

~~ISAAC LEWIS COLLECTION~~

GRAMINEAE, OR TRUE GRASSES.

by

William Darlington, M.D.

1841.

Isaac Lea Esq^r

with the respects of

Dr. Dartington

Dr. Dartington on
Grasses -

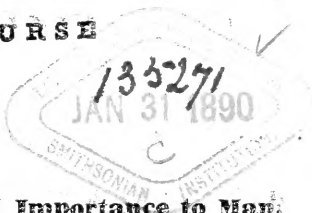
J



OK
495
G74022
1841
But

ISAAC LEA COLLECTION

A DISCOURSE



ON THE

Character, Properties, and Importance to Man,

OF THE

NATURAL FAMILY OF PLANTS

CALLED

GRAMINEÆ, OR TRUE GRASSES.

DELIVERED AS A LECTURE BEFORE THE CLASS OF THE CHESTER COUNTY
CABINET OF NATURAL SCIENCE, FEB. 19. 1841.

BY WILLIAM DARLINGTON, M. D.

Gramina ubique terrarum sociatim vigent, laeta praebent pecudibus
pascua et humano generi annonam. ENDLICHER, *Genera Plantarum*.

WESTCHESTER, PENN.
1841

1794

THE ...

...

CHARLES ...

...

...

...

...

A DISCOURSE, &c.

The late DAVID DOUGLAS—an enthusiastic votary of *Flora*, and finally a martyr in the cause—was so long engaged in exploring and collecting the Botanical treasures of our Western wilds, that he became familiarly known to the red men of the forest, by the cognomen of the “*Man of Grass*.”

Although I have but slender pretensions to the significant title conferred by our aboriginal brethren, on the unfortunate Scottish Botanist,—I have an idea, nevertheless, that those best acquainted with my vegetable predilections, will be prepared to expect, on this occasion, a discourse on some such humble and terrestrial objects,—rather than a Phaeton-like attempt to imitate my successful Colleagues, in traversing the ethereal regions of Intellect. They will doubtless conclude, that if it was sound advice to the Cobbler, not to venture beyond his *Last*,—the culler of *Simples* should in like manner profit by the admonition, and confine himself to his Plants. I have therefore selected a topic, for the evening, in accordance with these suggestions. Nor do I consider the change in the entertainment—unpalatable though it may be—altogether without its advantages. There is a kind of analogy between the mind and stomach, in relation to their sustenance: and, as the Epicure finds it salutary, at times, to substitute Bran bread for his habitual dainties,—so the Mind, which has been feasting on intellectual delicacies, may peradventure be benefitted by an occasional transition to coarser fare. At all events, it may enhance the gratification of a return to its wonted enjoyments.

I propose to attempt a cursory notice of the character, properties, and importance to man, of a single Tribe, or Family, of the Vegetable creation—known to the Naturalists by the name of GRAMINEÆ, or the *True Grasses*: and while I calculate with some confidence, upon a fellow-feeling among the *Botanical* portion of the audience,—I am not without a hope, that—in a district so distinguished for its agricultural advancement—the subject will also be found to possess a degree of *general* interest.

Before entering into particulars, however, it may be useful to make

some preliminary explanations,—or, as the politicians say, to “define our position.” The term *Grass*, in our vernacular tongue, is frequently used in a vague sense—to designate every kind of herbage found in our meadows and pastures: hence, we often hear people speak of *Clover*, *Lucerne*, and other plants—which have no botanical affinity whatever with the *true Grasses*—as though they really belonged to that remarkable tribe of vegetables. But such is not the language of Naturalists; and ought not to be, of any well-informed person. An accurate knowledge of objects can neither be acquired, nor communicated, without precision in the use of terms. The distinctive characters of that family of plants, of which we propose to treat, are now well understood, and have been satisfactorily defined.

Whenever we meet with a plant, having a cylindrical, jointed *stem*, with the joints solid, and the intervening portions hollow—or, in a few instances, filled with a pith-like substance,—the *leaves* alternate, one originating at each joint, embracing the stem with its base, and forming a sheath which is slit on one side down to its origin,—and the *flowers* protected by those peculiar envelopes, known by the name of *chaff*,—we may take it for granted that we have before us a *true grass*. Brief and simple as is this definition, it will be found to contain the most obvious characteristics of the Tribe; sufficient, it is believed, to distinguish it from all others. While we are on the subject, however, a few additional traits may perhaps be adverted to, with propriety. The *cuticle*, or skin of the Grasses—(for they have no *bark*, properly so called)—contains a considerable portion of *silex*,—as is shown by its vitrification, when stacks, or other dense masses of unthrashed grain, are burnt. A sort of glass is produced, from this *silex*, which preserves the form of the plant, even to its minutest parts. The *nerves*, or *veins*, in the Leaves of this family, are all nearly parallel,—in consequence of which, those appendages (i. e. the *leaves*) are entire, generally narrow, elongated, and more or less linear in their form. The *Flowers* are mostly small, disposed in little clusters or spikelets, and these spikelets are variously arranged, in spikes racemes, or loose panicles. Each *spikelet*,—consisting sometimes of one—but more commonly of two, three, or many *florets*—is usually embraced, or supported at base, by two chaffy pieces, called *glumes*; and each *floret* is immediately protected by two somewhat similar chaffy coverings, which, for the sake of distinction, are denominated *paleæ*. These chaffy coverings of the flowers and seeds of the Grasses, are wholly unlike the delicate and showy floral envelopes of most other plants,—and seem to be, in fact, the mere stunted vestiges of abortive leaves—or rather of their *sheaths*—closely crowded together. Hence we find them,

like the leaves, constantly *alternate*: for, although approximated in pairs, they are never exactly opposite—or originating in the same plane,—as we see to be the case with the sepals, and petals, of other tribes. The number of *stamens* is usually *three*—rarely *six*, or some multiple of three,—and occasionally, from abortion, some intermediate, or smaller number. Each fertile flower produces a *single seed*,*—the chief bulk of which is called *albumen*, and is that nutritious portion of our cultivated grains, from which the miller prepares *flour*. The *embryo*, or living rudiment of the future plant, is comparatively a mere speck, or minute point, in the seeds of the Grasses,—snugly situated, on the outer side, near the base of the albumen; where it lies dormant, until the concurring causes of vegetation (namely, warmth, moisture, and oxygen,) excite it into active life. This embryo—which is, in fact, an entire plant in miniature—may be distinctly and satisfactorily observed in a grain of Wheat, or Indian Corn;—especially at the moment of sprouting, or incipient growth,—when it will be found that the principal mass of the grain consists of the apparently inorganic matter, already mentioned by the name of albumen.† It is

* The FRUIT of the Grasses, generally, appears to be a simple NAKED seed, in each fertile floret,—but the seed is, in fact, invested with a PERICARP, or covering, as in most other plants. The Pericarp in this family however, is thin and membranaceous,—and is usually so completely adherent to the proper coating of the seed, as to be undistinguishable from it. In some species—such as Oats, Barley, Rice, &c,—there is found an ADDITIONAL ENVELOPE, formed of the PALEA, or inner chaff, which closely embraces the fruit.

† The extensive and disheartening ravages in our Wheat crops, perpetrated during the early stages of their growth, by the insect called HES-
SIAN FLY (CECIDOMYA DESTRUCTOR), render every fact and suggestion, connected with the subject, interesting to the Agriculturist: and I am happy to announce, on this occasion, that we are indebted to a Lady of our own State—Miss MARGARETTA H. MORRIS—for some recent information concerning the habits of the little DESTROYER, which promises to throw much light on its history; and may lead to important results. In a communication to the American Philosophical Society, Miss MORRIS alleges that “the ovum of this destructive insect is deposited by the parent in the SEED of the wheat, and not, as previously supposed, in the stalk, or CULM. She has watched the progress of the animal since June, 1836, and has satisfied herself that she has frequently seen the LARVA within the seed. She has also detected the Larva, at various stages of its progress, from the seed to between the body of the stalk and the sheath of the leaves. In the latter situation it passes into the PUPA or ‘flaxseed state’. According to the observations of Miss MORRIS, the recently hatched Larva penetrates to the centre of the straw, where it may be found of a pale greenish-white semi-transparent appearance, in form somewhat resembling a silkworm. From one to six of these have been found at various heights, from the seed to the third joint: they would seem to enter the Pupa state about the beginning of June. This fly was not observed by Miss MORRIS to inhabit any other plant than Wheat.” The inference from these observations is, that “to prevent the ravages of this

this large, farinaceous or *mealy* portion, of the seeds of Grasses, which renders the *Cerealia*, or cultivated grains, so valuable to man,—as furnishing the chief material for *Bread*. Wherever the *albumen* of seeds is found to be *mealy*, it is always innocent and nutritious,—even when the residue of the plant is poisonous. In some instances, it is replete with *oil*—as in the Poppy tribe; and in the seeds of the Coffee plant, the albumen is of a *horny* texture. There are other and large tribes, again,—such as the *Leguminous* plants—including our common Garden Beans, Peas, Clover, &c.—in which the seeds are wholly destitute of the appendage called albumen;—the miniature plant completely filling the integuments of the seed, and its chief bulk consisting of two thick, fleshy lobes, called *Cotyledons*. These lobes, or cotyledons, are the crude *primary leaves* of the future plant (appropriately called *Protophylls*, by the French Botanists),—and doubtless serve, in some degree, as *substitutes* for albumen, in supplying nutriment during the first stages of vegetation.

Having thus hastily glanced at some of the more striking features of the extensive tribe, technically denominated *Grasses*,—and the characters by which they are distinguished from other plants,—I flatter myself we shall have no difficulty in recognising any member of that family which may hereafter come in our way. It will be no *news*, indeed, to any of us, to be told that “Red-Top,” “Timothy,” and “Fox-tail,” are *Grasses*; and we all, perhaps, may be aware, that our cultivated Oats, Barley, Wheat and Rye—and even Rice—belong to the same category: But the fact may not be equally familiar to every one, that our Indian Corn, and Broom Corn,—the Sugar Cane, and the Bamboo—are also *true and genuine Grasses*. Much as these last-mentioned plants may seem to differ from the multitude of common Grasses, the disciplined eye of the Botanist perceives at a glance, that they all belong to the same family: and indeed, so eminently *natural* is the whole Tribe—i. e. so strong is the general resemblance in the characters and habits of its members,—that

“destroyer of the grain, it will be proper to obtain fresh seed from localities in which the fly has not made its appearance.” This result, it would seem, has been partially obtained by the introduction, into several neighborhoods, of seed wheat from the Mediterranean: in confirmation of which I may add my own limited experience. There are districts also in our own country—and even on the northern side of our own State—which, it is said, have never yet been invaded by this insect; and where seed wheat, free from the fly, may be procured.

Should the history of this little animal, as presented by Miss MORRIS, stand the test of future observation and scrutiny, we may yet learn to take advantage of its habits, and thereby arrest its destructive career; in which case, the researches of our ingenious countrywoman—like those of the illustrious Swede, concerning the *CANTHARIS NAVALIS*—will place her name high on the roll of national Benefactors.

superficial observers, finding it so much easier to adopt, than to verify the crude notions of the vulgar, have actually supposed several species to be continually, and reciprocally, changing into each other!* It is to be hoped, however, that our ingenuous youths will yet learn to discriminate between truth and error, in the objects around them; and not be content—as a popular writer expresses it—“to wander among the productions of Nature with little more perception, or enjoyment of her charms, than a cow on a common, or a goose on a green.” In this hope, and under this impression it was, that I thought a rapid sketch of so important a tribe of the vegetable creation might be found in some degree interesting.

The whole number of flowering Plants, already known to the Botanists, has been estimated at about *forty thousand species*,—of which it is supposed the Grasses constitute *one twentieth* part: but if we take into the account, the immense number of *individuals* of many species, the *proportion* of Grasses, to vegetation in general, will be greatly increased. The known Grasses of *Chester County*—native, naturalized, and cultivated—amount to about *one hundred species*; or *one-tenth* of the whole number of flowering plants, inhabiting the same district. A large portion, indeed, of this vast Family, is not known to possess any

*It is a curious circumstance, in the history of this vulgar error, that, in former times, when the OCCULT SCIENCES flourished, the peasantry of Europe imagined all our cultivated small grains to be subject to this kind of transmutation:—that Wheat was often changed, first into RYE, then into BARLEY, from Barley to RAY GRASS, or LOLIUM, from Lolium to BROMUS, or Cheat, and finally, from Bromus to OATS! They supposed, moreover, that by the agency of a fertile soil, the degenerate grass could be gradually restored to its original form; or at least, that it could be brought back as far as RYE!—“Veteres credebant frumentum per gradus degenerare in macriori terra, atque Triticum in SECALE, Secale in HORDEUM, Hordeum in BROMUM, Bromum in AVENAM et sic per gradus descendere, immo credebant etiam semina Bromi vel Hordei in fertiliori terra producere Secale.”—CAROLI A LINNE, AMENITATES ACADEMICÆ, TOM. 5.—Even in our own enlightened age and country, as we are wont to phrase it:—there are yet many persons strongly tinctured with the notion, that Wheat is frequently transmuted into BROMUS, or Cheat;—though I have not met with any so full in the faith, as to believe they can bring the degenerate offspring back again to its pristine state. It is remarkable, also, that this obsolete notion—so entirely exploded among scientific Naturalists—has lately found an advocate in a gentleman of some pretensions, as a Geologist,--and who has, more recently, acquired considerable notoriety, by his researches concerning TERRITORIAL LIMITS: I mean Mr. FEATHERSTONEHAUGH. As that gentleman has been so astute in detecting the mutability of the LAWS of NATURE,—we ought not, perhaps, to be surprised at his discovery of the extraordinary MUTATION in our NORTHEASTERN BOUNDARY, since it was established by the fathers of the Republic! It is quite as likely that landmarks should change their locality, as that objects of Natural History should lose the distinctive characters impressed on them by the hand of the Creator,

properties which Man has yet been able to convert to his own immediate advantage: But it becomes us to be cautious how we decide upon the value of objects, from the imperfect views of their *utility*, afforded by our limited knowledge. Many created beings, which appear to us as nuisances, may be important agents for good, in the general economy of Nature. The most worthless Grasses — or the veriest *weeds* that annoy the husbandman — *may* be the instruments of a wise Providence, for collecting fertilizing principles from every falling shower, or passing breeze, — and imparting them, in turn, to the soil on which they are finally decomposed. These silent and imperceptible processes may doubtless be extended, and their benefits enhanced, by human ingenuity and co-operation: but their spontaneous occurrence, in the great Laboratory of Nature, can scarcely elude the notice of the scientific observer.

With respect to *locality*, or peculiar places of growth, affected by this numerous Tribe, there is but little to remark.* We find Grasses growing on dry land, and in water; but none that are properly *marine* plants. — They occur in every kind of soil; both in society with others, and alone; sometimes occupying considerable districts, to the almost entire exclusion of other forms of vegetation, and thus forming the beautiful *turf*, so much admired in Lawns, and Meadows. *Sand* appears to be less favorable to their growth; but even this produces species which seem almost peculiar to itself.

The *diffusion* of this family has almost no other limits than those of the whole vegetable kingdom. Grasses occur under the equator; and are among the few plants to be met with in the frozen regions of Spitzbergen. On the mountains of the south of Europe, and on the Andes, in our own hemisphere, they ascend almost to the line of perpetual snow.

*The most striking differences between tropical and extra-tropical Grasses, are the following:

1. The *tropical* Grasses acquire a much greater *height*, and occasionally assume the appearance of trees. Some species of *Bamboo*, are from 50 to 60 feet high.
2. The *leaves* of the tropical Grasses are broader, and approach more in form to those of other families of plants.
3. The *flowers*, in tropical grasses, are more frequently imperfect, or declinous, — i. e. the stamens and pistils are oftener found in distinct and

*A number of the facts and observations concerning the GRAMINEÆ, here presented, may be found in Prof. LINDLEY'S Natural System of Botany, — a most valuable and interesting work, to the student of that science.

separate envelopes: they are also usually softer, more downy, and elegant, — as may be seen in the sugar cane, and others.

4. The *extra-tropical* Grasses, on the other hand, far surpass the tropical in respect of the number of individuals. That compact grassy turf, which, especially in the colder parts of the temperate zones, in spring and summer, composes the green meadows and pastures, is almost entirely wanting in the torrid zone. The Grasses there, do not grow crowded together, — but, like other plants, more dispersed. Even in the south of Europe, they are less gregarious, — and meadows are seldomer to be seen than in the north.

As to the distribution of *individuals*, the generality of species are social plants. The distribution of the *cultivated Grasses* is determined not merely by climate, — but depends partly on the civilization, industry, and traffic of the people — and often on historical events. Within the northern polar circle, agriculture is found only in a few places. In Siberia, grain reaches at the utmost only to 60 degrees — in the eastern parts scarcely above 55 — and in Kamtchatka there is no agriculture, even in the most southern parts, Lat. 51 degrees. The polar limit of agriculture on the northwest coast of America, appears to be somewhat higher; for in the more southern Russian possessions (57 to 52 degrees), Barley and Rye come to maturity. On the east coast of America, it is scarcely above 50 to 52 degrees. Only in Europe — namely, in Lapland — does the polar limit reach an unusually high latitude, viz: 70 degrees. Beyond this, dried fish, and here and there potatoes, supply the place of grain. The grains which extend farthest to the north in Europe, are Barley and Oats. These, which in the milder climates are not much used for bread, afford to the inhabitants of the northern parts of Norway and Sweden, of a part of Siberia and Scotland, their chief vegetable nourishment. Rye is the next which becomes associated with these. This is the prevailing grain in a great part of the northern temperate zone; namely, in the south of Sweden and Norway, Denmark, and in all the lands bordering on the Baltic, in the north of Germany, and part of Siberia. In the zone where Rye prevails, Wheat is generally to be found, — Barley being here chiefly cultivated for the manufacture of Beer, and Oats supplying food for the horses. To these there follows a zone in Europe and western Asia, where Rye disappears, and Wheat almost exclusively furnishes bread. The middle, or the South of France, England, a part of Scotland, a part of Germany, Hungary, the Crimea and Caucasus, as also the lands of middle Asia, where agriculture is followed, belong to this zone. Here the Vine is also found: wine supplants the use of beer, in many places; and Barley is consequently less raised. Next comes a district where Wheat still a

bounds, but no longer exclusively furnishes bread, — Rice and Maize becoming frequent. To this zone belong Portugal, Spain, part of France, on the Mediterranean, Italy and Greece; also the countries of the East, Persia, northern India, Arabia, Egypt, Nubia, Barbary, and the Canary Islands: in these latter countries, however, the culture of Maize or Rice, towards the South, is always more considerable: and in some of them, several kinds of *Sorghum* (kindred species of our Broom corn), and *Poa Abyssinica* (a plant related to our Meadow Grass) — come to be added. In both these regions of Wheat, Rye only occurs at a considerable elevation; Oats still more seldom, until at last they entirely disappear, — Barley affording food for horses and mules. In the eastern parts of the temperate zone of the old continent, in China and Japan, our northern kinds of grain are very unfrequent, — and Rice is found to predominate. The cause of this difference between the East and the West of the old continent, appears to be in the manners and peculiarities of the people. In North America, Wheat and Rye grow as in Europe. Maize is more reared in the Western than in the old continent, and Rice predominates in some of the Southern districts of the United States. Within the torrid zone, Maize predominates in America — Rice in Asia — and both these grains in nearly equal quantity in Africa. The cause of this distribution is, without doubt, historical: for Asia is the native country of Rice, and America of Maize.

In some situations — especially in the neighborhood of the tropics — wheat is also met with, but always subordinate to these other kinds of grain: In the high lands of South America, there is a distribution similar to that of degrees of Latitude. Maize, indeed, grows at the height of 7200 feet above the level of the sea, — but only predominates between 3000 and 6000 feet of elevation. Below 3000 feet it is associated with other vegetables peculiarly tropical; while from 6000 to 9260 feet, the European grains abound, — Wheat in the lower regions — and Rye and Barley in the higher.

To the south of the tropic of Capricorn, wherever Agriculture is practised, considerable resemblance with the northern temperate zone may be observed. In the southern parts of Brazil, in Buenos Ayres, in Chile, at the cape of Good Hope, and in the temperate zone of New Holland, Wheat predominates; Barley, however, and Rye, make their appearance in the southernmost parts of these countries, and in Van Dieman's land. — In New Zealand the culture of Wheat is said to have been tried with success: but the inhabitants avail themselves of a species of *Fern* [*Acrostichum furcatum*] as the main article of sustenance. Hence it appears, that, in respect of the predominating kinds of grain, the earth may be di-

vided into *five* grand divisions, or kingdoms: the kingdom of *Rice* — of *Maize* — of *Wheat* — of *Rye*, — and lastly of *Barley and Oats*. The first three are the most extensive; the *Maize* has the greatest range of temperature; but *Rice* may be said to support the greatest number of the human race.*

With reference to the *Properties*, and *Uses*, of this comparatively humble tribe of plants, it may be observed, that it probably contributes — directly, and indirectly — more largely to the sustenance and comfort of the human family, than any, if not all, of the other groups of the vegetable creation. Those numerous species which are regarded as mere weeds, — which even the browsing herds neglect, and trample under foot, — may yet, as has been intimated, be operative, in gradually fertilizing the soil.--- Some have been found of great value, simply in fixing and keeping together the blowing sands of the sea-coast, by their creeping suckers and tough entangled roots. Among these, the *Arundo arenaria*, *L.* and the *Cynodon Dactylon*, *Pers.* are the most remarkable. The roots of the latter are also employed in India, in the preparation of a popular beverage. The culms, or stems of the Grasses, have been put in requisition for various economical, and even ornamental purposes. The *Arundo*, just mentioned, is extensively used, in the Hebrides, for making ropes, mats, bags, &c. The branches of the panicle, at the summit of our cultivated Broom Corn (*Sorghum saccharatum*, *Pers.*) furnish a large supply --- as every one knows --- of those convenient implements, called besoms, and brushes.--- The culms of *Rye* afford a good material for roofing, --- and are much employed, by the farmers in Lancaster, and some other counties of this State, in thatching their barns. The Chinese manufacture a delicate paper from the *Rice* plant; and in our own country, a coarse but very useful paper, is made from *Oat Straw* --- and even from the husks of Indian Corn. In the country of the *Bamboo* (*Bambusa arundinacea*, *Willd.*), the culms of that stately Grass furnish spars for the equipment of sail-boats, --- and walking canes for the aid of pedestrians; --- while some of its slender Congeners afford rods, for our Anglers, which honest *Izaak Walton*, himself, might have envied. Large quantities of paper, also, are made in China, from the *Bamboo*. Some of the Reeds of Brazil, are described as living fountains: they grow from 30 to 40 feet high, with a diameter of six inches, form impenetrable thickets, and are exceedingly grateful to hunters; for, on cutting off such a reed below the joint, the stem of the younger shoots is found to be full of a cool pleasant liquid, which immediately quenches the most burning thirst. The fashionable world, moreover,

*SCHOUW, in LINDLEY -- UBI SUPRA.

is indebted to the Gramineous Tribe, for some favorite articles of dress.--- The well-known head-dresses, from *Leghorn* --- so highly prized by the Ladies --- are manufactured from the straw of a delicate variety of Wheat: and in our own country, many beautiful imitations of Leghorn hats and bonnets have been made from the slender culms of the Grasses, --- particularly the Meadow, or Green Grass [*Poa pratensis*, L.]. In the days of our grandmothers, too, this family of plants, contributed to the decoration of the rustic Fair: for even in those unsophisticated times, decorative appendages were not entirely eschewed. A humble substitute for Necklaces of coral, and pearl, was found in the fruit of an Oriental Grass, often seen in the gardens, whose hard and polished involucre is known by the name of *Job's Tears* [*Coix Lachryma*, L.]. But it is not only the means of adorning the person, that are to be derived from this source. The fistular stem, or culm of the Grasses --- especially of the Oat-plant --- appears to have furnished the Shepherds of antiquity with the material for an instrument of music! --- as, in *Virgil's* first Pastoral, we find one of these Swains reclining under the shade of a spreading Beech, wooing his rustic muse, and wakening the sylvan echos, with a *slender Oaten Pipe*, --- or, to adopt the language in which he is accosted by *Melibœus*, ---

“*Silvestrem TENUI MUSAM meditaris AVENA.*”

In an *Agricultural* point of view, the superior value of the Grasses as materials for pasture and hay, is owing to the large quantity of saccharine matter with which they abound, about the time of flowering; and which is the source of that rich, sweet odor, observable in well-preserved hay. This saccharine matter, which pervades the whole plant before flowering, and is most perfectly elaborated at that epoch, is designed to be ultimately concentrated and deposited in the seeds, --- chiefly in the form of *farina*; and hence we find the *herbage* of comparatively little value, after the fruit is fully matured. The skilful Agriculturist, therefore, when he wishes to have good *hay*, cuts his grass at the moment when the nutritious juices are most perfect --- and while they are diffused throughout the plant. But when his main object is the *seed*, --- as in our cultivated grains, --- he of course postpones his harvest until the career of vegetation is finished. It is needless to enlarge on the importance of the *herbage* of the Grasses, in supplying the food of our domestic animals --- and, indirectly, the animal portion of our own food. I will, however, mention those species which are deemed of chief value in our meadows and pastures, --- naming them in what I consider the order of their excellence.

1. The Meadow, or Green Grass, erroneously called “Blue Grass,” in Kentucky [*Poa pratensis*, L.] ---
2. Timothy, or the “Herd's Grass,” of the Northern States (*Phleum pratense*, L.) ---
3. Orchard Grass (*Dacty-*

is glomerata, L.]—4. Meadow Fescue [*Festuca pratensis*, L.]—5. Blue Grass [*Poa compressa*, L.]—6. Ray Grass [*Lolium perenne*, L.]—7. Herd's Grass, of Penna. often called "Red Top,"—the "Bent Grass," of the English [*Agrostis vulgaris*, L.]—and 8. Sweet-scented Vernal Grass [*Anthoxanthum odoratum*, L.]. There are a few other Grasses—native, or partially naturalized—to be found on our farms,—and which are more or less eaten by cattle, when the better ones are wanting: But they are of comparatively little value,—and good farmers are always desirous to supersede them, as soon as possible, by some of those above named. It is remarkable, that all the Grasses, here enumerated, are believed to have been introduced into our country. They are all more or less extensively naturalized; but some of them require to be regularly sown, to insure a full crop,—and are therefore known as *artificial* Grasses. Those generally cultivated, here, are the Timothy, and Orchard Grass,—and occasionally we see the Ray, and Herd's Grass, or Red Top;—though these last are not so much esteemed. The others are completely naturalized; and when the soil is either originally fertile, or adequately improved, the best of them,—viz. the Meadow Grass, and the Fescue,—soon appear spontaneously in our pastures, and supersede the artificial ones.—Now and then, we hear of attempts to introduce *new* Grasses to the notice of our Agriculturists,—accompanied by exaggerated statements of their value;—such as the Taller Oat-Grass (*Avena elatior*, L.)—sometimes called "Grass of the Andes": and a few years since, one of our coarse indigenous Grasses, called "Sesame", or "Gama Grass" (*Tripsacum dactyloides*, L.), was so extravagantly lauded in the journals, that many lovers of novelties were induced to try the experiment of cultivating it, in place of the old approved plants; but, like some *other* "Experiments" that we wot of, in our day it resulted in a total failure.* It is, indeed, exceedingly doubtful, whether any other Grasses are so well adapted to our climate, and our wants, as those old and long-tried acquaintances of our farmers, which I have already enumerated.

I have thus endeavored to give some idea of the uses, to which the roots, stems, and general herbage of the Grasses, are or may be appropriated, in the Arts, in domestic and Rural Economy: But it is from the *Seeds* of the Grass Tribe—with one exception—that we derive the most eminent and immediate advantages. To them we are indebted for what has been

*We cannot but remark, says the Botanical Editor of Rees's Cyclopædia, what extraordinary celebrity is attached, every now and then, to one grass or other, and how their fame passes away 'like the morning cloud,' while the best graziers scarcely know perhaps, better than their fat cattle, any thing of the nature of the common never-failing herbage, to which they are both so much indebted. ART. PANICUM.

emphatically called the Staff of life. The chief bulk of those seeds being made up of *farinaceous matter*,—which, as has been stated, is always innocent and nutritious,—they are consequently well adapted to the sustenance of Man. They not only supply us with *Bread*,—but with all the countless variety of dishes which ingenuity has prepared,—both from the flour, and the unground grain: and if but few species are commonly employed for that purpose, it is because the large size of their seeds, compared with those of other Grasses, renders them more eligible as objects of culture. There is but a solitary instance alleged, of the unwholesomeness of the seeds, in the entire family of the Grasses,—viz. those of the Darnel (*Lolium temulentum, L.*),—a common weed in many parts of Europe,—but scarcely known in the United States: and even in this case, the deleterious effects are probably much exaggerated. It is only when the seeds are damaged, or diseased, that they become injurious to health;—as when putrefaction has commenced,---or when that peculiar disease and enlargement of the grain occurs, which is known by the name of *Ergot*.* This kind of diseased grain (the effect, it is believed, of a parasitic fungus), has been found to exert a powerful influence on the animal system; and hence, instead of being a nutriment, may become either a *poison*, or a *medicine*,---according to the quantity taken, or the manner in which it is employed. Indeed, the remark may be made general,---² that the chief distinction between a poison and an active medicine, consists in the size of the dose, and the skill of the Doctor. A drug that has no power to do mischief, or to disturb the system, can possess but feeble medicinal virtues; and, if it deserve notice at all, should be classed among the *Aliments*, rather than in the *Materia Medica*. Accordingly, we find the poisonous plants furnishing the multifarious ingredients of the Apothecary's shop,---while the simple Grasses, in their sound and unsophisticated condition, yield nothing but the wholesome materials for food and nourishment. It is true, that human ingenuity has extracted a potent medical agent, in the form of *Alcohol*, from the fermented seeds and juices of the *Gramineæ*,---and it is equally true, that Man has wickedly converted that *extreme medicine* into his daily beverage: But this is only a signal instance of his depravity, in perverting the blessings bestowed on him,---and argues nothing against the intrinsic value of the materials thus abused. It merely illustrates the ancient truth---*corruptio optimi pessima*,---that the prostitution of the best things produces the vilest results.

*The QUALITY of grain, and of the flour manufactured from it, may be materially injured by incipient vegetation: The process of germination produces a chemical change in the seeds, and renders the farina unfit for culinary purposes: Hence it is impossible for the Miller to make good flour from grain that has sprouted.

But, *revenons a nos moutons*—let us return to our *Grass Seeds*.

In some regions, where our common cultivated grains do not succeed well—either from the character of the climate, or of the inhabitants—other grasses are employed as substitutes. The seeds of a tall aquatic grass (*Glyceria fluitans*, Br.),—which grows spontaneously here, as well as in the old world,—are used, in the north of Europe, as an article of food, under the name of *Manna seeds*, or *Manne de Prusse*. In some parts of Asia, Africa, and the south of Europe, food is prepared from the seeds of the several Grasses which comprise the different kinds of *Millet*,—and a few others* : But they are all inferior in value to the poorest of our *Cerealia*, or cultivated grains. The plant called “*Millet*”, in this region (*Setaria Germanica?* Beauv.), is valued chiefly for its *herbage*; and even that does not seem to command the attention of many farmers. The *true Millet*—unknown in our Agriculture,—is believed to be a species of *Panicum* (*P. miliaceum*, L.); but there are other kinds, nearly allied to our Broom Corn, known by the names of Indian Millet (*Sorghum vulgare*, Pers.)—Guinea Corn (*Sorghum cernuum*, Willd.) Chocolate Corn (*Sorghum bicolor*, Willd.)—&c. These have been cultivated here, occasionally; but rather as articles of curiosity, than of agricultural importance. Our common Broom Corn (*Sorghum saccharatum*, Pers.) is cultivated, here, exclusively for the uses indicated by its popular name,—as already noticed; though the stem contains much saccharine juice,—and it is sometimes raised, in Italy, for the purpose of making Sugar. The least valuable, perhaps, of our *Cerealia*—or those Grasses which are cultivated, here, for the sake of the *Seeds*—is the common Oats (*Avena sativa*, L.). This grain is lighter and less perfect, with us, than it is in the North of Europe,—and is almost entirely appropriated, here, to the feeding of domestic animals; but in less favored climes—as already remarked—it contributes largely, and directly, to the sustenance of Man. One of the many sarcasms upon the Scotch, in which the great English Lexicographer delighted to indulge, was his definition of *Oats*, as the food of *Horses in England*, and of *Men in Scotland*;—as if the effects of *climate* were a fit subject on which to taunt a People! The better quality of this grain is sometimes *malted*, when the demand warrants, or rewards the labor; and a small portion is manufactured into *meal*, as an article of diet for the sick: but both these operations are very limited, in our country.

*The seeds of the following Grasses, also, are more or less employed, in the old world, as substitutes for the grains known to us: viz. TRITICUM SPELTA, L. (which has been sometimes cultivated by the Germans, in this State, under the name of SPELT) —T. POLONICUM, L. PANICUM FRUMENTACEUM, ROXB. ELEUSINE CORACANA, GÆRTN. and E. STRICTA, ROXB.

Ascending in the scale of value, we next find Barley (*Hordeum vulgare*, L.) — a grain which, in some regions, is extensively used for bread, and more or less as food for horses, and other stock: But, in our own country, it is almost exclusively employed in the manufacture of a rich potation, known to us all by the names of Beer, Ale and Porter. The immense crops produced in the middle and northern States, are nearly all destined for the *Breweries*, — a comparatively small portion being used in the *Distilleries*. To prepare the grain for these establishments, it must undergo the process of *malting*, or incipient vegetation, in order to form the *sugar*, which is the source of the alcoholic strength of fermented and distilled liquors. It is found that when seeds begin to germinate, the farina or mealy portion, is partly converted into sugar, by diminishing its carbon, and augmenting the proportion of its hydrogen and oxygen; and this saccharine transmutation is precisely the operation of malting. The skill of the Maltster consists in arresting the germination, at the critical moment, when the formation of sugar is most complete and abundant. This he does by drying it in a kiln.

The grain next superior in importance --- being used to a considerable extent in making bread, --- is Rye (*Secale cereale*, L.). In our own State, from the force of custom, or prejudice, and the greater abundance of Wheat, --- we are in the habit of undervaluing the bread made of this grain. But in many districts --- where the soil is better adapted to the plant --- Rye is very generally used, and highly esteemed. It is also employed to a most mischievous extent, in the production of the ardent spirit, called *Whiskey*. In this case, the preliminary operation of malting --- though sometimes practised --- is generally dispensed with, as being too costly. The grain is merely chopped, or coarsely ground, and, in conjunction with a small percentage of malt, is subjected to *fermentation*; by which process, also, the farina loses a portion of its carbon, and becomes sufficiently saccharine to yield large quantities of impure alcohol. So great is the amount of ardent spirit procured from this grain, and so tremendous the abuse resulting from the practise, --- that it may be doubted, on the whole, whether Rye does not contribute more largely to the *destruction*, than to the *sustenance* of human life. Certain it is, that by the conversion of its wholesome Farina into an intoxicating draught, it is made a potent instrument of physical and moral evil --- a most prolific source of disease, misery and crime. All these mischiefs, however, arise from the misapplication and abuse of a positive good; for which man, himself, must be held accountable, --- and must expect the penalties, inseparable from folly and wickedness.

The next most valuable plant, among the *Cerealia*, is perhaps our Indi-

an Corn (*Zea Mays, L.*): And, indeed, in the districts most favorable to its culture, it may be said to rival Wheat itself, in importance. Those who are not in the habit of regarding the vegetable kingdom with a botanical eye, may possibly be surprised to hear this plant enumerated among the *Grasses*: Yet, if they will advert to the definition already given, they will find the Indian Corn to be a genuine member of the Gramineous Tribe, It presents, indeed, one of the few instances in which the stem is solid with pith, instead of being hollow, or fistular between the nodes; but in every essential feature, it will be found, on examination, to be a true and undoubted Grass.* The same remark applies to the Broom Corn, the Sugar Cane, and some others, in which the culm is filled with pith. In a district like this, where every occupant of a field, or garden, cultivates his crop of Indian corn, it would be wholly superfluous to dwell on the excellence and manifold uses of this universal favorite. Suffice it to say, that, while it is the most productive of our cultivated grains, every portion of the plant has its value, in rural and domestic economy. The large pithy culm, about

*The position, and structural aspect, of the fruit-bearing Spike, or EAR, in this plant — though so different from the prevailing arrangement, in other Grasses — are yet rendered perfectly intelligible by the GOETHEAN theory of the development and modification of the vegetable organs. As the natural or normal TERMINATION of all stems, and branches — when fully developed — is in flowers and fruit, — it will be obvious, on examination, that, while the culm, in this instance, terminates as usual — though bearing only STAMINATE flowers, — the EARS of Indian Corn are in reality, lateral FLOWERING BRANCHES, on which the numerous PISTILLATE flowers are concentrated into dense SPIKES; — each spike being completely invested by the SHEATHS of abortive leaves, which originate at the crowded nodes of the short, peduncle-like BRANCH. That this is the true character of the Involucre, or HUSKS, is apparent from the fact, that several of the lower, or exterior sheaths, are often tipped with the laminæ of imperfectly developed leaves (analogous to the AWNS of the PALEE, in many smaller Grasses): — indeed, in some instances, those sheaths may be seen bearing large foliaceous expansions — almost as perfect as the leaves of the main stem. I have also observed culms which put forth a flowering branch at EVERY NODE, — a little Ear protruding from the axil of every leaf, from the lowest to the uppermost; — though the usual number is two, or three, about the middle of the culm. The branch which supports the Spike, is sometimes so much elongated that it becomes too weak to sustain its burthen erect, — in which case the mature Ear is found drooping, or pendulous by the side of the culm: and occasionally, we find the SPIKE ITSELF ramifying, — i. e. SECONDARY branches, or spikes, issue from the axils of the sheaths composing the husk, — so that there is formed a COMPOUND SPIKE, or cluster of several small Ears, on the same primary branch. There is also a variety of Maize, in which the flowering spikes are still further developed; — each floret and fruit on the receptacle, being completely segregated, sub-pedunculate, and provided with its own proper husks, or involucre, — while the WHOLE are included in the common external envelope. Sometimes, even the flowers of the TASSEL, or racemose panicle at the summit of the culm, are so fully developed as to become PERFECT, and produce fruit.

the time of flowering, is replete with a rich saccharine juice,---from which, no doubt, a considerable quantity of sugar might be extracted. The entire *herbage* is therefore highly esteemed, as a nutritious food for cattle,---the *ears*, or spikes of fruit, afford a choice treat to the Epicure, even before they arrive at maturity,---and when fully ripe, yield copious nourishment, in many forms, both for man and beast; while the very *receptacles* of the seeds---long considered as mere refuse,---may be either ground with the grain as food for stock,---or reserved as a convenient auxiliary fuel, in lighting up our anthracite fires. In Pennsylvania, and generally to the North, the farina of Indian Corn is not extensively used by itself, in making *bread*,---probably for want of skill and usage: But whoever has experienced the hospitality of our fellow-citizens on the southern side of *Mason and Dixon's Line*, knows that *Corn bread* is there admirably prepared, and almost universally preferred to every other kind. The inhabitants of the West Indies, also, derive a large portion of their subsistence from our crops of Indian Corn. It must be added, moreover, that a vast amount of this grain, in conjunction with Rye, is converted by the distilleries into alcoholic poison,---and its wholesome properties transmuted into the pestilent ministers to a depraved appetite.--- There are two other grain-bearing grasses yet to be noticed; each of which is so eminently valuable to the human race, that it is not easy to say which is intitled to the highest position in the scale of importance. It will of course be understood that I refer to Wheat (*Triticum sativum*, L.), and Rice (*Oryza sativa*, L.). In point of *intrinsic* value, I think there is no doubt that Wheat may justly claim the precedence; but as Rice is believed to afford sustenance to a larger portion of the human family, than any other grain, we may allow it, on this occasion, to take rank as the first among the *Cerealia*,---and therefore, according to our arrangement of the subject, the last to be treated of. Wheat, however, is clearly the most important of the grains, in the temperate zones,---especially in the higher latitudes.--- The Romans gave the name of *Fruentum*, to all the grains which furnish bread,---and in England, the same grains are designated by the name of *Corn*; but these names were gradually, and by way of eminence, applied more particularly to *Wheat*---as the great staple of bread stuffs. So the term *Fruent*, is employed by the French, in a similar sense; and there was formerly a dish, made of Wheat boiled in milk, which the English called *Furmenty*, or *Fruenty*;---names evidently derived from the Latin word, *Fruentum*. Our colonial ancestors brought with them the English term, *Corn*, as applicable to the European grains,---and for the sake of distinction, they gave to the *Maize*---which they found here---the name of *Indian Corn*. In process of time, how-

ever—as the other grains had each a proper name—the generic term, *Corn*, has come to be almost exclusively employed, in the United States, to designate the Maize: and thus the word—like many others in our language—has, by usage, acquired a somewhat different meaning, on different sides of the Atlantic.—I shall not trespass on your patience by enlarging on a subject so familiar to all, as is the value and importance of Wheat. You are all aware, that in the greater portion of our happy country—especially in the middle and western States—it is one of the prominent objects of our Agriculture. So long, therefore, as our people shall apply themselves to the tillage of the soil, we may reasonably hope to be exempted from that fearful calamity, a want of Bread. In addition to the supply of food, furnished by Wheat,—I may remark, that our Laundresses are chiefly indebted to its Farina for that important article in their operations, known by the name of *Starch*: and in the olden time—when, whatever may have been the interior condition of the head, Fashion required the *exterior*, at least, to be conspicuously decorated,—the same amylaceous extract supplied the hair-dresser with his *powder*. As we have neglected the *external finish*, so elaborately bestowed on the Pericranium, by our ancestors, it would seem to be but reasonable that we should give the more attention to the furniture *within*! Although capable of yielding Alcohol—like all the farinaceous seeds—Wheat is generally too valuable, as an article of food, to be desecrated by the process of distillation.

In our notice of the *Cerealia*, the last in order—and, as is supposed, the first in importance, by reason of its extensive use,—is the Rice plant (*Oryza sativa*, L.). The beautiful grain which this grass affords,—though considered by us, here, more as a delicacy than as a standing dish,—is the principal sustenance of millions of the human race. Being a kind of semi-aquatic plant, Rice flourishes best in grounds that are low and marshy, or so situated that they can be overflowed—though there is a variety, called upland, or Mountain Rice, which is much cultivated: and every where, within the Tropical, and adjacent regions, where circumstances are favorable to its culture, this admirable Grass is to be found. In the southern parts of India—as I have had occasion to witness—the dense and squalid population is almost exclusively subsisted upon Rice. The elegant preparations of this grain, which crown the tables of the wealthy, in Oriental climes, must be seen, and tasted, to be duly appreciated. It is also much used as food, in Roman catholic countries, in the time of Lent. This plant belongs to a small subdivision of the Grass tribe, in which the *flowers* are often furnished with the extraordinary number of *six stamens*;—or possibly they may each consist of *two florets* concentrated within the proper envelopes of a single flower,—by which

crowding process, all the parts of one of the florets, except the stamens, may be suppressed, or abortive; a phenomenon, of which it is believed there are many analogous instances, in the economy of vegetation. The seeds are closely invested by the inner chaffy envelope, or paleæ, after the manner of Oats, and Barley; and while thus coated are known, in the East, by the name of *Padda*. They are deprived of this covering by passing them between mill-stones properly adjusted for the purpose, — and are thus prepared for the culinary department, much in the same way that *hulled* and *pearl Barley* are manufactured. The *albumen*, or farinaceous portion of Rice, is of a remarkably pure white — almost translucent; and of a very bland, nutritious quality. The gluten which it contains, enables the Chinese to manufacture from it, various ornamental articles of great beauty and delicacy. This gluten is also said to be an important ingredient in the preparation of *Japan paper*. The art of extracting alcohol from the seeds, has been applied to Rice, as well as to the other *Cerealizæ*. The fiery liquor called *Arrac* — the generic name, in the East, for alcohol — is obtained by distillation from Rice, in conjunction with sugar, or the juice of some species of Palm: and in China, an amber-colored wine is also made from that grain.

The last member of the Gramineous Tribe, which remains to be noticed on this occasion, is the Sugar Cane (*Saccharum Officinarum, L.*). This interesting plant more nearly resembles the Indian Corn — in its structure, and general habit* — than any of the other grain-bearing Grasses; — but unlike them all, its value consists — not in its Seeds — but in the rich saccharine juice contained in its pithy stem. It is found only in warm climates; and flourishes best in the deep rich soils within the tropics, — or in the lower latitudes of the temperate zones. It is propagated by cuttings of the jointed stem — planted in rows somewhat after the manner of Indian Corn. The diameter of the culm does not much exceed that of good specimens of Maize, — while it varies, in height, from 8 or 10 to 20 feet, according to the character of the soil. As it is not cultivated for its seeds, it is of course rarely permitted to flower; but is gathered while the rich juices are yet diffused throughout the stem. When these juices have acquired the proper degree of maturity, the culms are crushed between rollers, — the saccharine liquid is expressed — and conveyed into boilers, for the purpose of driving off, by evaporation, the redundant watery portion. This being done to the proper extent, and the

*Although in the structure of the culm, and general external appearance, the Sugar Cane has some resemblance to Indian Corn, — the BOTANICAL characters of the inflorescence are more allied to those of ANDROPOGON, or what we denominate INDIAN GRASS; and hence it is arranged the subdivision of the grasses, called ANDROPOGONEÆ.

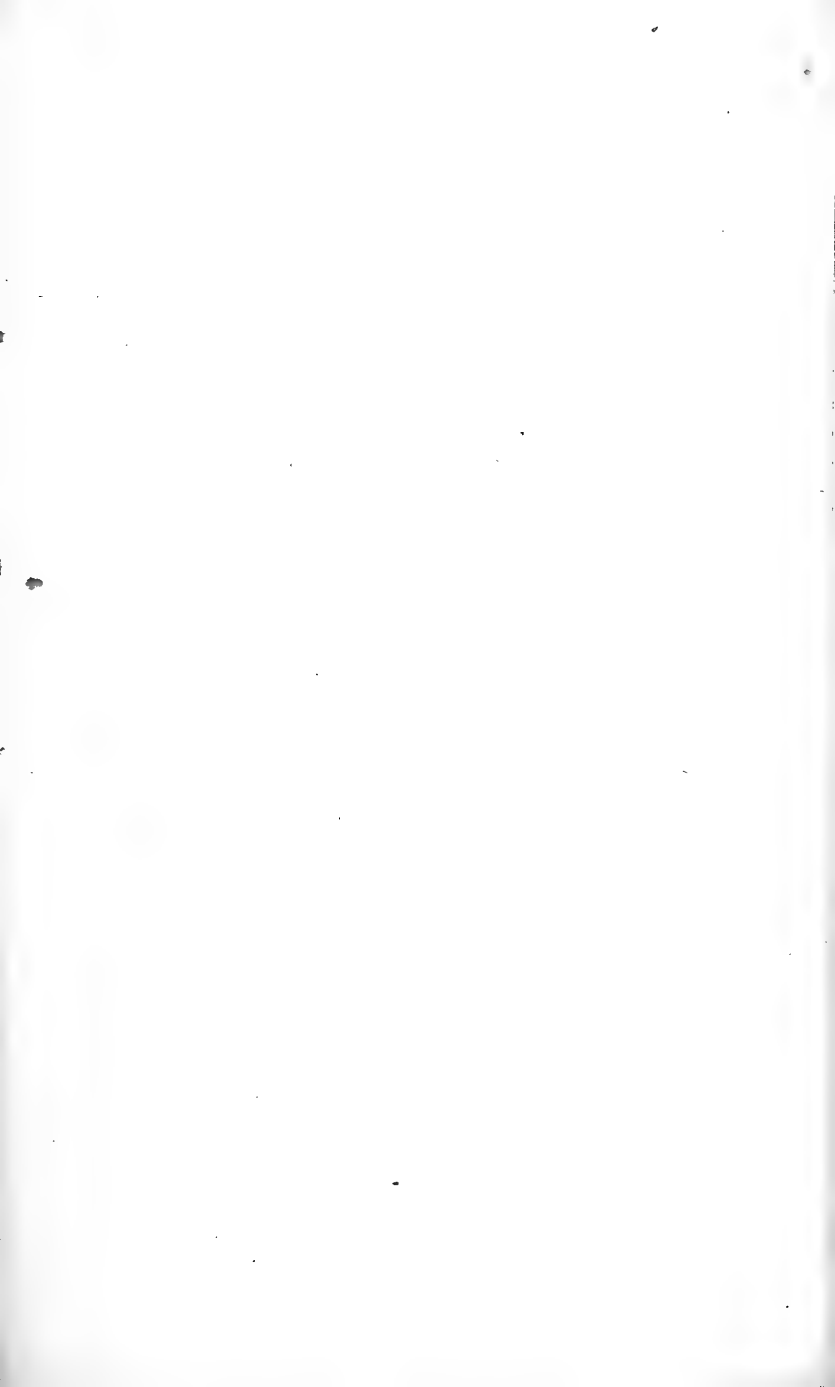
impurities duly removed, the Sugar is precipitated in crystals, --- leaving a dark rich syrup above, which is familiarly known to us all by the name of *Melasses*. These crystals, when separated and drained of the syrup, are left in various conditions of purity, --- and constitute the different sorts of our common brown Sugar. Subsequent boilings of the syrup afford a crude precipitate, of inferior quality, known in Commerce by the name of *Muscovado* sugar, --- a term corrupted from the Spanish word *Mascabado*, — and which, itself, is derived from the phrase, *mas acabado* — signifying *more done*, or *finished*:— i. e. the sugar, in this case, is the result of a further and concluding process.* Our *loaf sugar*, and *candies*, are obtained simply by *refining* the aforesaid saccharine crystals still further; viz. by dissolving them again—separating all foreign matters from the solution, by means of Lime, Alum, white of Eggs, and other clarifying materials — and then reducing the purified liquid to the proper state for a second crystallization. Thus are we furnished, by this magnificent Grass, with the purest, most nutritious, and universally palatable, of all the ingredients that enter into the composition of our food. The large portion of the globe adapted to the growth of the plant, and the copious product of its juices, render it probable that the *Cane* will ever be our principal resource for the supply of sugar. The *Maple* may furnish a tolerable substitute to Foresters, who live remote from the channels of commerce, — and systems of policy, or other considerations, may induce a partial resort to the *Beet*, to obtain this delicious and indispensable commodity:—but it may be doubted whether any, or even *all* the other species, of the vegetable kingdom, can rival this single Grass, in the production of sugar, — either in the quality, the quantity, or the cheapness of the supply. That the history of the plant, and its products, is closely interwoven with a melancholy tale of oppression, and human misery, is unhappily as true, as it is reproachful to our race; and it is no less true that the choice product of the *Cane*—like that of its grain-bearing kindred—is often prostituted to the vilest and most mischievous uses: yet we must recollect, that these evils are the results of man's own folly and wickedness, — and are no more chargeable upon the blessings thus perverted, than they are imputable to the design of a bounteous Providence.

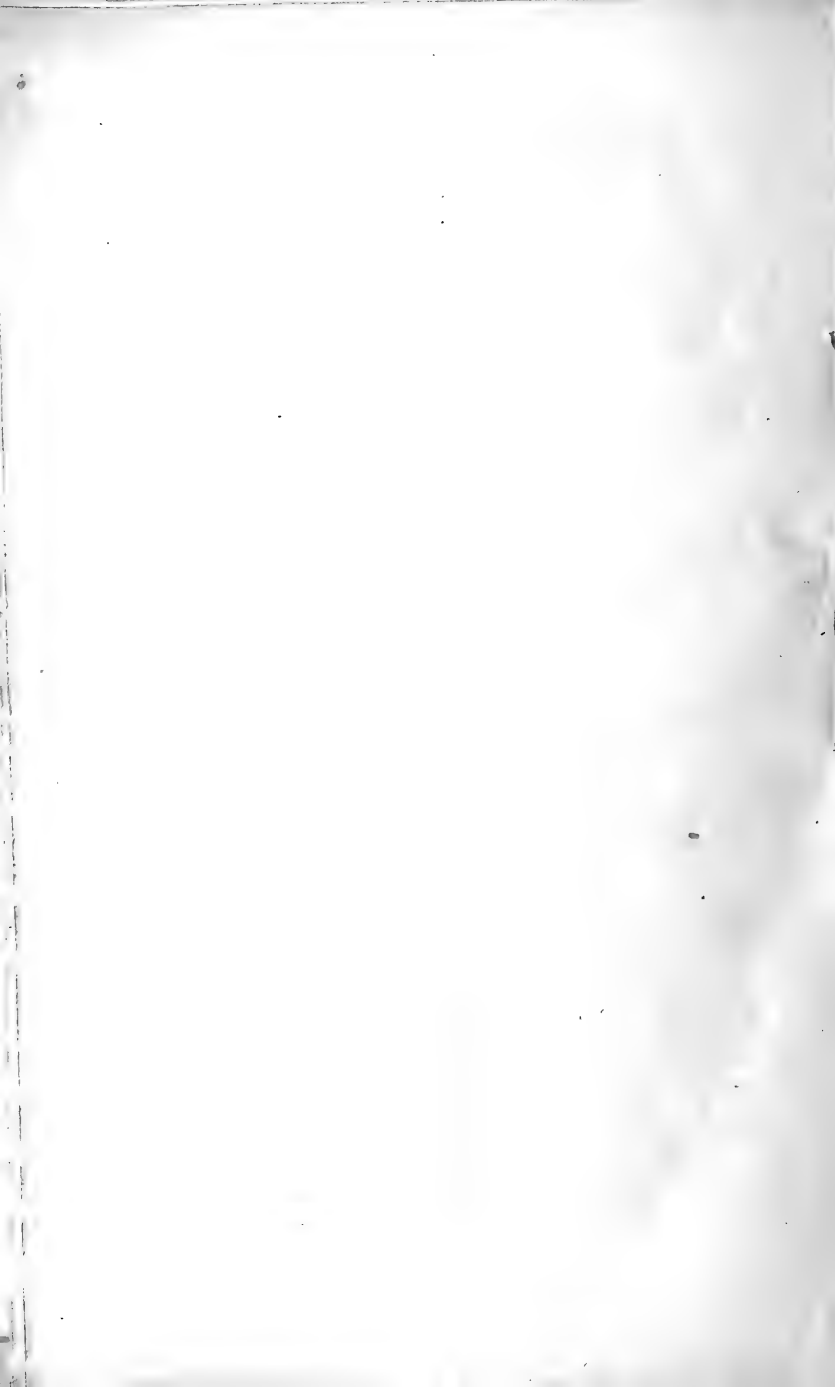
From the sketch now presented, — which I fear has been tedious, though extremely superficial and imperfect, — I think it may be perceived, that the simple Tribe of Plants, technically called *Grasses*, is not only one of the most abundant, but decidedly the most valuable, and important to man, of all the many natural families in the Vegetable creation. That

* “MASCABADO, ADJ. que se aplica al Azúcar inferior que sale de la última coadura.” DICCIONARIO DE LA ACADEMIA ESPAÑOLA.

while its peculiar characters cannot fail to interest the lover of Natural Science, — its uses, abuses, and manifold relations to the welfare of Society, must ever give it a strong claim to the attention of the Agriculturist, the Philanthropist, and the Political Economist.











SMITHSONIAN INSTITUTION LIBRARIES



3 9088 00613 6634