinct variety, having entire and erect growing leaves; its roots are of a roundish or somewhat flattened shape, attain to a medium size, and arrive early at maturity. In a collection of turnips, the seeds of which were received from France in 1837, and grown in the experimental ground of his Grace the Duke of Buccleuch at Dalkeith Park, this appeared the most promising; but it has hitherto received almost no attention from British cultivators, although, with a little care in the selection and rearing of its seed, it might be found a superior sort.

5. WOOLTON HYBRID *Red Top White Turnip*.—Was discovered about six years since in a field of purple top Swedish turnips by L. Uppelby, Esq. of Woolton, Barrow, near Hull, who reports it to be a very valuable kind, as it is hardy, globe-shaped, grows to a large size, and keeps well till the end of February, or even later. This variety has not yet been grown in Scotland, but we have been favoured by Mr Uppelby with a supply of its seeds this season, which are sown along with a collection of the other sorts presently cultivated, for the purpose of comparison.

IV. SOLANUM STOLONIFERUM of SCHLECHTD.—STOLONIFEROUS or CREEPING-STEMMED POTATO.—This potato was discovered on the mountains of Mexico and introduced to Europe by the French botanical travellers Messrs Schiede and Deppea, who were at first of opinion that in it they had found the true origin of the cultivated potato; but a more close examination has led botanists to consider it a distinct species, to which the name here given has been applied, as being descriptive of the habit of growth in its surface as well as under ground stems, the latter of which have been found, in light rich soils, to extend in one season as far as 3 or 4 feet around the parent plant, producing an immense number of very small tubers, a characteristic which has induced certain French cultivators to undertake experiments, with a view to procure improved varieties from seed, which it produces in abundance; and there appears little doubt that the desired object might be obtained by judicious selection and crossing with proper varieties of the more common species *S. tuberosum*.

V. SOLANUM TUBEROSUM of LINNÆUS.—COMMON POTATO or TUBEROUS-ROOTED SOLANUM. (page 213 of Ag. Manual.)

1. AGRICULTURAL LATE KIDNEY *Potato*.—Is in length nearly thrice its average diameter, slightly flattened, and thickened towards the point; eyes few and very shallow, or almost level with the general surface; colour whitish, and quality superior. Two tubers of this variety were received from J. C. Loudon, Esq., in November 1838, the largest of which measured 10 inches in length by 11 inches in circumference at the middle, and weighed 2 lb. 6½ oz., see Gardeners' Magazine, vol. xiv. page 638, in which it is recommended by its originator, Mr Bowndes of Binfield, as combining superiority of quality with unusual size; with us, however, it has been surpassed by many of the commoner sorts in actual weight of produce; and hence its

merits seem by no means such as to entitle it to special recommendation.

2. *CARACCAS Potato*.—This is a late, prolific, and healthy growing sort; of superior quality, roundish, slightly flattened shape, reddish colour, and rather under the medium size. It was found wild in Caraccas; and introduced about six years since by J. Hill, Esq., wine-merchant, Liverpool, who then presented a few of the original tubers to Mr Hannay of Dalquhairn, Dumfriesshire, under whose management they increased remarkably, and are now grown by many other cultivators in that district, where this variety is also known by the names of the *American* and *new Prince Regent* Potato.

3. *CHAPMAN'S NEW SPRING Potato* is a late variety reared by T. H. Chapman, Brentford End, London, who offered them to the public in spring 1842, and reports them to be in perfection for use, from November till June. Dr Lindley also bears testimony to their excellence of quality in the *Gardeners' Chronicle* for 2d April 1842. No trial of this sort has as yet been made in Scotland.

4. *COLONEL SPENS' BLACK KIDNEY Potato* is a smallish-sized, dark-coloured late keeping sort; presenting, on being cut, a blackish purple zone near and parallel with the circumference. The late Col. Spens of Craigsanquhar, from whom this sort was received in 1839, long grew and especially recommended it for spring and early summer use.

5. *CUCUMBER Potato* may be described as bearing a near alliance to the *Red Pine Apple*, page 230 of *Ag. Manual*, and was received in 1837 from Mr Dunbar, Barnton, who reported it as being very productive, as well as one of the best table potatoes grown in France.

6. *GOLDFINDER Potato*.—A very tall, luxuriant growing, and productive variety, with white and slightly oblong, somewhat flattened tubers; reputed as being of superior quality, and yielding a good crop even on inferior soils, and with little manure. Presented and highly recommended by James Hamilton, Esq. of Kames, in 1839.

7. *LEADINGTON WHITE Potato*.—A new and very prolific field sort, introduced by Mr James Baldin, Lennoxlove, Haddington, who states that it should be planted in rows at least two feet apart, as its stems attain to a height of 4 or 5 feet, and that he has frequently gathered from fifty to sixty good tubers from a single plant.

8. *MALCOLM'S EARLY RED Potato*.—A small roundish, hollow-eyed, and bright red coloured sort. Received in autumn 1839 from

Mr Alexander Pickard, gardener at Hallyburton House, Cupar-Angus, who intimated having that season planted it in the open ground in March, and lifted the crop for use in the first week of July. In produce, this is found to be considerably inferior to many of the early white sorts, but its good quality and similarity in colour to esteemed late sorts entitles it at least to a limited share of culture.

9. MANGEL WURZEL *Potato* is a name under which the *Red Yam*, page 135 of Ag. Manual, has of late years been brought into pretty general notice, and under which it still supports the character of being one of the best cattle or feeding potatoes.

10. ROHAN OR PRINCE DE ROHAN *Potato*.—Tubers of large size, roundish shape, hollow-eyed, and whitish coloured. This variety was raised from seed in 1829 or 1830, by an amateur in Geneva, who reared unprecedented crops of it, and used every means to prevent its getting into the hands of any other cultivator, until at length tempted to part with a tuber in exchange for some rare and valuable plants of Cacti, which Prince Charles de Rohan had received from S. America; but even then the Prince only obtained it upon condition that he should never send any of the produce to Holland, Belgium, England, Prussia, or Germany; from his gardens, however, it found its way into France in 1834, and from thence two tubers were brought over to Scotland by us in autumn 1836, the produce of which we exhibited at the Highland and Agricultural Society's Show at Dumfries in 1837. The highly flattering account of its quality and produce given by the originator of the *Rohan potato*, combined with his attempt to retain its exclusive culture, caused it to be sought after with the greatest avidity, so that it is now pretty generally known both throughout Europe and N. America; but the results of several years' experience shew that in Scotland it proves to be decidedly an inferior sort for the table, while it is at least equalled by several others for feeding cattle.

11. ROUGH ROBS *Potato*.—The potato to which this name has been applied is a healthy growing and prolific second-early, with roundish shaped, slightly flattened, reddish coloured, rough skinned tubers; and is much esteemed in the lower parts of Argyleshire and neighbouring districts, for the purpose of succeeding the earlier white sorts in the Greenock and other markets. Received in 1838 from Richard Campbell, Esq. of Auchinbreck.

12. SEGONZAC'S EARLY *Potato*.—Tubers of medium size, whitish colour, and oblong shape, rather deeply hollowed at the eyes, and insertion of the stem. This variety is of French origin, and was

recommended to growers in that country in 1836, as possessing the property of early maturing to such a degree as to render it capable of producing two crops in the season ; but an experience of some years proves it to be later than several of the earliest sorts generally grown in this country, while it is also inferior to most of those in quality.

13. SMITH'S YELLOW PERUVIAN *Potato*.—Tubers rather under the medium size, roundish or slightly elongated, with numerous deeply sunk eyes, and of a yellowish white colour. This is a healthy growing and superior late sort, having a peculiar yellow coloured flesh, and was brought into notice by Thomas Smith, Esq. of Penfillin, Dumfriesshire, who received it from its native country, Peru, and exhibited a basket of its produce at the Highland and Agricultural Society's Show at Dumfries in 1837.

14. SNAKE ROOTED WILD *Potato*.—Stems weak and straggling ; tubers seldom more than from two to three ounces in weight, very much elongated, and crooked ; the full length frequently measuring more than five or six times the average diameter. This curious variety was exhibited by Mr Stewart Murray of the Glasgow Botanic Garden, at the Highland and Agricultural Society's Show held at Glasgow in 1838, along with several others which had been received the previous season from their native districts in S. America ; and has nothing to recommend it but the singularity of its form.

15. SPANISH EARLY DWARF *Potato* is a small white sort of superior quality, and very dwarf growth, its stems seldom attaining a height of more than 5 or 6 inches. Received from Mr James Atkin, seedsman, Northampton, in 1836 ; but three or four years' cultivation has shown it to be deficient in produce as well as rather liable to disease.

VI. TROPÆOLUM TUBEROSUM of RUIZ and PAVON.

TUBEROUS or POTATO ROOTED *Indian Cress*.

Generic and Specific Characters.—Flowers composed of five unequal petals, with eight stamens and one style ; calyx a solitary five-cleft and spurred leaf ; seeds usually three together, and separately enclosed in a furrowed, coriaceous covering ; stems trailing ; leaves roundish, crenate and peltate ; roots tuberous. Perennial ; native of Peru ; introduced in 1834.

In its native country the tubers of this plant are cooked, and eaten like potatoes, or boiled to the consistency of a pulp or jelly, and flavoured with various ingredients according to taste ; which latter mode is there generally preferred. When prepared in the former

manner they are soft and waxy, in taste resembling sea-kale, combined to the peculiar pungency of the common Indian cress, to which this also bears a considerable resemblance in its foliage and rambling habit of growth, so that the young sets should be planted five or six feet apart. In this country it is only in favourable seasons that it produces its brilliant orange blossoms without the aid of a wall or artificial heat, so that the tubers cannot, under ordinary circumstances, be expected to arrive at their proper maturity ; and their culture is therefore never likely to extend beyond the gardens of the opulent, or such as may desire to have a few dishes in the season as a rarity. As, however, the plant withstands excessive drought it seems naturally adapted for the support of human life in countries where the ordinary crops are occasionally liable to be destroyed for want of rain.

PLANTS USED IN THE ARTS AND MANUFACTURES.

I. MADIA SATIVA of Molina.—CULTIVATED OR OIL-SEEDED MADIA.

Generic and Specific Characters.—Belonging to the class xix. and order 2, (Syngenesia Superflua) of Linnæus ; Receptacle and seeds naked ; Involucre double, the outer usually 8-10 leaved, and much larger than the inner, which is composed of many leaves or scales. Plant upright, with numerous diverging branches, and together with the leaves and involucre, covered with very viscid glandulous hair or down ; leaves lanceolate, entire, and more or less stem-clasping ; flowers inconspicuous, yellow, and much crowded at and near the extremity of the branches. Annual ; $1\frac{1}{2}$ to 2 feet high ; native of South America.

In its native country the Madia has long been cultivated for its oleaginous seeds, the produce of which is deemed by many even superior to that of the olive or poppy. In Europe its culture was first attempted, in 1835, by M. Bosch, royal gardener at Stutgard, since which period it has been greatly extended, and that with the utmost success, under the patronage of His Majesty the King of Wirtemberg and others: The following is extracted from a communication received along with a quantity of seeds of the Madia Sativa in spring 1839. “ From its valuable property of enduring winter and spring frosts, the Madia may either be sown in autumn or spring ; the ground being previously well pulverized. Four pounds of seed will suffice for sowing an acre in drills, and about six pounds for the same space broadcast. The young plants should be thinned out so as to stand at least 4 or 5 inches apart. The crop should be reaped when the earliest seeds acquire a grey colour, and disposed in handfuls to facilitate drying, after which it should be immediately thrashed out, as, if stacked in the haulm, the viscid matter which adheres to the foliage would cause fermentation. The seeds should afterwards be washed in warm water to clean them of the same viscid or glutinous

and strong smelling substance. The crop on an acre of poppies averages 12 bushels imperial, which yields about 22 lbs. of oil per bushel, or in all 264 lbs. @ 6d. = L.6, 12s. ; while an acre of *Madia sativa* produces on an average 26 bushels of seed, each of which yields about 17 lbs. of oil,—or in all, 442 lbs. @ 6d. = L.11, 1s. Chemical analysis shows that 100 parts of *Madia* oil contains 45 of *olein* (fluid fat), 40 of *stearin* (margarine or solid fat), and 15 of *glycerine*, a sweetish glutinous substance."

A quantity of *Madia* sown by us in the vicinity of Edinburgh in May 1839, ripened seeds in August following, but the unusually rainy weather caused many of the plants to damp off after flowering. A portion of the seeds which were sown immediately after harvesting produced plants 2 to 3 inches in height that autumn, many of which perished in course of the winter ; but the remainder, although weak in spring, recovered sufficiently to produce a good crop of ripe seeds about the middle of July. Upon the whole there seems every probability that, in ordinary favourable seasons, the *Madia sativa* might be grown very successfully in Scotland.

II. POLYGONUM TINCTORIUM of Loureiro—DYERS' BUCK-WHEAT.

Specific Characters.—Flowers with six stamens and three pistils, reddish coloured, and disposed in slender spikes ; leaves ovate, sharpish pointed, of a light green colour, smooth and shining, with abrupt closely fringed stipules at their base ; annual or biennial ; native of China.

Although this *Polygonum* was known to British botanists as an inconspicuous exotic so early as 1776, when it was introduced to the Royal Gardens at Kew, by John Blake, Esq., yet authentic information relative to its properties as a dye-yielding plant, was only received at a comparatively recent period, from the missionaries resident in China, where it has been cultivated from time immemorial for its colouring matter, which is deemed equal if not superior to the finest indigo. In Europe, attention was first directed to its growth by M. Delile, professor of Botany in the Jardin du Roi, at Montpellier, who, in 1835, obtained seeds of it from the Baron Fischer, director of the Imperial Gardens, St Petersburg ; and these having increased rapidly under his management, he was, in a year or two, able to distribute them pretty widely, so that in 1838 we succeeded in procuring a sufficiency to make trial of its cultivation in the vicinity of Edinburgh, the results of which shewed that although the climate

was not sufficiently warm for its maturation, as the plants only exhibited the first appearances of flowering just prior to their being destroyed by frost, yet as these had then attained a height of from $2\frac{1}{2}$ to 3 feet, with numerous side branches, and yielded a considerable weight of foliage per acre, it may probably be cultivated with advantage even in this climate, when the extraction of the dye is better understood. In France, its growth and manufacture have been made the subjects of numerous experiments, attended with various results; but it is generally believed that a more intimate knowledge of the proper method of extracting the dye is still requisite to render its cultivation a matter of general importance.

Thunberg, a Swedish botanical traveller, mentions, that, in addition to *Polygonum tinctorium*, the Japanese also extract blue dyes from *P. chinense*, *P. barbatum*, and the common road-side weed, *P. aviculare*.

III. SESAMUM ORIENTALE of Willdenow.—ORIENTAL SESAMUM OR OLY-GRAIN.

Generic and Specific Characters.—Belonging to the xiv. class and 2nd order (Didynamia Angiospermia) of Linnæus; calyx five parted; flowers, including the ovary or seed-vessel, containing one abortive and four true stamens, bell-shaped and five lobed, the under lobe being largest; capsules two-celled, and having each cell redivided by the inflexed edges of its valves; stems nearly erect, and furnished with oblong ovate leaves. Annual; $1\frac{1}{2}$ to 2 feet in height; native of Arabia and the East Indies.

The *Oriental Sesamum* is a tender white-flowered annual, of little beauty, but cultivated to a great extent in most tropical countries, particularly in Arabia and the E. and W. Indies, for its seeds, four and a half pounds of which yield about one pound of oil, which is employed for like purposes with that of rape, as well as for salad and other culinary uses. The seeds are also prepared in various ways for food, being parched, as also made into bread, puddings, used in soups, &c.

IV. SESAMUM INDICUM of Willdenow.—ORIENTAL SESAMUM OR OLY-GRAIN.—In its specific character this differs from the last by its more erect habit of growth, as well as in its lower leaves being three lobed, while its upper or entire ones are more of an oblong or lanceolate form, and in its flowers being of a light purple colour. It is cultivated in the same countries; and used for like purposes, with the Oriental Sesamum.

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