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THE ILLUSTRATED

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ORNAMENTAL TREES.

NOT NATIVES OF THE PROVINCE OF QUEBEC,
BY CHARLES GIBB, ABBOTSFORD.

I am glad to see that the Journal of Agriculture has taken up the subject of ornamental tree planting, and that Mr. Chapais is following it up by continually drawing attention to it. M. Chapais' notes, giving the experience of M. Auguste Dupuis at St. Roch des Aulnaies, L'Islet, are especially interesting.

Our neglect of tree growing is not owing to lack of native species, but from something lacking within ourselves. In ornamental planting, native species should form the ground work, to be supplemented to the utmost we can by kinds of foreign origin.

The great drawback to the planting of trees, not found in our forests, is the fact that so few are propagated by our local nursery men, hence extra cost; and besides this, importing, unless done with a fair knowledge of the kinds chosen, often results in the selecting of tender kinds.

All the trees in this paper are trees that I have seen, and the descriptions given are from my own notes taken on the spot, except when otherwise stated. A large proportion of them I have on trial.

ACER.—Maple.

A. *Campestre. English or Cork barked maple.*—This may be seen on the grounds of McGill College, as a shrub, sometimes passing a winter with but little injury and more often a good deal hurt. The terminal buds never push properly.

Mr. Wm. Brown, many years ago, at his nursery, at Côte des Neiges, had 40 or 50 young trees of it. Some of these were planted about his grounds, and grew to a height of 10 or 12 ft., and seemed hardy. There are hardy trees of the species, as it is found growing in Northern Asia, and also along the shore of the gulf of Finland, and about St. Petersburg.

A. *Colchicum Rubrum. Red Colchicum maple.*—Is a native of Japan. It has bright colored tips and is quite ornamental, but it suffers where the winters are even less severe than here.

A. *dasycarpum. Soft or Silver maple.*— Among a number of these trees, some will be erect, others drooping. It is from this tendency to sport that we have so many ornamental varieties of it. Further south, it is more pendulous than it usually is here; though this may be partly accounted for by longer growing seasons and often richer soils.

In Washington, I asked what variety of the soft maple they were planting in their streets and was told it was only their common kind. There is an avenue there, 4 miles long and two avenues of 3 miles each, of this drooping soft maple, though, for street planting, it is not as great a favorite as either the Norway or the Sugar maple, partly because it is more brittle. These pendulous soft maples seem to be tending towards the mean, of which Weir's Cut-leaved is the extreme.

Var. Argenteum Striatum. Is a pendulous variegated leaved variety, but from the specimens I have seen, it did not appear to be constant. (1)

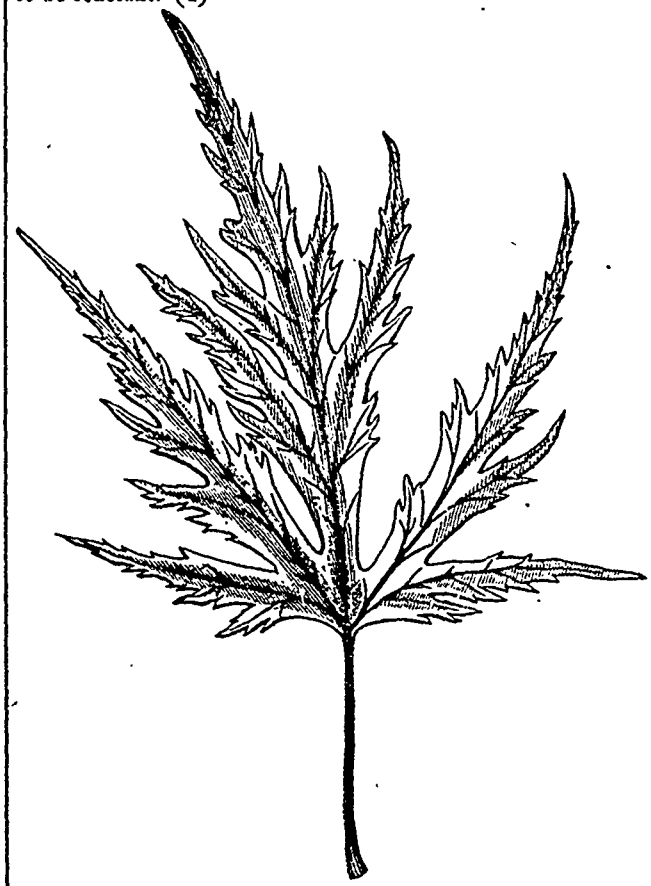

Fig 1.—Weir's cut-leaved Maple.

Var. Heterophyllum Laciniatum. New Cut-leaved Silver

(1) If the adjective is to agree with *acer* it must be in the neuter, if with *varietas*, in the feminine gender. Catalogues always seem *incerti generis*.—A. R. J. F.

maple.—Is a striking cut-leaved variety of upright habit. Likely to be hardy, as it is a seedling of the common silver maple. It was produced from seed by Ellwanger and Barry, Rochester, N. Y.

Var. Rici.—Is a new one whose beauty I have been struck with. Leaf small, and tree very pendulous. I believe this also to be a seedling of Messrs. E. and B.

Var. Wagneri. Wagner's Cut-leaved Silver maple.—What young trees I have seen of it did not seem constant or equal in beauty to the following:—

Var. Wierii. Weir's Cut-leaved Silver maple.—This has been growing for several years in an exposed situation on the grounds of the Parliament buildings of Ottawa. I have seen it also in other places about Ottawa.

It seems quite hardy with me, here. It is not massive, as most maples are, but somewhat feathery in foliage, of eccentric and wayward habit of growth. The foliage on the young shoots is remarkably slashed as may be seen by the cut given. It is an interesting and attractive tree, worthy of being planted freely.

A. Macrophyllum. Great leaved maple of Oregon.—This is perhaps, the grandest of all maples, yet is not hardy much north of Philadelphia. However, Dr. George M. Dawson, has found it on the Pacific coast as high as latitude 51, so that it is possible that much more hardy varieties of it will be found; but whether hardy enough to stand this climate is probably doubtful.

A. Negundo, Negundo aceroides. Ash leaved maple or Box elder.—This tree is indigenous in the West, and may be found as far north as latitude 53, on the little Saskatchewan, and therefore hardy here. I got 100 young trees of it from Rochester, and also two from Ontario, which have proved by no means hardy.

The reason I will explain at length, as it shows the existence of some varieties not generally known.

In the streets of Washington, where there are several avenues 3 or 4 miles long of this tree, it was found that they had been planting two different species, one of southern origin, the other received from the West. The former, the more flexible in growth, so much so as to be often bent out of shape by the weight of its seeds, and unable to stand as severe cold as the other; that from the West is more rounded and more compact, is of larger leaf, and that with reddish stem; its seed capsules are larger, and seed with larger percentage abortive; foliage light, lively green, and leaf convex and decidedly the more beautiful tree of the two. This species from the West is the same as that which has proved tender with me.

In my dilemma, a horticulturist from the West comes to my assistance, and tells me that, in the West, there is what is known as the Ohio Negundo, and that which is known as the Missouri Negundo, the latter that of the far west, and the one of most northern habit. This, from what I hear of it, is likely to be like that in the grounds of the McGill College, grown from seed from Winnepeg. This tree is of rapid growth, of medium beauty, and perfectly hardy.

Var. Californicum seems to resemble what is grown in Washington as the Southern species.

Var. Foliis aurea variegata. Golden variegatea Negundo.—This tree, I am led to believe, is not likely to prove hardy.

A. Platonoides. Norway maple.—This is the hard maple of Central Europe, "next to the birch and trembling poplar, the most common tree in the Russian woods." It is even more dense than our own sugar maple, is slightly more spreading, and grows nearly as large.

It has proved hardy in Montreal, seems quite hardy with me, and of more rapid growth than the sugar maple.

It is a tree that has become quite a favorite in the States and has been grown largely for street planting. In Washington, next to the Oriental Plane, this and the sugar maple seem their favorite street trees.

It does not seem to sport much, yet there are many curious varieties of it of great beauty.

Var. Cucullatum. Curled-leaf Norway maple.—Has leaves the lobes of which curl and turn inwards, giving it a singular and most unmaplelike look. It is well worthy of trial.

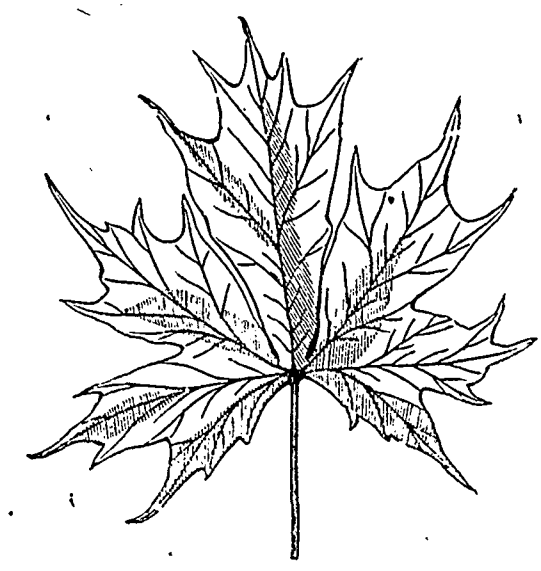

Fig. 2. Norway cut-leaved Maple.

Var. Dissectum. Cut-leaved Norway maple.—I have never seen a large specimen of this, and think it may be of somewhat dwarf habit of growth. It is one of the handsomest of cut-leaved trees, as may be supposed by the leaf in the annexed cut, which is, of course, of a reduced size. This proved perfectly hardy with Mr. Brown.

Var. Laciniatum. Eagle's Claw Norway maple.—Has leaves shaped as its name would suggest. Quite a curiosity but hardly equal to the above two.

Var. Schwerderii. Schwerder's Norway maple.—The beauty of this variety consists in the color of the leaves of the young shoots, which are often a bright crimson. This is said to be the case in spring.

In July, I have seen young trees dotted all over with rich bouquets, as it were, of rich, rosy red leaves. As the tree gets old and slower in growth, this characteristic, one would expect to become less *prononcée.*

A. Polymorphum atropurpureum.—The Japanese are the most beautiful of all maples; among the most beautifully tinted and laciniated of all trees.

Most of them must be looked upon as greenhouse plants, but the above, from its hardiness, is worthy of our notice. Several plants of it have stood for the last three years in Forest Hill cemetery, near Boston, without injury, and also at Mr. Hunneywell's, at Welsley, Mass. It is a shrub of rich, somewhat purplish red foliage, rather deeply cut, and well worthy of such slight protection as it might need in this climate. I must add however that its richness of color fades very much about midsummer.

A. Pseudo platanus. European Sycamore maple.—This tree is found largely in the central and middle parts of Europe. It is said to be found at an altitude of 3000 ft. in Switzerland, and so, possibly, there may be varieties of it that might prove hardy.

In Montreal it has proved far from hardy. I have tried the (Aurea variegata) golden leaved, and the (purpurea) purple

leaved, three trees of each, but the first winter killed them all to the graft. The tricolor is one of the best of variegated trees, but too likely to prove tender to be worth trying.

A. Tartaricum. Tartarian maple.—This is a small tree, growing to the height of 20 feet on the lower Volga, and is quite common in the southern parts of European Russia. Its leafage I forget, but it is said to be pretty.

Of native varieties A. *Pennsylvaticum or striatum*, the large leaved moore wood or striped bark maple, and the A. Spicatum, are small sized trees, abundant in our woods, that are highly ornamental and deserve to be better known.

ÆSCULUS.—Horse Chestnut.

The European Horse Chesnut, as it is called, is perhaps the grandest flowering tree we have. In Montreal it does well, there are some specimens there nearly 18 inches in diameter, but we are just upon its northern limit.

At Newport, Vt. Dr. Hoskins has failed so far with it through lack of hardiness, and in exposed situations in the country it has not been a success. I see however that Mr. Auguste Dupuis, at St. Roch des Aulnaies, 70 miles below Quebec, has found it hardy. If we had more local nursery men, we should have these trees growing from nuts from our hardiest northern grown specimens, instead of from trees accustomed to milder winters.

Var. Alba Flore Pleno. Double white flowered horse chestnut.—I do not know if this has been tried, It is said to be very beautiful when in bloom.

Var. Rubra flore pleno. Double red flowering horse chestnut.—This Mr. Brown introduced from France, and grew a large number of them in nursery, and had them in his grounds 15 to 20 ft. in height. They appeared fairly hardy, yet it may be asked where are all those which were then planted about Montreal. It would appear that they have not lived. These double flowering varieties bear no nuts, a point in their favor where nut gatherers are troublesome.

Æ. Rubicunda? Red flowering horse chesnut.—Also imported from Scotland by Mr. Brown. It did not prove as hardy as the common white.

Ailanthus. Celestial tree—A large tropical looking tree from Japan with large butter-nut looking leaves.

Our winters are rather too severe for it, but it is one of those trees which, if cut to the ground in the fall, make rampant growth the next season. In this way I have seen it make a growth of at least 16 feet.

It has a habit of suckering, yet might still find a place in ornamental grounds.

ALNUS.—Alder.

A. Firma.—A species from Japan rather pretty but curious as it has leaves like a morello cherry.

A. Glutinosa. Common European Alder—This is the most aquatic of trees. It has not any more beauty about it than our native alder, but grows to a much larger size. I have seen a tree 35 feet in height and nearly 2 feet in diameter.

Captain Raynes, of Montreal, has trees of it about 25 feet in height, which are quite hardy, and with me, during the last two years, it has not shown the slightest signs of tenderness. It is a tree found in high latitudes in Europe. It grows wild about St. Petersburgh, where, under garden culture, it has attained a height of, at any rate, 67 feet.

Var. Laciniata. Cut-leaved alder.—This is really a striking by pretty tree, a native of northern France, where it is said to be quite common, especially in Normandy. It seems of slightly slower growth than the above, and I had supposed it would not become so large a tree. The largest I had seen was but 25 feet, but I see that it is stated in Europe to have measured 63 feet. It is a tree of far more grace and beauty than one would expect in an alder, and has shown no lack of hardiness with me during the last two winters.

Var. Laciniata imperialis.—Imperial cut leaved alder.—"Oh! what an aerial tree" exclaimed a friend as I showed him a specimen of this tree. It is dull in color, but of delicate graceful growth, quite unlike an alder or any thing else, a rare though a frail, delicate looking beauty indeed. I think this tree is hardy, at any rate in sheltered places. Some winters it has stood perfectly with me, sometimes it has been killed back.

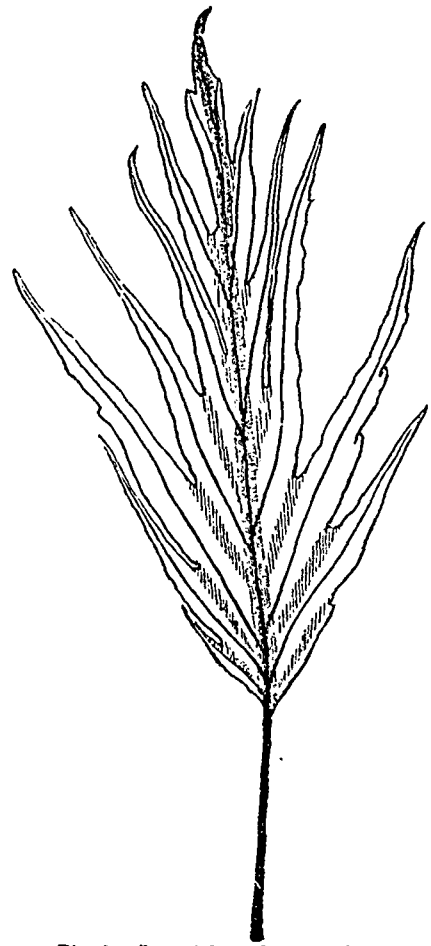

Fig 3.—Imperial cut-leaved Alder.

The alder is a tree suited to damp or wet soils. I believe this killing back to have been caused by the very dry soil in which I had planted it.

A. Incana Laciniata.—Is a very pretty tree, with foliage much like the cut leaved, but rough on the upper side.

A. Tiliaca. Linden leaved Alder.—Has large coarse leaves, and is a tree of medium beauty.

AMYGDALUS.—Almond.

A. Communis flore pleno. Large double flowering almond.—Bore a profusion of blossoms with Mr. Brown, but not hardy above the snow.

ARMENICA.—Apricot.

The apricot is said to be found in high altitudes in the Caucasus, and Grossia says "it covers the barren mountains west of Pekin," and, "that the double flowering varieties are largely grown for ornament". In still more severe climates we have the Siberian apricot, which has been grown for a long time in England as an ornamental tree or shrub. And of late, it is said, that a Mennonite, released from exile in Siberia, came to Nebraska, bringing pits of this tree which are now fruiting there.

Is it possible that we may yet have a hardy race of apricots, hybrids between this and the fine varieties of southern climes; just as we have hybrids between the little crab of Siberia and the common apple? This is a field for reasonable hope.

BETULA.—Birch.

This is a tree of even Arctic habitat. It is found in Greenland, in Iceland, and in Lapland, it is said, within 1937 feet of the line of eternal snow. It is said to be found a tAlten, in Lat. 70°, growing to large size.

The Birch varies greatly from seed. "In extensive birch forests, whether in the rocky scenery of Sweden, the bog in in the north of Russia, or on the hills of Germany, full grown trees may be seen as various in their foliage and habit of growth as the young plants in seed beds." The same thing I have observed in our own woods, in the common white birch, that most nearly allied to the European. I have found cut-leaved kinds, though not equal in beauty to the European; and also what appeared crosses between the common white, which is the triangular leaved birch of our low lands, and the canoe birch.

B. ALBA.—European White Birch. This is the birch of northern Europe where it grows to a height of 50 or 60 feet. Dr. James Browne in his work, "The Forester", says that in Scotland there are two species, one erect, the other weeping; the latter the more rapid in growth and the more graceful.

In the grounds of Ellwanger and Barry, at Rochester, I was struck with the great beauty of a weeping birch, and was told that it was only the common European variety, but probably of that weeping form spoken of by Dr. Browne. In England, it is said to be an amphibious tree, which means that it will stand any amount of moisture, for drought as we know it, is unknown there. It also grows well on dry soils.

Three years ago I planted 35 of them. These are now the tallest, except some poplars, in a test plantation of 22 varieties of timber trees. They all took and grew rapidly, including two knocked out by sheep.

Of the European birch there are many grafted varieties of great beauty.

Var. Fastigiata.—This, when young, is as erect in growth as the Lombardy poplar. Its leaves are glossy and large for a white birch, and it is a striking form of tree. The only query is—will it maintain this fastigiate form as it becomes older? I have seen but one tree of fair age, and that was showing a tendency to spread.

I need hardly say it seems quite hardy here. It has retained its leaves in color later than other varieties.

Var. Foliis purpureis.—Purple leaved birch.—In spring and early summer the leaves of this variety are not green, but a deep, reddish purple. Not till later in the season does it become a dull green.

This tree ought to have special attention paid to it from the fact that we can hardly grow the copper beech. Purple leaved trees are such an addition to ornamental grounds, yet such trees should be massive as are the beech and hazel, not airy like a birch.

I fancy, from the look of what trees I have seen, that the tree does not attain large size.

It is hardy without doubt, no terminal bud seems even to hesitate.

Var. Pendula laciniata. Weeping birch.—Scott in his beautifully illustrated work, "Suburban Homes," a book full of facts, yet written with a poetry of thought worthy of John Ruskin, considers this "the most exquisite of modern sylvan-belles"; and says that "this tree stands the acknowledged queen of all the airy graces with which lightsome trees coquette with the sky and summer air.". Tall, slender, and graceful, it is becoming widely planted. There are no really fine trees of it about Montreal.

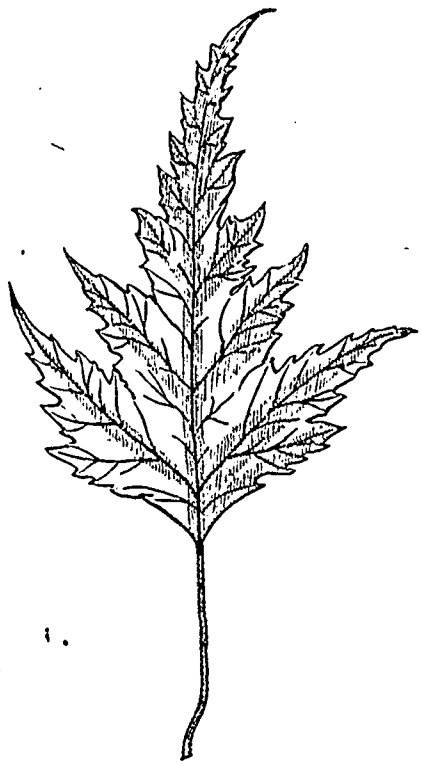

Fig. 4.—cut-leaved Weeping Birch.

One of the best is that in front of Bute House, on Sherbrooke St, facing the gates of McGill College.

Var. Pendula elegans.—This I have not seen. A cut of it appeared in the August number of the Journal, p. 56. When top-grafted, its branches hang round its stem in parallel lines.

Var. Pendula Youngii. Young's weeping birch.—Is a trailing birch found in England, which, when top-grafted makes a tree of beautiful pendulous habit, but not of that special airy gracefulness that I had expected.

Var. Pubescens. Downy leaved birch.—Said to be a native of Germany, not of special beauty, and like our common white birch.

Var. Tristis.—Is a variety but little known. When young, it is the most graceful and charming of all young trees I know. The leaves are small, and not cut, but the ends of the branches are nearly as slender as a piece of thread.

I have never seen but one old specimen of it, a grand old tree, but one that hardly did it justice. It has stood with me for 3 years with no other injury than the pinching back of a few little side shoots.

Var. Urticifolia.—Nettle leaved birch. Is another variety of medium beauty.

B. Bhojputra. Indian paper birch.—This is from the high altitudes of Himalayan Mountains. It has no special beauty while young. Its hardiness I cannot yet speak of but it is the only birch I have whose leaves were killed by the severe weather at the end of October.

B. Costata.—Is from the Amoor, and said to be erect in growth. (I have not seen it).

B. Dalicarlica.—Received from Paris by the Busy Institute, Jamaica Plains, Mass. It seems to be the fastest grower of all birches.

CASTANEA.—Chestnut.

The American Chestnut is a fine tree and one which attains great size. An old tree on the Centennial grounds, in Philadelphia, is 6 feet in diameter. It is highly ornamental, when in blossom, and bears nuts in large quantity, for which alone it would be well worth growing. Unfortunately we are rather beyond its northern limit. It is not hardy in Minnesota, but, in Ontario, as may be seen in that most valuable map by Messrs Bell and Drummond, published in the fourth report of The Montreal Horticultural Society, it crosses the line of the black walnut, west of Hamilton, and continues along the northern shore of lake Ontario as far east as Port Hope.

In central Iowa, even, the forestry manual of the Iowa Hort. Soc. recommends that the nut be always planted where the tree is intended to grow, and that it be mulched very heavily for 3 years. Our only chance of growing it seems to be in our finding increased hardiness in our most northern trees. In New Hampshire it must approach very near to Lat. 44.

C. Vesca. Spanish Chestnut.—Is a native of the central and milder parts of European and other countries; named Spanish, because the nuts were largely imported from thence into England.

It bears a larger fruit, but is not as hardy as the American, nor does the tree seem to be found in Europe in as severe climates as our native species.

C. Japonica. Japan Chestnut.—A dwarf tree, and young bearer of large fine nuts, and has been considered a new introduction of great value. I have seen terminal buds nipped a little on Long Island; but last winter was very severe there, and we must not consider it tender without some further evidence.

CATALPA.

This tree I have already called attention to in the Journal. As an ornamental tree, it has large heart-shaped leaves (I have measured a leaf on mine on young growth, fourteen inches long). It is of rapid growth, attains good size, and bears a profusion of white blossoms in summer. A singular fact about it is the difference of hardiness of species which look so nearly alike. As an ornamental tree, it was planted in the South Eastern States and then Northward into the Southern parts of New England, and followed the demand for ornamental trees westward.

Its value as a timber tree was just looming up, and it was being planted as far north as the northern boundry of Iowa, when the severe winter of 1865 revealed the fact that there were two species, a Western and a Eastern.

Var. Bignonioides.—The northern limit of this tree is some distance to the South of us. Rochester is considered north of its usual range. It is thought to be hardy there only because subject to lake influence. Arthur Bryant, in his little book on "forest trees", a litle book brim full of facts seen by himself, speaks of the Bignonioides as hardy at Princeton, Illinois. This was written in 1871, and it is since then that, it has been traced that the trees from which Mr. Bryant gathered his seed were of the Western or hardy kind. Mr. Auguste Dupuis, at St. Roch des Aulnaies, 70 miles below Quebec, finds this trees hardy, but it would be difficult to prove his tree Bignonioides, unless the two kinds were growing side by side.

VAR. SPECIOSA.—Hardy Catalpa. This has been found indigenous in the West, as far north as Lake Minitonka in Minnesota, and is the kind that stood the severe winter of 1865 in northern Iowa, and which since then has been known as the Hardy Catalpa. In the spring of 1878, I planted 150 young trees, which have shown such proofs of hardiness in my bleak exposure, that I hope it will have further trial for ornamental purposes. In the West it is in great demand for timber plantations, as it is a rapid grower and easily transplanted, and the wood is as indestructible as Mulberry or Locust. A gate post has been found sound enough to reset after 90 years. Railroad companies are planting it, and inducing farmers to plant it, for sleepers and fence posts, and for inside finish of passenger cars. Only by its introduction for ornament can we ascertain its farther uses in this climate. I should like to refer those interested to "Relations of Forestry to agriculture", by Dr. J. A. Warder, in the Journal of Am. Ag. Assoc. 1881, and "Additional facts in relation to the Catalpa", by E. E. Barney, Dayton, Ohio, which latter may be had, per mail, for 6 cts.

CEDRELLA SINENSIS. SATIN WOOD (SO CALLED).

Is a tree of rapid growth, and dark butternut-like leaves, lately introduced from China, which my attention has been specially drawn to, but as I have seen it killed back somewhat, during the last two winters on Long Island, it is not likely to be of use to us.

CERASUS.—Cherry.

Most of the ornamental varieties of the cherry are grown for the sake of their beautiful bloom. In testing any of them let us avoid those of the Bigarreau family as not likely to prove hardy.

Cerasus pumila pendula. Dwarf weeping cherry. This seems to be a variety of the Morello and, therefore, of probable hardiness. Grafted six feet from the ground, it forms an umbrella-like top, like a Kilmarnock Willow, though much more graceful. It has been used in the public gardens at Boston and is worthy of its place there.

Large double flowering cherry.—With Mr. Brown, this bore a profusion of large double flowers like little roses and grew to a height of 7 feet. The foliage seemed of Morello type and quite hardy. Mr. Brown prized this highly.

The Mahaleb.—Is very ornamental when young, but is said to become too branchy as it attains age. It seemed pretty hardy with Mr. Brown, and is quite hardy enough for a dwarf stock to graft upon.

C. PADUS—European Bird Cherry.

I am not aware that this has been tried here. It is of a hardy species indigenous at St. Petersburg, or near there.

Var. Aucubafolia. Aucuba-leaved bird cherry.—The foliage of this is dotted with white and in the early part of the season is quite pretty.

Var. Variegata. Variegated-leaved bird cherry—Less distinct in its marking than the above and so loses beauty earlier in the season.

CERCIDIPHYLLUM.

This is one of the late introductions of Prof. Sargent at the Busy Institute, Jamaica Plain, Mass., from the mountains of northern Japan, where it attains great height, with a trunk from six to ten feet in diameter. The foliage is quite small, and the twigs exceedingly slender.

I have seen a number of little trees of it about Boston and other places unhurt by last winter; more, I cannot say, the coming winter will give a clue to its hardiness here.

CERCIS.—Judas Tree or Red Bud.

C. Canadensis.—A very ornamental flowering tree, native of the milder climates to the South of us.

At St. Catherines, Ont., it has not been quite hardy, and with Mr. Brown, not hardy above the snow.

C. Japonica.—Was hurt a good deal in Boston last winter.

CLADASTRIS.—Yellow Wood.

C. Tinctoria.—Is one of the finest of American flowering trees—but its hardiness I rather doubt. However, Busy Institute has lately received a variety from Amour, which may yet be of interest to us.

Amour is that province of Siberia, which is North of the

Amour river, North of Lat. 58, and 200 miles from the coast. This is a high latitude in the climate of extremes, and anything from thence should be hardy.

CORNUS.—Dogwood.

C. Florida.—White flowering dogwood. I cannot find out whether this has been tried here. I have seen the ends of its shoots suffer in Boston, and therefore, have felt doubtful about it. However, we have beautiful flowering varieties in our own woods well worthy of garden room.

CORYLUS. HAZEL.—AVELLANA ATROPURPUREA.

Purple Hazel.—Next to the purple Beech, this is the most effective of dark foliage trees. It is a variety of the European Hazel. It has large massive foliage, dark purple in color during early summer. It forms a small tree of bushy form, but. unfortunately, its terminal shoots suffer somewhat even at Boston. It is, however, a tree that stands heavy cutting back, so that if winter killing here is confined to its yearling shoots, it may yet find a place in ornamental gardening

CRATÆGUS.—Thorn.

A most ornamental species, but the most beautiful are European and of doubtful hardiness.

C. Oxyacantha.—Common Hawthorn. Quick.—This is the celebrated English hedge plant. Mr. Wm Brown had many hundreds of the young plants, and had a hedge 4 or 5 feet high. The young shoots were invariably killed back. It seemed hardy only when covered by snow. With Capt. Raynes, in his sheltered position, it seemed to stand better, and his hedge grew to a height of 12 feet.

Double Scarlet.—Bore a few flowers with Mr. Brown. These were very beautiful, but though the tree grew to a height of 5 or 6 feet, it proved far from hardy.

With Mr. Wm Evans, at Côte St. Paul, it has flowered freely and seemed much more hardy.

Double White.—Grew side by side with the above, with Mr. Brown, and seemed equally tender.

Our native thorns vary greatly. Some, when of fair age, have branches almost horizontal and parallel like a cedar of Lebanon and are very effective.

In passing along the road, last summer, between Farnham and Stanbridge East, I observed some pretty cut-leaved thorns, near a farm house,

On enquiry, I was told that there were more like them in the woode—yet I have seen no natives that could approach, in beauty, the blossom and the cut-leaved foliage of some foreign kinds. Could we trace their habitat we might get some idea of their chances of success here.

FAGUS.—Beech.

The beech is difficult to transplant, and it is unfortunate that the most ornamental varieties are European and less hardy than our natives.

F. Sylvatica.—European Beech.—This is a native of the Northern parts of Europe; yet not of the severer climates, neither does it seem to approach the northern limit of the Norway maple any thing like as near as our own beech does to that of our sugar maple. Mr. Brown grew it in nursery, and it was quite hardy well covered up in snow, but where are the trees then sold and planted about town? They surely did not all die from transplanting, and I hear no word of any now living. The hardiness of this tree is not yet proved.

Var. Pendula.—Weeping Beech.—Scott speaks of this as "the most curious tree of our zone." It is the very embodiment of all the odd freaks of growth that can make a tree picturesque. There is a tree on the grounds of the Parson's nursery at Flushing, which must be about fifty feet across its greatest breadth. Branches starting from the trunk, twenty or thirty feet high, trail upon the ground on every side, making, as it were, a large tent under which, I suppose, fifty people could take shelter in a rain storm.

Var. Purpurea.—Purple leaved or Copper Beech.—Is the most beautiful of all dark foliage trees, and, except the Babylonica willow, the one of all others which we may mourn the loss of from the severity of our climate.

It changes the character of ornamental grounds, wherever introduced. I got 14 trees of it, some I gave away, some died, and the behaviour of those living is not altogether in favour of its standing our severe winters. Mr. Brown tried several dozen trees and got them up to 6 feet in height, but they proved quite tender. There is, however, one tree of medium size 18 years planted in Montreal in a very sheltered and overcrowded position. This may offer a faint ray of hope for sheltered city gardens.

Var. Purpurea Riversii.—Is even richer in color than the above, but with Mr. Brown proved equally tender.

Var. Incisa.—Is a rare but very striking cut-leaved tree, but not of hardy family.

FRAXINUS.—Ash.

This is a species of much more varied beauty than our native kinds would lead us to expect; on the other hand, our native white ash seems to be the favourite for timber planting, and, for this purpose is being propagated and planted by the forest schools of Europe.

F. Americana. Var. Aucubafolia. Aucuba leaved Ash. — This is the finest of all the variegated leaved trees, which we are likely to be able to grow in this climate. As a variety of the native Ash, one would expect it to be hardy. In all the young trees I have seen of it the gold blotching of leaf seemed to be permanent.

The foliage is very bright and showy, but of course, like all other variegated leaved trees, largely loses this after mid summer.

Var. Bosci. Bosc's Ash and the Var. Pannosa, or Carolina Cloth-like leaved ash.—Do not seem to me to have points of special beauty when young. When older, I cannot say.

Var. Juglandifolia. Walnut leaved ash.—Is pretty from its glossy peculiar tinted leaves.

Var. Punctata. Gold spotted-leaved Ash —Has small gold dottings and is rather pretty but is less permanent and not equal to the Aucubaefolia.

F. Excelsior. European Ash.—Is found in rather high latitudes in Europe; and has been grown to good size even at St. Petersburg, but as purchasable trees are very apt to be the offspring of English and Scotch trees. In this country, the question is, what is the hardiness of those already tried? Mr. Brown had trees about 30 ft. in height, seemingly quite hardy. Capt. Raynes also has 3 or 4 trees about 25 ft. which seem thoroughly at home in our climate.

Var. Atrovirens.—Dwarf crisp-leaved Ash—Is a great curiosity. Its leaves which are of the darkest possible green are curled and all huddled together along the stem. I am afraid to say how slowly it grows some specimens certainly not more than an inch per year.

Var. Aurea and *aurea pendula.— The golden barked, and golden barked weeping* varieties are pretty, but of doubtful hardiness.

Var. Concavafolia Variegata.—Variegated leaved Ash – Is a beautiful variety on account of the tinting of various colours of its young shoots.

Var. Monophylla.—Single leaved Ash.—This is the most solid and rich leaved of all these varieties. A tree I have of it no one seems to take for an ash. It is decidedly ornamental.

Var. Monophylla laciniata.—Is a rather rapid growing tree, with heavy cut-leaved foliage, quite striking and pretty.

Var. Pendula.— Weeping European Ash. A tree of rambling as well as pendulous habit. It is usually top-grafted

and grows to a medium height, covers a good deal of space, and is one of the best of "arbor trees." It proved quite hardy with Mr. Brown. I have not heard of its being tried in bleak exposures.

Var. Salicifolia. Seems to be a tree of delicate constitution with leaves not much broader than a blade of grass.

F. Potamophila.—This is a really beautiful small leaved-ash, from either Siberia or Turkistan, lately introduced by Prof. Sargent.

GLEDITSCHIA.—Honey Locust.

G Monosperma.—American Water locust.—Is a tree of careless air and serpentine branches of wayward habit of growth.

The most beautiful of all the Locusts in the grounds of the Department of Agriculture at Washington, but probably not hardy here.

G. Macrocantha—Suffered much last winter at Washington.

G. Triacanthos. Honey locust.—Is a rapid growing tree with a profusion of strong spikes or thorns on its branches, and often on its trunk, with delicate graceful foliage, and branches in horizontal and parallel lines. It is specially effective when intermixed with trees of more solid outline. We seem to be pretty near its northern limit, yet it has proved quite hardy at Como, on the Ottawa. Its hardiness should be secured by growing trees from seed of hardy northern trees. There was once a fine row of grand old trees of it, at the West end of St. Joseph suburbs, Montreal, but few of which now remain; and in the Seminary gardens in Notre-Dame St., there are old trees which would make two or three saw-logs a piece and which bear a profusion of seed annually. If properly cut back it makes a hedge that not even a rabit can get through, and as the Osage orange and the English quick are tender, we have no other plant for this purpose except our slow growing native thorns. The variety named "inermis," only differs in having fewer and shorter thorns.

Var Bujoti pendula. Bujot's weeping honey locust. Pretty and graceful but not likely to prove hardy.

GYMNOCLADUS. KENTUCKY COFFEE TREE.

G. Canadensis.—This is a fine light foliage tree, looking a good deal like a locust; quite ornamental, and used largely in the public gardens at Boston. Mr. R. Spriggins tells me it is doing well in Mount Royal Cemetery. From a few trees I have seen about Montreal, I notice that it differs in hardiness, some trees having their yearling shoots killed back three or more inches; others are seemingly less tender.

I doubt if the tree seems thoroughly at home in our climate.

JUGLANS.—Walnut.

J. Nigra. Black Walnut.—This tree attains large size but should not be planted where it overshadows others.

It is an indigenous tree as far north as London, and is found along the north shore of Lake Ontario as far east as Cobourg.

It has however proved quite hardy in many parts of our Province. The experiments of the Hon. G. Joly, 100 miles North-east of Montreal, given in the sixth report of Mont. Hort. Society, gives some idea of the rapid growth of this tree from the nut. The largest after six summers growth was fifteen and a half feet in height. There is a fine tree at Captain Raynes', Cote St. Antoine, and a fine old tree at Abbotsford, showing that certain varieties of it are, without doubt, hardy in this province.

J. Regia European Walnut or Madeira-nut.—Has even been fruited in Montreal, but the tree is by no means hardy, and in fact lacks hardiness some distance to the south of us.

The Cut-leaved Walnut. Is a rather pretty tree, somewhat of Negundo or Elder like foliage; it suffered somewhat at Washington last winter.

J. Mandshurica and *J. Japonica.*—Are recent introduction at Busy Institute, which it will be interesting to test alongside our own species.

J. Ailanthifolia is posibly the same as *Mandshurica.*—I saw a young tree of it at Rochester. It had started to grow as rapidly and stoutly as our own Sumac.

KOLRUTERIA.

K. Paniculata.—A small tree from China with pretty yellow flowers in August, succeeded by a curious growth of bladder-like seed vessels. It was slightly hurt in Washington, last winter, also in the grounds of the "Rural New Yorker", not far from Jersey City. Not as hardy as I had hoped.

LARIX.—Larch or Tamarac.

This is a tree of somewhat formal outline, but of feathery foliage, and one that should be planted among massive round-headed trees.

L. Europœa.—European Larch.—Is a native of the mountains of Central Europe, and rather a faster grower than our native species. On this account it has been grown in preference to the native in enormous quanties on the prairies of the West. It is said to transplant readily if only planted early, very early. Three years ago, I planted about 100 trees of it and poor little things they were, and taken up too early in the fall. However, I lost but few, and the largest are now six feet in height.

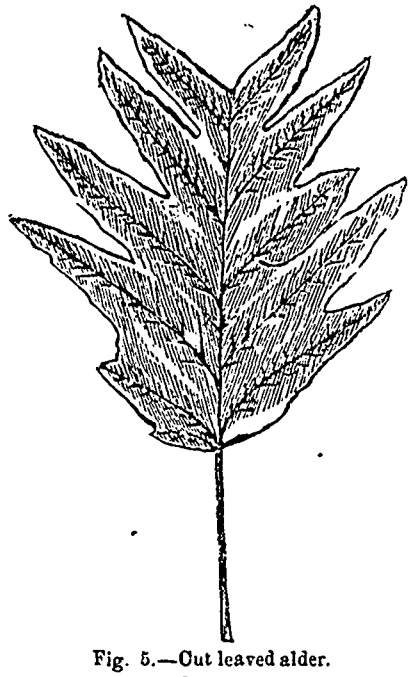

Fig. 5.—Cut leaved alder.

It has proved hardy in Montreal, and, so far, hardy here; hardy even in Minnesota.

Var. Pendula.—This is a variety of straggling and erratic habit and is always top-grafted 5 or 6 feet high on the common European larch. It is said to be difficult to transplant, and it has been so with me, for out of a dozen trees planted, not one is living. It is, however, only when grown thus to a large size, and with side branches trimmed up to top graft, that the larch is difficult to transplant.

There is a drooping variety of the larch grown in some parts of England in general form like the common kind, but of drooping and almost weeping habit of growth. This was the tree I was trying to grow when ordering the Larix pendula.

L. Kœmpferi.—From Japan. In Central Park there is a fine young specimen of this really beautiful tree, far more

soft and fringy than a common larch, and of a peculiar, almost tropical appearance. What is usually propagated as the Pœmpferi looks much as other larches. There is some mistake somewhere.

L. Leptolepsis. From Japan. On the grounds of the Busy Institute this has proved the most rapid grower of all larches. It is of late introduction and its ultimate size, I do not know. The Tamaracs among the White Mountains and about Boston have been attacked by some insect or fungus, causing them to droop their leaves, and threatening their destruction. The leptolepsis larch, though growing in Boston quite close to native infected trees, shows, as yet, no signs of injury.

Liquidamber. Sweet Gum.—This is a really beautiful tree, native of the milder climates to the south of us. It suffers when young at Boston, and, with Mr. Brown, would not live above the snow line.

Liriodendron. Tulip tree.—There are trees about Boston fifty feet in height which, when in full bloom, are a sight worth seeing. A friend says, that the sight of one of these in full bloom is a sure cure for atheism. It also attains large size about Niagara. I planted a lot of little trees three years ago thinking that they would grow and kill back, and that I might, in that way, grow it as a shrub on account of its large peculiar leaf. It is not one of those trees that can be grown in that way. But it has come through our winters almost all right. It seems nearly hardy.

MACLAURA.—OSAGE ORANGE.

This is grown largely as a hedge plant where the winters are milder than ours. I have seen it at London, Ontario, making an impenetrable barrier around an orchard, growing rampantly one year, and killing back next, its dead spikes proving as formidable as the living. However, a friend writes that it has been found in the woods near London, suggesting increased hardiness. It forms a small ornamental tree of great beauty.

MAGNOLIA.

This is a class of tree of stately form, heavy, massive foliage, and large fragrant flowers, but we have not dared to try them here as yet; still, as a class, they vary much in ability to stand cold. The evergreen *Magnolias* suffered severely last winter at Washington. In the botanic gardens of Harvard University, at Cambridge, there are *magnolias* at least thirty feet in height. I have been struck with the way in which some varieties shoot their terminal buds in Boston, and think that they should be tried in some sheltered places about Montreal.

The Chinese varieties Soulangea and Speciosa and the Fraseri seemed the hardiest.

The head of the Jersey Cow depicted on our page is about as lovely a specimen as can be found. I don't know whether I am premature or not, but I would make a small bet that at the next exhibition at Mile-End there will be found more than one descendant of the old race, imported from the N. W. of France by the early settlers, whose general configuration and the "expression" of whose countenance will forcibly remind a competent observer of this lovely gazelle-like creature. The Canadian cow is to have a fair chance to show what she is and what she *can do*.

The first number of "the Breeder's Gazette," published at Chicago, has been kindly forwarded to us by the proprietors. The paper and type are both of a superior quality, and the engravings are well executed, though we must be pardoned for saying that the good points of the cattle are a little exaggerated. There is plenty of room for a journal like this, if it will hold the balance even, and take no party side in the contests between Shorthorn vs. Hereford, and Percheron vs. Clydesdale, and adhere strictly to its promise, that "our Horse Department shall be conducted from the stand-point of the farmer and the breeder rather than from that of the gambler and horse jockey."

AGRICULTURE.

Paris, October 1881.

With the view to develop the use of steam ploughs in France, a native manufacturer will lend that implement gratis, in order that intending purchasers may test its utility. The combination system, for the general purchase of farm machinery, the subscribers employing the implements by a rotation determined by lot, is also making satisfactory progress. At the Electricity Exhibition, the plough ordinarily worked by steam, has for motor, electricity, which drags the machine in inverse directions, as do the locomotives. In the case of the electric motive power, it is not necessary to transport the generating machine on the grounds, the current can be sent along by wires, at a distance of one or two miles from the farmstead, where the generator can be worked by the stationary steam engine. It does seem, that the only difficulty connected with the use of electricity, is to be able to produce it on a large and cheap scale. In the case of extensive illumination, electricity can be profitably employed, but not otherwise up to the present. There is no doubt electricity as a source of power and heat, as well as of light, will be made commercially cheap. For example, the power of the fluid is marvellous; in the Electric Exhibition the one current supplies the light, and drives the several machines, while never displaying any diminution in power, despite the several and varied demands made upon its services.

A warm discussion is going on between scientific and practical men, as to the possibility of profitably rearing precocious Merinos for the butcher. The Scientists assert the practice is remunerative, but their opponents reply, offering an examination of their accounts, that for thirty years they have been occupied with the question, and have never found the precocious Merino a paying investment, save where the rams are reared and exported for breeding purposes. A flock, then, of Merinos, highly fed, and destined early for the butcher, does not pay—in France at least. Scientific authorities are called upon to rebut these facts by counter-facts.

France expends three-quarters of a million of francs annually, in the purchase of native horses in Algeria, for cavalry wants, besides awarding prizes to breeders and supporting studs. The horses of Algeria are not good looking, but they are serviceable and bear immense fatigue. The Arabs continue to prefer mule rearing, to horse-breeding: the mule is more easily reared, fetches a higher price, and often commences work at the age of 18 months; for the Arab, the mare is his all; her foal, if of the same sex as the mother, is a joy, and is reared: if the contrary, a veritable calamity. Cattle rearing is more remunerative than horse-breeding, and less liable to deception.

Salicylic acid, after remaining for a long time a laboratory curiosity, has developed into a modern industry. The new product was accepted by some enthusiasts, as the philosopher's stone: it was boasted that it cured every disease, no matter whether of long or short standing, like a patent medicine. Then came the inevitable reaction. The French government excommunicated it in the interest of the public health, while other countries, that dispense with governmental tutelage, had no complaints to record on sanitary grounds. In Germany the acid has been found by veterinary surgeons efficacious against several diseases: horses with sore mouths, were cured in five days by merely allowing them to bathe their lips in a weak solution, renewed thrice daily. In 1874, in

HEAD OF A JERSEY COW.

Hungary, when the poultry epidemic broke out—eruption about the eyes, head, feet, &c., a cure was effected by touching the affected parts with a brush dipped in a solution, adding the acid to a tub in which ducks and geese could bathe, and mixing it with the sand or ashes wherein fowls liked to roll. Of late, in Germany, salicylic acid has been successfully and generally employed, not as a remedial, so much as a preventive agent. For horses, bulls, cows, &c., these receive one thirtieth of an ounce daily. smaller stock in proportion: about 3 ounces of the acid are dissolved in a bucket of warm water, and the solution proportionably distributed. As an antiseptic, the acid is excellent. An objection has been made that it lessens the reproductive powers of stock, but Mr. Ludloff, who has employed the acid daily for five years, finds, that 100 cows produced 89 calves, while the average was 88 for the preceding five years. The generative functions are thus unaffected. The cost of the acid, per head of cattle, per week, is only one penny.

The cultivation of the parsnip is taking extensive proportions in France as a forage plant, its natural home appears to be Brittany, where it continues to grow till the close of December. Mr. LeBian has made the culture of this root a speciality, and is in a fair way to substitute it extensively for oats for horse feeding. It goes capitally with maize, and hogs accept it as a dainty dish.

The seat and centre of the *charbon* disease, or "mountain malady," is in Auvergne, the Pasteur process of vaccination has been tried in several of the mountainous districts, and with the fullest success. Mr. Pasteur announces, that he is occupied in the arrangement of a little laboratory for the commercial preparation of vaccine. he will not be ready to execute orders till next spring. no loss will be incurred in the interim, as the disease is limited during winter. He will prepare 44 gallons of the matter, sufficient to vaccinate one million of animals, it will be forwarded in special glass tubes, and the cost will be one-half penny per head of stock. Up to the present, 30,000 animals, sheep, oxen, cows, horses, &c., have been vaccinated, and with success, in the sense that they have been saved, while others at their side have succumbed.

The two most successful means for destroying the phylloxera are, autumnal inundations followed in spring by rich manurings, and next, the sulphuret of carbon, in the proportion of three-quarters of an ounce per square yard, dibbled in round the roots. The sulphuret has the disadvantage of being dear, and the draw-back of killing the patient occasionally. Where the latter occurs, the cause will be found to reside in an excess of humidity in the soil, and the lowness of surrounding temperature. On well-drained lands, having a silicious or calcareous subsoil, the sulphuret may be employed with safety; treat only vines not too gravely attacked by the insect, and select winter for the work, where the soil is tenacious and the disease of long standing, multiply the holes in the square yard and reduce the doses. In spring, apply farm yard manure, with the addition of potash salt, in the Chloride form for example, but never employ oil cake.

The Dutch Poultry Show was especially remarkable for its splendid organization. the birds had little parks in which to move about, and water-fowl had their bath, all, as might be expected from the country, proverbially clean. It was the unanimous opinion that the flower of the flock were the Dutch Padouans. (1)

Mr. Barral has made some experiments on the quantity of food consumed and assimilated by poultry, and concludes, that weight for weight, they eat more than mammiferous animals, or birds at liberty.

The department of the Seine Inférieure is very pastoral, it has 133,000 milch cows, yielding on an average, 6 quarts of milk daily; from this milk, butter, valued at 26 million frs., and cheese, at 7 million frs., are manufactured. It is proposed to create a model dairy farm, totally independent of the State, where, as in Denmark, theory will march hand in hand with practice. Were the capabilities of this region developed, the butter made to day, could be sold in London next morning.

Petroleum cures cutaneous affections; Mr. Desbois finds, if it does not kill ants, it drives them away, as he knows from experience in his conservatory.

It has been decided by several of the Councils General, that for the future the highroads and by-ways shall be planted with fruit trees, instead of elms, poplars, acacias, ash, &c., that merely exhaust the soil.

The vintage is excellent this year in point of quality. The beet crop will not be heavy, but the juice will be very rich.

(1) A new breed to me. Leghorns I know and Houdans, but I never heard that *Padua* was celebrated for any thing but for being the birth place of Titus Livius, and for bad latin! A. R. J. F.

AGRICULTURAL MACHINERY.

THE M'CORMICK GOLD MEDAL TWINE BINDER.

The engraving, in our last number, represents a rear and side view of the gold medal sheaf binder of the M'Cormick Harvesting Machine Company, Chicago, Illinois, U. S. A., Messrs. Lankester & Co, of 228, Upper Thames Sreet, London, E. C., are the exhibitors and sole consignees. With the exception of the binding apparatus it is similar in construction to the M'Cormick wire binder, of which illustrations were given in the *Agricultural Gazette*, 1878. This is the fourth gold medal the Royal Agricultural Society have awarded this American house, viz, 1851 and 1862, both London; 1878, Bristol, and 1881, Derby. Such successes will doubtless give rise to no little comment on both sides of the Atlantic. What will most interest English makers of reaping machines is the fact that the gold and silver medals are awarded for sheaf binding only, that, thus far, the three medal machines are manufactured on the principle of Appleby's American packing and binding apparatus; that such is public property in England, and the judges highly commend Mr. King's principle of tying and separating the sheaf, which is different from Appleby's and certainly preferable. Some slight alterations have been made in the reel platform and elevator, but it is questionable if they are improvements, for the Bristol wire binder made better work in reeling, cutting, and elevating over the wheel, and also in separating the sheaf, than does the Derby twine binder; and if the reader will compare the illustration of the latter with the two engravings of the former, the only difference worth noticing is the position of the driving gear and its simplification. The latter is a decided improvement, the former is the contrary, for with the exception of the chain gear that drives the reel, all the other driving gear is inside the main driving wheel, which increases the weight on the grain wheel and also the side draught. The driven gear of the packing and binding apparatus, which is intermittent in its action, is outside the main driving wheel, which helps to counteract the weight on the grain wheel and side draught, but taking everything into account, including the position of the pole, side draught, and the balance on the main supporting wheel of the Derby machine (1881), it is not improved, but the contrary, as compared with the Bristol machine (1878); and it is much to be regretted that the judges did not test the draught and side draught of this mabhine, as they were evidently greater than in the silver medal machines, and also in Wood's binder, and in King's. At Bristol the binder arm was elevated above the centre of gravity, and had a to-and-fro traverse on the binder platform. At Derby there is no tra-

verse, and the binder and packing arms are below the centre of gravity, and this is a most decided advance in mechanical construction. But Mr. King's machine missed fewer sheaves than did the M'Cormick twine binder, or any other in the trial field, and made the best separation; results that were patent, not only to the judges, but to everybody in the field; and had Mr. M'Cormick himself been present at Derby, as he was at Bristol, he could not have failed to see it.

Another improvement in the M'Cormick Harvesting Machine Company's Derby binder is the addition of the Appleby "butter," as compared with the shifting platform of the Bristol binder, so as to bind the sheaf in the proper place, be the corn long or short. This is not very distinctly seen, but it may be observed under the screen at the butt end of the corn on the breast that is coming down side on from the elevator It consists of a short endless apron on the principle of the platform apron. It centres on the upper roller shaft upon which it has an irregular movement, and can be adjusted to a less or greater angle whilst the machine is in motion, by a draw rod lever, seen on the top of the elevator at the right hand of the driver, so as to force the butt ends of the corn a less or a greater distance forward, purposely to have the butt ends at the proper distance from the band. Hence its technical name "butter."

The packing device for gauging the size of the sheaf consists of two arms below, working up through the breast in two slots alternately, and at each stroke they gently raise the grain and move it a stage forward into the packing chamber against the projecting feet of the spring lever, the curved point of one of which is conspicuous in the cut, the other being covered. The principle of action is that of the crank shakers of our English threshing machine. And when each packer has moved down the grain a given distance it withdraws below the breast, whilst the other rises to perform its function.

The two curved projecting feet resist the packers up to a given pressure against them, but when this pressure is applied they give way, throwing the packing arms out of gear and the binding mechanism into gear. The projecting feet can be shifted up or down the spring lever, on which they are fixed, so as to make larger or smaller sheaves as may be desired, the principle being that of a steelyard. This is very ingenious. The judges had a man who weighed the sheaves by means of a spring balance. But here the sheaves are weighed automatically by a species of self-acting steelyard, and so exactly as to make them all of the same weight or nearly so, according to the quantity of grain forced into the packing chamber by each packer at a single stroke.

The binding apparatus is above the sheaf, the needle arm rises up from below, and is mechanically timed to co-operate with either packer, whichever makes the last stroke; and the moment the twine is cut, and the free end held fast in the gripper, the needle withdraws below, taking the twine with it inside the bound sheaf, so as to be ready for the next sheaf. During the making, the projecting curved feet (only one of which is seen) prevent the twine from sustaining any undue strain to break it. It has just sufficient tension put upon it to hold it close to the forming sheaf, but no more

The driven and driving gear of the binding apparatus is above and conspicuous in the cut. It is supported by a standard at the butt end of the sheaf, with a fellow projecting arm over the sheaf sufficiently far to bind the largest corn in the proper place, the framing being stationary Short corn is brought up to the needle by the "butter" The knot is a close round one, and the binder hook is on the "bird-bill" principle. The lower mandible centres on a pin in the head, and projects back, terminating in a ball, so as to form a weighted lever. The needle carries the twine over the neck under the lower mandible into the gripper, a turn of the knotter shaft forms the loop, and in turning, the ball of the lower jaw comes against a cam, which opens the bill, into the mouth of which the two ends of the band enter, when a cam closes the bill, holding the ends fast in a gripper, and they are then cut off; the loop is next pushed over the upper mandible and the ends drawn through and held fast until the knot is drawn tight as two projecting arms on the rotary shaft throw off the sheaf, in bringing the knotter into position for another sheaf; at the same moment of time the binding apparatus is thrown out of gear and the packers into gear, and they commence forming another sheaf.

The following objections were raised against the gold medal machine during the trials—1. The binding apparatus was said to be an infringement of Fisken's patent (4242,) 1877, now held by Messrs. Samuelson & Co.; also of Messrs. J. & F. Howard's patent (821), 1880. Consequently two conclusions were deduced from this—(1) that the judges ought not to have selected this machine for trial without the concurrence of the above firms, and (2) that purchasers cannot use it without paying licence and royalty, and there cannot be a doubt that the two English makers have good cause for objecting on both the above grounds. 2. Apart from the question of patent infringement, the American "bird" of the gold medal machine is much inferior, in point of mechanical construction, to Fisken's "bird," and even worse than the Bedford "bird," which has been given up by the patentees for a better, viz., Messrs. J. & F. Howard's knotter, constructed on the principle of Mr. King's knotter, recommended by the judges for sound principle of construction. But without going into the controversy as to whether the Bedford "bird" or the Chicago "bird" is the better of the two, both are condemned as faulty mechanism from their centrifugal action, more especially the ball-weighted lever mandible of the gold medal knotter, especially after it has been used for some time and the wearing parts have more play. Weighted lever action has been tried over and over again in connection with harvesting machines, but it has invariably been given up. More than a dozen patents might be quoted, but it is unnecessary, as the objection cannot be called in question. For a similar reason the small lever which shifts automatically the binding and packing mechanism out of and into gear is objectionable from its centrifugal action, as, from its great velocity, and hence force of stroke, it is liable to derange the truthful working of parts. It is an element of Appleby's patent, and is an objectionable mechanism in the two silver medal machines as well as in the gold medal one. It was this lever in Messrs. Samuelson & Co.'s machine that was broken from its violent action in crossing a deep furrow in Mr. Radford's field of tall red wheat on Wednesday afternoon. And besides being liable to injure itself and derange the working parts with which it is connected, it is liable to sustain injury from external causes. It is possible to protect it from these, but it was not so protected in any of the machines. And we were told it was bent in the Banbury and Brockport silver medal machines on the railway, and had to be straightened. Whether the small sheaves thrown off by the gold medal machine are traceable to anything wrong with this lever or not we had not the means of determining, but we presume the weak point lies hereabout, for before the Johnston Harvester Co. straightened this lever and made some other alterations, when starting in Mr. Radford's oat field, on August 4, they made small sheaves, but after the proper repairs they made the sheaves in that field of uniform size, and also during the whole of the trials, and, as like causes produce like effects, the above conclusion is warranted.

Another objection has reference to the trials. The gold medal machine was put into the more favourable plots by the judges—both in the 2-acre oat field on Tuesday and in the

2-acre plot in Mr. Hall's wheat field on Wednesday forenoon —whilst it was not sent to Mr. Radford's wheat in the afternoon to be tried when it was blowing a fitful gale. Its 2-acre plot in Mr. Hall's wheat was leaning more in one direction, and hence was more difficult to reap and bind with the lay of the crop, but it was not so much broken down and tangled as the two adjoining plots, and hence when cut one way, as it was, it was more easy to cut and bind than they were. Practical farmers saw this plain enough, and also that Samuelson & Co.'s and Wood's plots ought also to have been cut one way, for had they been so cut far better reaping and binding would have been done with fewer mishaps. In Mr. Radford's field there were deep cross furrows, and in crossing these the silver medal machines discharged sheaves not bound. These were lying along the edge of the furrows in rows, so that there was no mistake as to the mechanical cause not being due to the machine but to the deep furrows. It will no doubt be said that they ought to have crossed such furrows without missing the binding. Granting this, another question follows—Would the gold medal machine have crossed the furrows without missing? And the answer is, it was not tried. Hence the validity of the objection. Again, in Mr. Radford's field the gold medal machine was not tried, so that farmers could not see how it would reap and bind in windy weather, such as was experienced during the trial by the two silver medal machines and King's, which were not equal in this respect. And lastly, the draught and side draught of the gold medal machine was not tested by the judges in comparison with that of other machines, for had it been so, the general opinion was that both would have been against it and in favour of the silver medal machines and King's; whilst during the whole of the trials more manual assistance was given to the gold medal machine than to the silver medal machines and King's, which very largely reduced the draught of the machine. — *Ag. Gazette.*

First Lessons in Farming (Young Man's Department.

We have seen that plant-food is of two kinds; *organic*, or matter that can be rendered gaseous by fire, and *inorganic*, matter which resists the attacks of fire. We can easily see that inorganic food must be derived from the soil, and as nothing can enter into a plant so long as it retains its solid form, it is clear that this inorganic matter must be derived from those parts of the soil which are capable of being dissolved, in chemist's language, soluble. plant-food must be made liquid by water, or it must be imbibed in the form of a gas. *Carbonic acid* and *ammonia*, however, are associated with both groups, the organic and inorganic, and are received by plants from the soil when dissolved in water, as well as from the stores existing in the atmosphere.

On what does the fertility of the soil depend? To answer this question, I must first ask you to consider what you would think of being left on a desert island with nothing to eat but frozen meat, and no means of thawing it. "I have plenty of food," you would say, "but I cannot use it: I must starve." And so it is with plants. There may be any amount of plant-food existing in the soil, in a *dormant* state, but before it can be utilized by the plants you cultivate, it must be placed in an *active* state. Plant-food in a *dormant* (sleeping) or inactive state, is just as useless to the plants as a loaf of bread locked up in a banker's safe would be to a hungry man. The soil may contain all things necessary to supply nourishment to vegetation, but, the plants may languish and die. It is only that part of the soil which is capable of being dissolved by rain water which is available as food. The supplies of food which are ready at any given time are those which determine the growth of the plant. Hence, in every chemical analysis of soils, it is absolutely necessary that the ingredients that are soluble in water should be distinguished from those that are insoluble; for it is of no use to the farmer to be told that there is a plentiful supply of any particular ingredient, unless that ingredient be in a fit condition to afford nourishment to vegetation.

But we must not imagine that the *dormant* portions of the soil are useless. By no means. They are the store which nature has laid up for future use, and keys have been provided by her, with which the skilful operator, aided by her own powerful hand, may open the lock of the great safe and set free the imprisoned riches. A bad husband-man may steal and carry off a most terrible proportion of the *active* ingredients of the soil, but it is only the good farmer who is able to avail himself of the *dormant* parts. I would far rather succeed a bad farmer on a farm than a good one, unless, owing to circumstances, the latter had to leave unexpectedly. The bad farmer might skim off most of the cream, but the good farmer would manage, in the last few years of his occupation, to take cream and cheese too, and thus repay himself for his outlay at the beginning of his lease.

And how does the skilful farmer set about ravishing these hidden treasures from the bosom of the earth? In two ways: passively and actively. I must, I fear, repeat many things in these *first steps*; but repetition is the parent of acquisition, and you did not learn your alphabet by glancing over it once. The rain-water, with its carbonic acid and oxygen, and the frost, gradually break down the hardest rocks, and, in time, dissolve much of their finer portions. The same action takes place in an autumn-ploughed field. The air, the rain, the frost, work their will upon the soil, break it up into finer particles, and these little fragments are so acted upon by the elements, that the exterior portions of them become soluble in water, and fit to be taken up into the circulation of a growing plant. Thus you see that the farmer who knows his business *actively* prepares the road for nature's agents, and then *passively* waits till the servants have done their mistress' bidding.

Time, you will observe, is everything in farming. Plants demand available food, and demand it at the instant: they can't wait, and they won't. There may be hundreds of pounds of *dormant* food to the acre on your farm, the plants care nothing for it: they want active food. If you go on drawing cheques upon a bank without paying in any deposits, you know what will happen: sooner or later your funds will be exhausted. And so with the soil: if you persist in demanding crops from the land without making any return, the land will, in effect, say to you: "You have taken all my ready-made lime (or potash) how can you expect me to furnish your wheat or your oats with what I have not got? No, you must wait, you must pay me some lime (or potash) back again, and then I will try what I can do for you. *You* cannot live without prepared food, neither can the plants you cultivate."

As the soil is the only source from which your crops can obtain this inorganic food, it is as well that you should know what they remove from the land. In the following table you will find as accurate a statement as the varying yields will admit of. You cannot remember all the figures, but you can form a good general idea of the facts they represent.

And what a difference there is, not only in the quantity of the same material demanded by the various crops, but also in the quantity demanded by the different parts of the same plant! For instance, wheat, beans, and clover, remove no carbonic acid, at all, from the soil; whereas, a crop of turnips walks off with 43 pounds. It takes only 13 ounces of silica to suffice for 25 bushels (1500 lbs) of the *grain* of wheat; but the 3000 lbs. of *straw* which, in England at least, are required to produce the above crop of grain, demand 101 lbs. of silica, to enable the crop to stand against the heavy gales

and rain, which, about the time of harvest, do their best to hurl the hope of the tiller to the ground.

	WHEAT.		BEANS.		TURNIPS.		CLOVER
	25 bushels	3000 lbs straw	25 Bush Corn.	2500 lbs of Straw	20 tons Bulbs.	6 tons Tops.	2 tons Hay.
	lbs	lbs.	lbs.	lbs.	lbs	lbs.	lbs.
Potash	7 49	18 21	22 63	89 17	125 73	75 95	52
Soda	97	90	6 68	2 69	22 98	16 23	7
Magnesia	3 07	4 11	5 03	11 24	12 27	9 27	35
Lime	85	9 31	3 63	33 58	37 87	69 81	111
Phosphoric Acid	11 47	8 15	23 67	12 16	31 11	27 87	20
Sulphuric Acid	08	5 82	61	1 83	42 26	36 56	13
Silica	84	101 82	72	11 84	11 66	2 58	10
Peroxide of Iron	20	1 32	35	—	3 71	2 58	3
Common Salt	03	33	90	7 15	28 69	38 15	8
Carbonic Acid	.....	.....	.....	.....	21 71	21 00	.....
	25 00	150 00	63 00	168 00	340 00	300 00	259

Why should beans take from the acre of land on which they grow only 12 lbs. of silica, and wheat 102 lbs? The reason is obvious. Look at the stuff of which the straw of both crops is composed. The one is soft and woolly, the other hard and steelly. Some grasses contain so much silica that the blades, even, will cut your fingers if they are drawn sharply through the closed hand. On the outside of a thoroughly ripe straw, or of a cane, you can absolutely see the bright glossy coating of silica. And this silica is one of the most important materials in the production of grain-crops; for this reason: you may by heavy dressings of manure, get any amount of straw to grow up, bearing magnificent ears, but if there is not a sufficient quantity of silica in a soluble state to glaze and stiffen that straw, the whole crop will fall to the ground, and all you reap will be a few bushels of thin grain. And this is the principal reason why large applications of manure to exhausted soils so often disappoint the farmer: the other elements of plant-food are given, but the soluble silica, the straw-strengthener is absent, or rather unready.

In short, you are to understand, that a superabundance, even, of all the other constituents of your crops is utterly useless, if one of them be absent, or from its condition, hard to come at. They must all be there, and they must all be in a fit state for the plant to feed on. There may be 2o/o of phosphoric acid available in the soil for the food of your wheat crop, but if the .36 of a pound to the acre of common salt be wanting, good-bye to your hopes of harvest. As the strength of a chain is measured by the strength of the weakest link in the chain, so the fertility of a soil is determined by the quantity of that essential food which is present in the least proportion, and not by that which is in greatest abundance. A carpenter may have plenty of boards for the construction of a shed, but if he has no nails, the shed stands a poor chance of being built. Give him never so many more boards, and you help him not a bit. It is the nails he wants, and until he gets them he can make no progress in his work.

But land may be wanting in fertility for *mechanical* as well as for *chemical*, reasons. A hard pan may exist, whether natural or caused by the constant deposit of iron detached by friction from the plough share, etc.; this will prevent the roots of your crops from penetrating to a sufficient depth, and in consequence, their range of pasture is so restricted that in a dry season they will wither away. The cure for this is deeper ploughing, by which the *pan* will be broken up, and the restriction removed. Water stagnant near the surface, thus excluding the air, is another cause of inferior crops; the water-level must be lowered by drainage, and then the air will obtain accecss to the soil and the growth of vegetation will be rapid, healthy and vigorous.

ARTHUR R. JENNER FUST.

Poultry Department

From the Live Stock Journal, Eng.

CHICKEN REARING.

Early in January I began to cast about for a legitimate way of increasing my profits. Early chickens, I heard, sold for 7s. 6d. to 15s. a couple. I would certainly have early chickens, and therefore an incubator would be necessary. Christy's easily managed machine was ordered; it required, said the advertisement, a few gallons of boiling water morning and night. Under my care, however, it required three times the quantity mentioned. However, it was started, and kept going until the temperature was steady. Everything was ready to start except the eggs; the weather was bitterly cold and the hens gave up any pretence of supplying us. Towards the beginning of February, however, they did begin. I had to suffer many taunts at breakfast-time about my farm, which produced no eggs and very turnipy butter. I bore it all in silence, for I knew my hens were laying, and the eggs being saved for a better fate than poaching. As soon as I had two dozen, they were put into the incubator. Oh, the trouble that machine was to me! One day the temperature would keep too low, the next too high. However, at the end of three weeks—the day before I expected them—when I opened the drawer, the eggs were rolling about in every direction, and eighteen little chicks rewarded our care. Of these thirteen grew up, but, with the usual perverseness of the fowl race, they proved no good for winter eggs, as they began to lay in July, and had had their first lay before winter. Next time the incubator was filled with about eighty eggs, from which we had over fifty chicks, nearly all of which grew up. There is no doubt (for anyone who can devote hereself to the incubator) it answers well, but it certainly requires incessant care.

I have passed over the batch of eggs which got cooked, the batch which was cooled, and the batch which blew up. This last affair obliged the incubator to be hurried out of the house altogether. The nuisance of all the hot water being taken out of the boiler every morning, just when the servants most required it for use, is a fact so apparent that I did not think it necessary to refer to it. All workers have found the same objection so great, that most makers have now connected their incubators with circulating boilers, which reduce the labour in working them to a minimum, and Mr. Christy's is now quite perfect in that respect.

Besides the seventy chicks hatched in the incubator, I had over a hundred from my hens. All were the same cross—Brahma hens and a Dorking cock, the latter a magnificent fellow I had bought from a cottager.

CROSS-BRED FOWLS.

There was no doubt about the hardiness of this cross—almost every bird hatched grew up, and about June the sight of my poultry-yard was really worth a visit. The first im-

pression one had was, that here was a breed invented on purpose for grilled chicken legs, for every other part was sacrificed to the thighs. As they were my own, I was obliged to try and see beauties in them, but all I could say was, "Wait: when they are on the table you will discover my cross is *the* cross. K——says they are the finest table fowl known. I waited and waited for the breasts to develop, but they only grew taller and taller, till at last I ordered one to be roasted. On the dish coming to table, an uncourteous guest remarked, "What strange animal have we here?" "Something in the ostrich line," answered another. Killed very young, their legs were fairly nice, and they made a quantity of soup, for they had such large bones, but others that were slain at Christmas time were, to those who understand what a really good fowl is, almost uneatable. In size they were magnificent, several turning the scale at twelve pounds, but my landlord hinted that it would take him at least a year before he should care to see a chicken on the table again. For the hens of this cross, I must say a kind word, as I never had such good layers or such mothers. One or two actually lived on for seven years, and reared a brood the last year, and, what is more, they grew handsome, densely black, and so very wide that their legs never looked over-large.

The next year I put Game hens with the Dorking cock, and in this cross I discovered the ideal fowl. I had set over 150 eggs, most of them my own, before the second week in March, so that I had numbers hatching out every day after the first of April. During the first week I had them all fed with a sort of custard made of eggs and milk, gradually mixing a little barley meal, until at the end of a fortnight they were feeding well; oats and tail wheat crushed together made excellent food as soon as they were able to peck; no water was ever left with the coops, but each time the chicks were fed the water was poured out fresh. This care prevented gapes, although others were complaining all round, and really it was very little more trouble. Wire pens into which the chicks could run held the more delicate food; the older birds had to walk round and long for it in vain.

Maize was given to the fowls mixed with other sorts of grain, but never alone for more than a few days together, for it is so fattening, that if fed on for long together it will actually kill them, the hens dropping off their perches quite dead without the slightest warning.

I had no ducks of my own, but bought four dozen at 10d. each, just half-feathered. At this age they are very little trouble, and soon make the acquaintance of the green peas, they were fed upon meal and corn, whilst those actually fattening had milk to drink; turned into the garden, they did a great deal of good, as they destroyed the slugs and snails without picking at the plants and scratching like chickens.

Here I must mention an extraordinary event which took place in a sister's poultry yard. She possessed some very fine cherry trees of the best of all kinds for cherry brandy, and the cook had been hard at work making a large quantity. The cherries, after being soaked in the brandy until all their flavour was drawn out, were thrown by one of the servants into the poultry-yard.

An hour later, every dweller there was furiously and frantically drunk. The turkeys went running and tumbling all over the place, the ducks tried to stand on their heads, whilst the chickens ran backwards.

No harm seemed to come, however, and after an hour or two the drunken fit wore off, and the fowls came to their senses.

The cockerels of the Game and Dorking cross I had killed off directly they were fat enough, and delicious little round birds they made; whilst the pullets were kept for killing later on, and for laying. All the older birds were fattened before they began to moult, save a few which were required for stock.

For setting both hens and pheasants, I tried boxes of my own invention with the most perfect success, knowing that so many birds perish just when they are hatching, both among pheasants as well as chickens, it occurred to me that the reason probably arose from the birds being set in a yard and fed on the gravel, when naturally the old birds would be seeking their food among long damp grass, from whence they return to the eggs with wet feathers.

I had the sitting-boxes made long enough to cover six nests, with divisions, but had no bottoms for the nests, which were made on the ground; the roofs of the boxes slanting to throw off the rain. They were then placed in a small wood, where the grass was long. Every day, before letting out the hens, if there was no dew, the grass was well watered, and in very hot dry weather the ground on each side of the boxes was watered several times a day. Sprinkling the eggs, if the hen's feathers are dry, has very little effect, as the feathers absorb all the moisture at once.

This plan answered so well, not a single egg was found in which the bird had died in the shell. Pheasants' eggs require more damp than hens', as the shell is so much more greasy.

Each box, I have forgotten to say, was padlocked; a rod ran through all the locks of the nests, and kept them secure.

Although I found the cross-bred birds the easiest to rear, and the best layers, I was always most careful to keep only pure cockerels, and these were generally Dorkings; now and then I used to kill off all the cross-bred hens, and start fresh again. A gardener who lived a short distance from my farm had the care of a dozen Game hens and cock, so that I always had plenty of that breed, whilst pure Dorkings were kept at the farm with the cross-bred ones, their eggs being so much larger, there was seldom any difficulty in selecting them for hatching.

Eggs for setting should not be kept over a fortnight; they will hatch when a month, or even six weeks old, but the chickens are not so strong. Great care is required while the hatching is going on; the hens should be well fed chiefly on corn, as grain digests slower than soft food, and therefore the hens are less restless. Ten minutes is quite long enough for them to be away from the nest, although in summer twenty minutes will do no harm. Care should be taken that they have plenty of fresh water, and a dust-bath of sand and wood-ashes, with a little sulphur, this mixture will destroy all insects—a fruitful source of bad sitting.

It is not generally known how very fond fowls are of roots; and a few mangolds, turnips, carrots, or beetroot are well bestowed on them, for during winter poultry frequently flag for want of green food, which can in this way be easily given; also in the pheasant pens they are most useful, and will be greedily devoured. If the birds scour at all, boil the roots first. As we hatched early, we always had plenty of eggs when they were scarce, although early hatching alone will not bring about this desirable result, for animal food must in some form be supplied. During most years the butcher has furnished the yards with something—I never inquired too closely what—but last year I tried a new recipe, which produced eggs more plentifully than I ever remember, for we gave them real insects. To do this a good deal of foresight is necessary, as the only insects to be got during the cold months are meal-worms.

In September prepare either one, two, or three pans, according to the number of your fowls—one pan, I should say, to every five-and-twenty—put in them two quarts each of musty meal, a tallow candle or two, a pair of old cotton stockings, cut up, and about a pint of meal-worms—to be bought at any bird shop. The pans should then be set in the cellar, and, as soon as cold weather sets in, and insect life begins to fail, a

few meal-worms should be given daily. Whether it was this new food I do not know, but I never before had such quantities of eggs, and the winter was so cold and severe many of my neighbours complained of having none.

This year I am going to try the same food for young pheasants as well as my young chickens.

About this time I was presented with a very fine bronze turkey cock, so I tried to get some mates for him, which I soon did through a paper, and gave 10s. each for two handsome hens, which laid extremely well, and performed the arduous duties of incubation in a very satisfactory manner. We had some trouble with the young ones at first, as three died from gapes and four from roup, but after that forty-five got on splendidly; until one day two died of some mysterious complaint, when they were getting fine strong birds. I was fortunately able to discover the cause of their death next morning, and thereby prevented any further mortality.

On coming out of the yard into the meadow I saw my horrible turkey cock stamping on every young turkey he could get near, and crushing them down into a shapeless mass of feathers. I had him instantly shut up, and condemned to death, when fat enough—not in time, however, to prevent his having killed six of his most promising children. Most of the turkeys were killed as poults, but twelve were reserved for Christmas, and were finished off with oatmeal and milk.

I found tailings, buckwheat, and barley the best and cheapest food to give turkeys, but as they also require a great deal of green food, they were given all the refuse that could be spared from the pigs; they seemed particularly fond of dandelions, and would devour them by the basketfull; and as turkeys are subject to inflammatory complaints, I encouraged them to eat as much green stuff as possible. Any heating food is very bad for them, maize the worst of all. Bran mixed with a very little barley-meal just to give it a taste, made into a crumbly paste with some warm water, suits them well, also coarse oatmeal; nettles boiled and mixed with all their food are excellent.

The old cock Turkey weighed 28 lbs. when fattened, and I kept him on, meaning him to grace our Christmas board, thinking how I could proudly point to him, and say to my landlord. See how my farm cuts out Leadenhall Market. But, two months before that season approached, I was persuaded to send him to a local show, where he took a prize, and sold for three guineas; whilst the smaller turkey that I had fattened up instead of the veteran proved, I expect, better eating, though it did not present quite such a noble appearance as the other would have done.

I wrote to the gentleman who bought the old cock, warning him to enclose him in a separate place apart from his offspring should he keep him another year; but he replied rather rudeby, "That he had bred turkeys for fifteen years, and knew all about it. However, my mind was relieved, and so I did not mind.

During the autumn and winter my poultry-yard was so crowded, and my cows were doing so well, that I advertised offering to send hampers of farm produce to London. I had quantities of answers, and agreed to send three a week—one at 12s., one at 21s., and one at 30s., Had the people only been satisfied with what I could send, and not have wanted such extraordinary things, this market would have answered well, but their demands were so great that I soon grew tired of trying to supply them. Then the butter and eggs were changed by the servants, who disliked their mistresses dealing anywhere but at shops; and I was continually getting letters to say that my butter was worse than the lowest quality of salt.

I at once had a stamp cut with my initials in the centre, and the eggs marked in ink: this plan prevented cheating, but the trouble was so great I soon gave up, and contented myself with only supplying personal friends.

ELECTRO-HORTICULTURE.

A paper read by Dr. Siemens before the Royal Society, Eng., on the influence of electric-light upon vegetation: London, 1881.

The marvellous strides made by experimenters on the power of the electric force, of late years, have become already known to my Montreal readers practically, as well as from the public prints. But it will surprise many of them to hear of the wonders of which Dr. Siemens has to tell us. "My experiments," says he "go to prove that the electric light is capable of producing upon plants effects really comparable to those of solar radiation, that chlorophylle is produced by it, and that bloom and fruit rich in colour and aroma can be developed by its aid.

They also prove that plants do not require any period of rest during the twenty four hours of the day, but make increased and vigorous progress if subjected in winter time to solar light by day, and electric light by night."

The arrangemeat consists of a six horse-power steam engine, two dynamo-machines, *Siemens D.*, connected, separately, with two electric lamps, each capable of emitting a light of about 4,000 candle-power. One of these lamps was placed inside a glass house of 2,318 cubic feet capacity—say 15 feet long by the same in width, and 10 feet high. The waste steam heated the house, the temperature being kept, as nearly as possible, at 60°F, and pease, beans, grain of all kinds, as well as cauliflowers, strawberries, peaches, tomatoes, vines and a variety of roses, rhododendrons, and azaleas—all of these were subjected to the influence of the electric light. The naked light appeared at first to wither the plants, so a thin sheet of clear glass was interposed between them and the electric light, and this had the double effect of discharging the chemical products of the arc, resulting from the gradual combustion of the carbon electrodes, and of acting as an effectual screen between the arc and the plants under its influence.

And what were the effects of this treatment, "Pease, sown at the end of October, produced a harvest of ripe fruit on February the 16th under the influence, bar Sunday night, of continuous light. Raspberry stalks put into the house on December the 16th produced ripe fruit on March the 1st. and strawberries planted at the same time ripened their fruit, excellent in flavour and colour, on the 14th of February, while vines, started into bud (or as a gardener would say "broken") on the 26th of December, produced grapes of more than ordinary flavor on the 10th of March.

Contrary to expectation, the pease which were gathered ripe on the 10th of February vegetated when sown a week afterwards, and showed every symptom of healthy growth. Botanists say that plants submitted to the influence of continuous light are incapable of reproduction; but in this case they are clearly in error. Dr. Gilbert, of Rothamsted, has undertaken to conduct further experiments on other grains.

A *banana* palm has fully developed under this new form of culture. The result was a bunch of fruit weighing 75 pounds, of unusual size, and pronounced by competent judges to be unsurpassed in flavour. Melons, also remarkable for size and aromatic flavour, were produced in the *early Spring* of 1880 and 1881, and Dr. Siemens is of opinion that "still better results may be realized when the best condition of temperature and of proximity to the electric light have been thoroughly investigated."

It was found that, where barley, wheat, and oats, were subjected to the influence of the electric light *inside* the glass-house, they grew too rapidly, and fell to the ground when they had attained the height of a foot or fifteen inches. In the open air the above grains subjected after germination, which was slow on account of frost and snow, to an external electric light matured their seed perfectly. Sown on the 6th of January the grains

ripened on the 27th of June, having been aided in their growth by the electric light up to the beginning of May.

The expense of working this new invention is not great. The engine consumes 56 lbs of coal per hour, which, at $5 a ton, would amount to 12 cts. per hour, or to 6 cts. per light of 5,000 candles. But, as the heating of the house by the waste steam has to be deducted from this, the real cost cannot exceed 4 cts. for the two lights! Where extra power can be used, all the personal attention necessary is the renewing of the carbon electrodes every 6 or 8 hours, which can easily be done by the man whose ordinary duty it would be to look after the fire used in the ordinary plan of heating.

At Dr. Siemens' place, the electric energy is utilized in the day time for threshing, sawing, pumping, &c., by means of wires extending to different parts of the farm, and attached to small dynamo machines placed at points where power is required. A naked strand of copper wire is supported on poles or trees, without insulators, and the return circuit is effected through the park railing or wire fencing of the place, which is connected with the transmitting and working machines by means of short pieces of connecting wires.

A. R. J. F.