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J. E. WILLIAMS, EDITOR.

# THE SOUTHERN PLANTER.

DEVOTED TO

## AGRICULTURE, HORTICULTURE,

AND THE

## HOUSEHOLD ARTS.

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# THE SOUTHERN PLANTER

*Devoted to Agriculture, Horticulture, and the Household Arts.*

Agriculture is the nursing mother of the Arts. [XENOPHON. | Tillage and Pasturage are the two breasts of the State.—SULLY.

J. E. WILLIAMS, EDITOR. AUGUST & WILLIAMS, PROP'RS.

VOL. XIX. RICHMOND, VA., OCTOBER, 1859. No. 10.


## Professor Campbell on Vegetable Physiology, &c.

We have been kindly permitted to transfer to the pages of our journal, from Professor Campbell's admirable "Manual of Scientific and Practical Agriculture," the two chapters on "Vegetable Physiology," and the "Organs of Plants." accompanied by the author's illustrative engravings. We hope this specimen of his concise, yet lucid and thorough treatment of his subject, will awaken in the reader the desire of owning the book, and of appropriating to his own advantage the whole of its invaluable contents.—[EDITOR.

### VEGETABLE PHYSIOLOGY.

*Plants* and *animals* constitute the two great departments of organic nature. They all consist of those organs necessary to sustain life, to promote growth, and to reproduce their own species. Plants, as well as animals, are endowed with *vitality;* but they differ from animals in not possessing *sensation.* In some plants there seem to be some evidences of sensation, as in the sensitive plant (*Mimosa*); and it may be that all plants have some kind of sensation, which is so obscure as not to be ordinarily perceptible. Still we generally regard plants as destitute of this property.

BOTANY *is the science of plants.* It gives us a knowledge of their names, classification, structure, the functions of their various organs, and the uses to which they are applied.

VEGETABLE PHYSIOLOGY is that department of Botany which treats of the organs of plants—their structure, and the part they severally perform in promoting life and reproduction. A distinction is drawn between vegetable Anatomy and Physiology; the former treating of the *structure* of the organs, and the latter of their *functions.* But we shall embrace both of these in the term *Physiology.* An intelligent view of this subject is of high importance to every one engaged in the cultivation of the soil.

Skilful cultivation always increases the productiveness of plants; and in many cases, improves their quality to such an extent as to render what was once worthless, now highly valuable. The apple, the potato, and the tomato, are examples of plants reclaimed from a wild and almost worthless state, to one of the highest value and importance.

GERMINATION.—The plant is first found as an *embryo* in the seed, from which it springs. *Exp.* Place a bean in warm water, and let it remain a few hours, until it becomes swollen. Then separate the two lobes

of which it is formed, and you will discover, near what is called the "eye" of the bean, the embryo, consisting of two parts, one to be developed into roots, and the other into the stalk and leaves of the plant.

When a seed is placed in a moist, warm soil, it soon begins to absorb water, and also oxygen from the air mingled with the soil. A chemical change begins at once within the seed, by which the material of the grain is so modified as to become the food of the embryo plant. Seeds consist chiefly of starch and gluten; but these being insoluble, cannot be taken up by the germ in their present form. Under the combined influence of air, water, and heat, the gluten becomes *diastase*, and begins to act as a ferment; and, under its influence, the starch is soon converted into dextrine, and then into sugar. Being thus rendered soluble, it enters the circulation of the embryo, which begins to expand, and soon bursts the seed. It "sprouts," sending forth two branches, one of which turns downward, and puts forth roots; this is called the *radicle*. The other turns upward to seek the light and air; this is the *plumule*, and is soon developed into the stalk and leaves. *Exp.* Put grains of corn into several cups or bowls filled with fine soil, and place them in a warm place for three or four days, keeping the soil moist. At the end of this time examine one of them, and observe the change the grain has undergone. Then examine one on each successive day, and you will see the *radicle* and *plumule* in their various degrees of development, until the one becomes roots, and the other rises to the surface, and sends forth a green blade. Meanwhile the grain has been consumed, and will soon disappear entirely; the plant being now able to get nourishment from the soil through its roots, and from the air through its blades or leaves, no longer requires the store of nourishment which an all-wise Providence had laid up for its infancy. Fig. 30 will give some idea of the appearance of a grain of Indian corn, in one of its stages of germination.

Fig. 30.

The covering of the seed is called the *integument* (the *bran*); and the starchy part within the integuments, and surrounding the embryo, is known as the *albumen*. The albumen and integuments together form what is called the *cotyledon*, or seed-lobe. When a seed consists of only one lobe or cotyledon, the plant producing it is said to be *monocotyledonous:* Indian corn is an example of a monocotyledonous plant. If the seed has two lobes, as the bean, the plant is *dicotyledonous*.

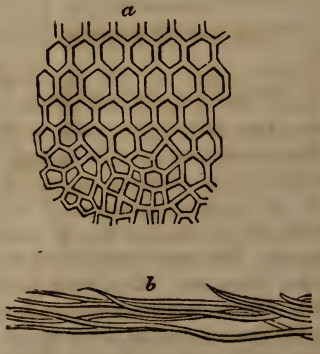
The stems of plants whose seeds have only one cotyledon, increase in size by *internal growth*. Such plants are called *Endogens*. The dicotyledonous plants, on the other hand, generally grow by the formation of new layers on the *outer* part of the stem, and immediately beneath the bark. They are hence called *Exogens*. The *grasses* (including wheat, corn, etc.), the *palms*, and plants generally having the veins of their leaves parallel, are endogens. Beans, peas, and the trees and shrubs of our forests, are exogens.

Tissues of Plants.—The various organs of plants are composed chiefly of several kinds of structure, called *tissues*. These are made up of *fibres* or *membranes*, or both together.

There are five kinds of tissue: 1. *Cellular tissue;* 2. *Woody tissue;* 3. *Vascular tissue;* 4. *Vasiform tissue;* 5. *Laticiferous tissue.*

*Cellular tissue* is composed of minute cells, resting upon and pressing against each other, so that the sides where they meet become

Fig. 31.




flattened, and give to the cell a somewha regular form. Fig. 31 (*a*) is a section o cellular tissue from pith of elder, as viewe with the microscope.

*Woody tissue* has a fibrous structure—th

fibres being in the form of slender tubes overlapping each other at their extremities, as in Fig. 31 (*b*). It is this structure which gives strength to wood, and the various kinds of fibrous material used in the arts, such as flax, hemp, cotton, etc.

*The vascular tissue* resembles the woody in external form, but differs in having a long slender fibre coiled within it from end to end.

*The vasiform tissue* consists of tubes much larger than those of the woody fibre. These tubes may be seen in a cross-section of oak-wood. It is chiefly through these that the sap passes in ascending from the roots to the leaves.

*Laticiferous tissue* consists of very small tubes and cells, found most abundantly in the bark and leaves. After the sap has been prepared in the leaf for nourishing the plant, it is called *latex*. Those vessels of the leaf in which this preparation or elaboration goes on, and those which afterwards convey the latex to the part of the plant to be nourished by it, are formed of the laticiferous (latex) *tissue*.

These various kinds of tissue hold and transmit the fluids of the plant, the different tubes and cells having no communication with each other, except through minute pores. These vessels are sometimes charged with liquid matter, and sometimes with gases.

Let us now examine the structure and functions of the various organs so beautifully constructed out of these several forms of tissue.

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### ORGANS OF PLANTS.

The chief organs of the plant are the *Bark*, *Root*, *Stem*, *Leaf*, and *Flower*.

*Bark.*—The bark is the external covering of the plant; and, in the widest sense, may be regarded as enveloping every other part of it, except the extremities of the roots, and the stigma of the flower. It consists of *three layers*. The *outer* one, called the *Epidermis*, is a thin, and often transparent integument, which covers every part of the plant, with the exceptions above mentioned. It may be easily separated from the surface of the leaves and green stems of many plants. On trees of many years growth, it becomes thick and rough, forming an uneven, scaly surface. The *inner* layer of the bark, which is in contact with the surface of the wood, is called the *liber*. It is generally thin, and often strong enough to serve many valuable purposes of art. The ancients used it as we use paper (hence, *liber*, a book); while in more modern times it has been used in the manufacture of mats, and of cloth of various qualities, from the coarsest coffee-sack to the finest Irish linen. Between the epidermis and liber is the *cellular integument*, which in many trees is quite thick. In the bark of the cork-tree (*Quercus suber*,) it forms the material of which corks are made.

The epidermis and cellular integument are both composed chiefly of cellular tissue. The liber consists of cellular and woody tissues.

There are little openings in the epidermis, called *stomata* (mouths). These are very minute, requiring the aid of the microscope to see them. They are most numerous on the surface of the leaves, and on parts of the plant of recent growth. These stomata perform important offices, which will be discussed in connection with the leaves.

*Glands* are minute masses of cellular tissue, of various forms, and situated in different parts of the plant. Their office is to elaborate and discharge the peculiar secretions of the plant. The gums, oils, &c., are secreted by glands.

Hairs, stings, and prickles, are protuberances of the epidermis, or of the cellular integuments, covered by the epidermis.

### ROOTS.

The roots serve the double purpose of sustaining the plant in its proper position, and of absorbing from the soil appropriate nourishment. Their office is somewhat similar to that of the mouths of animals. They take in both food and water.

*Variety of forms.*—Roots have a great variety of form, but we have room to notice only a few of the most common and conspicuous varieties. (1.) The *ramose*, or

Fig. 32, *a*.

*branching root*, is one which sends off branches of various size in every direction. It is the kind of root common to all trees and shrubs. (See Fig. 32, *a*). (2). *The spindle root* tapers from the top downward, often branching near the lower end. It sends off little branches, or rootlets, all along the sides. We have examples of this form in the radish and parsnip (Fig. 32, *b*).

FIG. 32, *b*.

The *turnip*, or *napiform root*, differs from the spindle root, only in swelling out considerably, just at the surface of the ground. (3.) *The tuberous root* consists of fleshy masses connected together by fibres. It closely resembles the potato, which was formerly regarded as a tuberous *root;* but the proper tuberous root has no buds (eyes), while the potato has, and it is, therefore, classed with underground *stems*. (4.) *The fibrous root* is one which consists of numerous thread-like divisions, or fibres, extending out from a common head near the base of the plant. Wheat, corn, and most of the other grasses have fibrous roots (Fig. 32, *c*). Other varieties we cannot now stop to notice. The student should collect the different varieties of roots, and wash them carefully, so as to preserve every part unbroken, that he may become familiar with them as they actually grow.

FIG. 32, *c*.

*Floating*, or *aquatic roots*, are such as belong to plants which float upon the surface of water, without having any connection with the soil.

*Aerial roots* are such as shoot forth in the air. (1.) Sometimes they remain suspended in the air, without attaching themselves to any other substance, except so far as may be necessary to sustain the plant to which they belong. Their office, then, is to absorb nourishment from the air, and the rain which falls upon them. Of such plants are the pendent mosses, which festoon the trees so remarkably in some of our Southern States. (2.) They sometimes attach themselves to the bark, and even penetrate the tissues of other plants, from which they get their nourishment. The mistletoe is an example of such beggar-plants. They are aptly called "*parasites.*" (3.) The roots which shoot forth from the joints of some prostrate plants, as the tomato, are regarded as aerial roots, but these soon penetrate the soil. (4.) Another variety of aerial roots are such as spring from the stems of erect plants, at some distance above the surface of the ground, and extending downward into the earth, stand like a circular row of *braces* around the base of the stalk. We have a beautiful example of this kind of root in the Indian corn, when growing on a good soil. These are often called *brace-roots*. They serve to support the plant, and prevent its being prostrated by winds; and, at the same time, collect nourishment from the soil.

*Parts of the root.*—Whatever may be the shape of the root, it generally has several distinct parts worthy of notice:

(1.) The *Caudex* is the main body of the root, generally descending vertically into the soil. It is frequently called the *tap-root*.

(2.) The *Fibrils* are the branches sent off from the caudex, often passing into many sub-divisions.

(3.) *Spongioles* are the soft, pulpy points of the fibrils, through which the plant gets its nourishment from the soil in a liquid form.

*Structure.*—The root has a structure similar to that of the stem to which it belongs. The bark of the root is more soft and spongy than the bark of the stem. Its epidermis terminates near the spongioles, leaving them uncovered. The fibrils are composed chiefly of vasiform tissue, covered with the epidermis. The extremities of the fibrils consist of this vasiform tissue in very soft and delicate form, spongy in structure, and hence called "spongioles."

*Functions of the Root.*—These have several times been alluded to. The *first* is the mechanical office of *attaching the plant to the soil, and keeping it in its proper position.* The *second* is the *absorption of food and moisture* from the soil.

## THE STEM.

The stem originates in the plumule. The ascending of the plumule and descending of the radicle, seem to be owing chiefly to the mysterious influence of light. When seeds are planted in a box of soil, with a few stalks of hay or a little moss spread over it,

and then some narrow strips of wood placed over all, so that the contents of the box will not fall out when it is inverted; and the box then turned with its open side downwards, over a mirror, a bright surface of tin, or even over white paper, so that the light will reach the soil only from below: the seeds will germinate, and the plumule *descend* towards the light, whilst the radicle will *ascend* into the dark soil above it.

Stems are *aerial* when they grow above the surface of the ground, and *subterranean* when they grow beneath the surface. *Erect* stems continue to grow in a vertical direction. *Creeping* and *trailing* stems are such as grow along the surface of the ground. Many of these have *tendrils* (coiling fibres) by which they sustain themselves on the branches of other plants; as we see in the grape-vine.

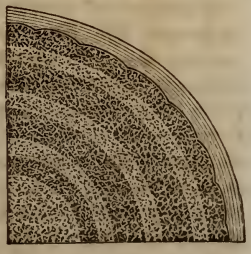
Subterranean stems generally grow just below the surface of the soil. They are distinguished from roots in having buds, from which aerial or other subterranean branches may be sent forth. The roots of many plants have the power of developing buds, and thus sending up "shoots" from their surface; but still *buds* are the chief mark of distinction between roots and stems.

*Forms.*—Some of the most general forms of subterranean roots are: (1) The *tuber*, a familiar example of which we have in the potato. Its buds (eyes) are the germs of new stems, to be developed the next year. (2) The *bulb*, which consists of concentric layers surrounding one or more germs or buds, from which stems spring up, developing new bulbs at their base during the succeeding season of growth. Examples—the tulip and onion.

Stems are further distinguished by the terms *ligneous* and *herbaceous*. A *ligneous stem* is one which has a woody structure, such as we see in ordinary trees and shrubs; and is composed of *pith*, *wood*, and *bark*. An *herbaceous stem* is composed of tissues similar to those of the ligneous stem (the cellular predominating), but less compact, softer, usually of a single year's growth, and without the distinctions of pith, wood, and bark. Ligneous stems are usually distinguished, in temperate climates, by concentric layers of wood, marking the annual growth, and thus enabling us to determine the age of the tree. Herbaceous stems usually grow but one season: in many cases coming to maturity and dying with the ripening of the seed.

Physical Structure of Exogens.—The exogens (outside growers), when they first spring from the seed) and also branches, during their first year's growth), have a soft, spongy centre of cellular tissue, called *pith*. This is covered with a thin layer of vascular tissue, having its spiral vessels connected with the leaves, and called the *medullary sheath*. Surrounding this is the *bark*. Such is the structure of the infant plant; but this condition lasts but a short time. The sap, carried up by the pith, and elaborated in the leaves, descends through the vessels of the liber, and soon forms a layer of wood around the medullary sheath. This layer consists, first, of *ducts* or sap-tubes, formed during the early part of the season; then of a more compact layer of woody and vassiform tissue. Such a layer is added every year, giving to a cross-section of oak or ash an appearance similar to that represented in Fig. 33.

Fig. 33.



The pith soon ceases to be the channel through which the sap ascends—the newly-formed ducts performing this office. Again the layers of wood become gradually hard, the sap-tubes partially obstructed by the deposition of matter, which gives a reddish or brown color to the wood, and the sap ceases to ascend through them. They then form the red-wood, called the *duramen*, on account of its compactness and strength. For several years the newly-formed layers continue to circulate the sap, and retain their light color; they form the *alburnum* (white-wood—sap-wood). The *duramen* is the most valuable portion of the tree, on account of its strength and durability. The *alburnum* is softer, and decays readily, on account of the albuminous matter present in it.

Passing from the centre of the trunk or stem to the bark, and cutting the annual layers at right angles, are many plates formed of fine fibres. These are called the *medullary rays*. They are conspicuous in a piece of split wood of oak or maple.

PHYSICAL STRUCTURE OF ENDOGENS.—"In the endogenous stem, there is no distinction of pith, wood, and bark; nor does a cross section exhibit any concentric arrangement of annual layers. It is composed of the same tissues and vessels as that of the exogen; that is, of cellular tissue, woody fibre, spiral vessels, and ducts—the first existing equally in all parts of the stem, and the rest imbedded in it in the form of bundles. Each bundle consists of one or more ducts, with spiral vessels adjoining their *inner* side next the centre of the stem, and woody fibres on their outer side, as in the exogens."—*Wood's Botany.*

Most of the endogenous herbaceous stems are hollow, and have hard joints at nearly regular intervals. A bladed leaf is usually attached at each one of these joints. The joints give strength to the stem. Examples are seen in many of the grasses. Some stalks, like those of the Indian corn, are jointed, but not hollow.

*Functions of the Stem.*—These are, *first*, to convey the sap from the roots to the leaves, where it is prepared for the nutition of the plant, and thence to carry it to the various parts to be nourished by it; *secondly*, to sustain the leaves, flowers, and fruit, so as to expose them properly to the action of air and light. Where it is necessary that a very large surface of leaf should be exposed, the plant is constructed with numerous branches, forming a spreading top, such as we see on trees generally. In a tree, that part of the stem below the branches is called the *trunk*. The trunk is the most valuable part of those trees used for timber.

### THE LEAF.

*Buds.*—Plants have two kinds of buds: (1) *The leaf-buds*, the first of which is the plumule as it bursts from the seed. This is developed into the stalk and leaves, and is itself perpetually renewed on the summit of the stalk. Just above the base of each leaf, a new bud makes its appearance; and in ligneous plants it is subsequently developed into leaves alone, or into a branch and leaves. (2) The *flower-bud*, which has a different structure, generally having enveloped within it the germs of both leaves and flowers.

In the cold climates, buds are protected in winter by a scaly covering, which opens and frequently drops off soon after the bud begins to swell and grow in the spring.

The leaf combines, in a striking manner, the useful and beautiful, in its structure and color. The almost countless shapes, from the straight and slender blade of grass to the deeply lobed oak leaf and the broad palm, present to the eye a wonderful variety of Nature's most delicate handiwork. The *green color*, the most pleasant to the eye, seems to have been provided by a kind Providence to soften the bright glare of the summer's sun, and thus to promote the comfort of his creatures.

To the plant itself the leaf bears the most important relation. It is the breathing organ of the plant—its *lungs*. It is the *digestive* organ, too—its *stomach*.

STRUCTURE.—The leaf consists of several parts worthy of distinct notice. The *leaf-stem*, or that by which it is attached to the branch or stalk to which it belongs, is called the "*Petiole.*" Some leaves have no petiole, but are connected by their base directly with the branch or stem. They are then said to be *Sessile*. The broad expansion of the leaf is called the "blade." The framework consists of numerous *veins* and *veinlets*. The *mid-vein* is the extension of the petiole, running through the centre of the leaf. The other veins either branch off from the base of the mid-vein, or run parallel with it. The branches of the veins are called *veinlets*.

A leaf is said to be (1) "*Net-veined,*" when the veinlets so intersect and cross one another as to form a sort of net-work. The leaves of exogens, such as our forest trees, peas, beans, &c., are net-veined; (2) "*Parallel-veined,*" when the veins run parallel with the mid-vein, and the veinlets parallel with one another, as in grasses, and most of the endogens; (3) "*Fork-veined,*" when the veins and veinlets are *forked* as in the fern leaf.

*Forms.*—The form of the leaf is determined by the direction and extent of the veins and veinlets, and the development of the intervening tissue. It may be *orbicular*, round; *ovate*, egg-shaped; *cordate*, heart-shaped; *lanceolate*, lance-shaped, etc., according as the outline of the framework assumes one or other of these imitative forms.

PHYSIOLOGY OF THE LEAF.—The veins and veinlets may be regarded as a prolongation of the medullary sheath, and are com-

posed of the *woody* and *vascular tissues*. The thin, membranous part of the leaf, or *lamina*, is formed of *cellular tissue*, and generally consists of two layers; that which forms the upper side of the leaf differing somewhat in structure from that which forms the lower side. In some cases the plane of the leaf is nearly or quite vertical when in its natural position. In such cases, both sides being equally exposed to light, have the same structure.

The cells, which abound in the lamina, have their inner surface lined with little green globules of *chlorophyll*, which give the green color to the leaf. The different *shades of green* are produced by the greater or less compactness of the cellular tissue, and consequent compactness of the chlorophyll (leaf-green.)

Every part of the leaf is enveloped in the *epidermis*. Beneath the epidermis, and among the cells, we may find many open spaces, especially near the lower surface of the leaf. These are called *air-chambers*, and have communication with the air through openings (stomata) in the epidermis, which are too small to be seen with the naked eye, but with the aid of a powerful microscope, they may be seen in great numbers. Fig. 34 represents a magnified view of some of the stomata as seen in the leaf of the lily. They are so numerous on most leaves, that many thousands of them are embraced within the space of a single square inch of surface. The stomata are chiefly confined to the lower surface of the leaf; but in leaves whose natural position is vertical, exposing each side alike to the sun, they are found on both sides.

Fig. 34.

### FUNCTIONS OF THE LEAF.

When the sap ascends from the root to the leaf, it carries with it in solution a portion of the material necessary for the nourishment of the growing plant. But this nourishment is still in a crude form, and too dilute to be adapted to the purposes for which it is designed. It must, therefore, undergo certain modifications. These take place chiefly in the leaves, as described in the next three sections.

*Exhalation.*—The sap must be condensed; that is, the surplus moisture must be thrown off. This takes place through the stomata, and is similar to the *perspiration* of animals. It is generally called "*exhalation*," and occurs chiefly under the influence of light, and to a great extent independent of *temperature*. The stomata are *open* in the *light*, and *closed* in the *dark*; but the direct rays of the sun are unfavorable to their action.

*Respiration.*—Plants derive a large proportion of their nourishment from the air, through their leaves, in the form of carbonic acid gas. They also absorb small quantities of oxygen from the air, but throw off a much larger quantity into the air. This inhalation of carbonic gas, and exhalation of oxygen, we shall call "*respiration*." In one respect it is the reverse of respiration in animals, inasmuch as animals inhale oxygen and exhale carbonic gas. The respiration of plants goes on chiefly by day, the stomata being opened under the influence of light. As the carbonic gas enters the leaf, it is at once dissolved by the sap, and carried through the circulating vessels of the leaf, where it is decomposed, its carbon being retained, and its oxygen thrown back into the air.

*Digestion.*—The food taken up by the roots, and carried by the sap to the leaves, there meets with the gaseous food from the air, all together forming, by their solution, "crude sap." This is generally modified during its circulation through the leaf, if an abundant supply of light be present. The changes which the plant-food thus undergoes, we call "digestion," because of its resemblance to the changes produced on animal food by animal digestion. When the sap has thus been prepared for nourishing the plant, it is called "*latex*," *or true sap*. It is then conveyed by the circulating organs to the various portions of the plant, and in some mysterious way, under the guiding finger of Omnipotence, assumes various forms of organic structure, producing stems and leaves, flowers and fruits. Here we have a beautiful analogy between the circulation of sap in plants, and the circulation of blood in animals.

### FLOWERS AND FRUIT.

Growth, decay, and death, mark the history of every individual upon our globe, whether plant or animal. If, then, organized beings possessed not the power of reproduction, our world would soon become a bleak and barren waste. But the Creator

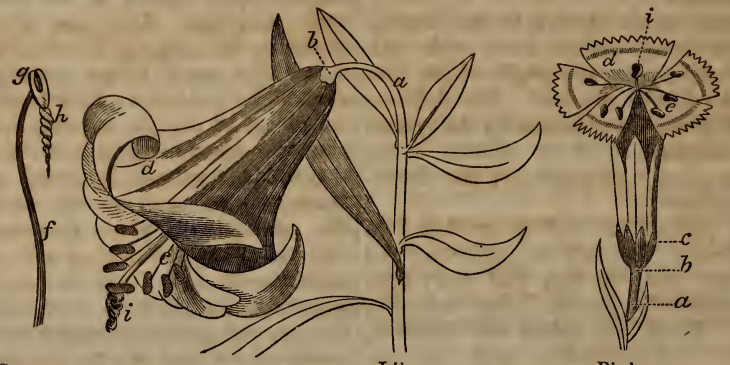
has wisely ordained that the earth shall bring forth "grass, and herb yielding *seed after his kind*, and the tree yielding fruit, whose seed was in itself, after his kind."

*Reproductive Organs.*—The reproductive organs of plants are found in the flower, which is the expansion of the *flower-bud*. These, by their combined influence, bring the seed to maturity, and thus produce the embryo of a new plant.

*Structure of the Flower.*—As a general rule, flowers have several distinct organs or parts worthy of note:

(1.) Many flowers are attached to the plant by a stem, called the "flower-stalk" (Fig. 35, *a*). When the flower rests upon the stem, or branch of the plant, without a flower stalk, it is said to be "sessile."

FIG. 35.




Stamen. Lily. Pink.

(2.) The head or top of the flower-stalk on which the other organs rest, and to which they are usually attached, is called the receptacle" (*b*).

(3.) The calyx is the external *cup* which surrounds the flower at its base. It is generally *green*, but sometimes colored like the other parts of the flower. It is sometimes in one entire piece, having its edge notched. At other times it consists of a whorl of separate leaves. These divisions of the calyx are called "sepals" (*c*).

(4.) The delicate and beautifully colored circle of leaves, forming the inner coating of the flower, is the "corolla." Its divisions are called "petals" (*d*).

(5.) The "stamens" are the slender organs of thread-like structure, situated within the corolla, and generally (though not always) equal to the petals in number (*e*.)

The three divisions of a stamen are: the *filament*, or slender stem; the *anther*, which is a little two-lobed organ at the extremity of the filament; and the *pollen*, or fine yellow dust found in the anther. The pollen, when viewed with a microscope, is found to consist of minute membranous sacks filled with a fluid substance (Fig. 35, *f. g. h.*)

(6.) Within the circle of stamens are the "pistils.' These occupy the centre of the flower. Some flowers have but one pistil, others have a great many (Fig. 35, *i*),

The pistil has three divisions: *ovary*. which is the enlarged part of the pistil at its base, and contains the germs of the future seeds; the *style*, the slender part of the pistil rising above the ovary; the *stigma* is the top of the pistil, and usually consists of one or more rounded lobes.

The ovary is often *simple*, consisting of a single cell, or *carpel;* but more frequently it is *compound*, having two or more carpels. When the ovary is simple, it has but one style and stigma; when compound, it has a style and stigma for each carpel; unless the style is wanting, as sometimes happens. In that case, the stigma rests upon the ovary, and has one division for each carpel. (Fig. 36, *a*, shows a simple pistil with its different parts; *b*, one of compound form.)

FIG. 36.


*Stamens* and *pistils* are essential organs for the production of seed in any plant. But they are not always found in the same flower. (1.) They often *grow in different flowers upon the same stalk*. In such cases,

the flowers containing the stamens are called "staminate," and those containing the pistils are called "pistilate." For example, Indian corn has its stamens in the *tassel*, and its pistils in the *ear-shoot*. The tassel then is the staminate flower, while the shoot, with its silk, forms the pistilate flower; the tassel, with its beautiful, pendulous stamens, and the shoot with its fine glossy silk, present interesting objects of study. (2.) *The staminate and pistilate flowers sometimes grow on separate plants.* Of this we have an example in common *hemp*. A little examination will enable the student to distinguish between the staminate and pistilate plant. The staminate is barren—the pistilate produces seed.

FUNCTIONS OF THE FLOWER.

The corolla is the breathing organ of the flower; but, unlike the leaf, it absorbs large quantities of oxygen, and exhales corresponding quantities of carbonic gas. The same process is carried on to some extent by the stamens and pistils.

The end to be accomplished by the stamens and pistils, is to fertilize the seed. Pollen is produced in the anthers; and by them is so discharged at the proper season, that portions of it fall upon the stigma. The little granules of pollen then burst, and their contents are absorbed by the stigma, and carried through the style to the ovary, where they take part in the formation of the seed. If the pollen is cut off from the stigma entirely (as may be done in an isolated stalk of corn, by destroying the tassel before the silk makes its appearance), no seed can be produced. But if other tassels are near at hand to provide pollen, the stalk may produce an ear without a tassel of its own.

There are certain periods in the growth of crops, when the pollen, and even the stamens, may be beaten off by violent rains and hail, to such an extent as greatly to diminish the quantity of grain which would otherwise have been produced.*

By a wise provision of the Creator, the flower is so constructed that the pollen is readily transferred from the anther to the stigma. When the flower grows erect, like the tulip, the pistil is shorter than the stamen; and the anther rising above the stigma, readily discharges its pollen where it is wanted. So, when the flower droops, as the lily, the pistil is longer than the stamen, in order that the pollen may still fall upon the stigma, (see Fig. 35).

When the staminate and pistilate flowers are on different plants, the pollen is sometimes carried from the one to the other by the wind; sometimes by bees, and other insects.

FRUIT.—When the ovary is fully developed, it forms the *fruit*. The fruit consists of two parts: (1) The *pericarp*, which surrounds the seeds; and, (2) The seeds which contains the germs of new plants.

In the apple, peach, etc., the pericarp is the most valuable portion of the fruit. In cereal or grain crops, the seed is of chief value—the pericarp being the chaff or husk.

The seed may be divided into: (1) The *integuments* (bran), which consist of several layers forming the outer coating of the grain; (2) The *albumen*, which is the white, starchy mass within the integuments; and, (3) The *embryo*, or germ of the new plant, which is also within the integuments, and generally surrounded in part by the albumen.

The albumen constitutes the larger part of cereal grains, and serves not only as food for the embryo plant, but also constitutes a large proportion of the food of man and beast.

DURATION OF PLANTS AND THEIR ORGANS.

When a root or stem lives through only *one summer*, it is said to be *annual*. When it lives through *two*, it is said to be *biennial;* and when it lives through *three or more* it is said to be *perennial*.

The root and stem are often *both annual*, as in flax, hemp, Indian corn, cotton, and tobacco. (2) The *root* may be *biennial*, and the *stem annual*. In such cases the stem does not usually make its appearance until the second season. Examples—the common thistle and winter wheat. (3) The *root* may be *perennial*, and the *stem annual*, as in most varieties of grass. (4) *Both root and stem* may be *perennial*, as we see in trees and shrubs.

*Leaves are deciduous* when they die and fall at the close of summer, or as soon as the plant has reached maturity. They are *evergreen* when they endure until the new leaves of the next growth have made their appearance. It is, properly speaking, the

* The wheat crops, in the summer of 1858, were seriously damaged in some places, by the heavy rains which fell while the grain-fields were in full bloom.

*plant*, and *not the leaf*, which is evergreen; for the old leaves of evergreen plants, like the pine, drop off in the spring, as the new leaves come out to take their place; and thus the succession of leaves keeps the plant ever green.

Climate modifies the duration of the leaf. A plant may be ever green in a warm climate, while its leaves become deciduous when removed to a colder region.

*From the Southern Farmer.*

## Permanent Improvement of Tobacco Land.

*Mr. Editor*—In the last number of the *Farmer*, a correspondent writing from Columbian Grove, Lunenburg county, requests that you or some correspondent would inform him of "the best mode of improving and keeping up tobacco land, and what kind of grass is best to use that will improve the land the most." As this is a subject of much interest to the planter, I hope we shall have the views of many in regard to the best mode of improving our lands, cultivating the soil, and producing such crops as are remunerating. Although unaccustomed to writing for agricultural papers yet I am disposed to communicate my views and experience on this subject, which, if you think worthy, you are at liberty to publish.

In order to facilitate the improvement of our lands, it is important that our farms be divided into five shifts or fields, to be cultivated somewhat after the following order; 1st year, corn and tobacco; 2nd year, wheat and oats; 3rd year, clover or other grass; 4th year, wheat on fallow, 5th year, pasture. On every farm there should be kept as many cattle as can be wintered. These should be penned regularly during the summer, taking care to move the pens as often as every 10 or 12 days, on land intended for tobacco the next year, which should be the poorest land in the field. New lots should be made every year as large as the means of manuring, or the size of the crop may require. All the manure that can be made during the winter and spring, either by hauling litter into farm pens, or composting on the land, should be applied. The land should also have an application of guano just before planting. Land thus treated will seldom fail to produce a good crop of tobacco. After the tobacco is removed, the land should be seeded in wheat, and one gallon clover seed per acre sowed and harrowed in about the first of April. If we succeed in getting a stand of clover, which we may reasonably expect, this land, which before was poor, may now be said to be permanently improved. After standing one year in clover, the land should be fallowed for wheat. We have known land thus treated, to yield from 15 to 20 bushels of wheat per acre, which before, would not have made 3 barrels of corn. On all corn land that will produce it, clover should be sowed to be fallowed as before directed. But as a general thing, clover will not grow on ordinary corn land, even after an application of guano. On such land as this, we would sow herds grass, which, when once we can get a stand, will act as a permanent improver. Land sowed either in clover or herds grass, should be grazed very little the first year. We have found the pea fallow to succeed very well, but as a general thing, it is too expensive and requires work at an unseasonable time. By pursuing the system here recommended, I think that instead of finding tobacco an impoverisher, we will find our lands improving annually. No lot land should be cultivated in tobacco more than one year, until it has gone through the regular rotation. By this means we shall be improving more land, besides adding to our wheat crop. I know that this system has objections, such as the inconvenience of having our lots so far from our buildings, the inconvenience of making and hauling manure, &c.; but I am satisfied that the benefit and advantages derived from it will more than repay us. Hoping to hear from others on this subject, I will now close this imperfect sketch, as I may, perhaps, refer to it again.

J. G. P.

*Forkland, Nottoway*, June 15, 1859.

## Life Without Trials.

Would you wish to live without a trial? Then you would wish to die but half a man. Without trial you cannot guess at your own strength. Men do not learn to swim on a table; they must go into deep water, and buffet the surges. If you wish to understand the true character of your boys—if you would know their whole strength—of what they are capable—throw them overboard! Over with them!—and if they are worth saving, they will swim ashore of themselves.

*From the Report of the Commissioner of Patents for the year* 1858.

## Considerations on the Causes and Effects of the Diminution of American Crops.

Notwithstanding the natural fertility of a large portion of the surface of the United States, a fertility which is acknowledged to be superior to that of any country in Europe or Asia, the average arcable product of the soil is much below that of some countries in those regions. China, for instance, which supports a population estimated at 300,000,000, or ten times that of the United States, upon a *cultivated* surface probably not three times greater than that of this country, must produce about three times as much to the acre.

France, with an area less than one-fourth that of the settled portion of our territory, has a larger population, proving that its soil produces much more than ours.

England and Scotland, the soils of which are far from being naturally of a first order of fertility, must raise enormous amounts of life sustaining products, as is exemplified by their large population.

The same might be said of Belgium, and of several other countries.

It seems to be that few questions could be more interesting to consider than to investigate the causes and possible remedies of this state of agricultural inferiority. And let me here at once remark that it is lamentable and humiliating that it should be necessary to discuss such a topic as the exhaustion of *American lands;* of lands of great natural fertility, which have not been in cultivation, on an average, for half a century, while soils, not naturally more fertile, are known to have been in culture in Europe for at least 2,000 years, and in China for a much longer period, yielding at this day, far larger returns than do our own lands which are, as it were, fresh from the creation! It is my belief that the main cause of our inferior production is to be found in the sparseness of the population. There are undoubtedly several others, but they are nearly all more or less dependent upon this first and principal cause. I would add that as the population of the United States is increasing at a ratio probably unprecedented in the history of man in so extended an area, we have every reason to hope that the evil is constantly and rapidly being corrected.

As long as there shall remain vast tracts of unoccupied virgin soil, of exceeding fertility, to be had for a low price, so long must agriculture be carried on in a loose and careless manner, particularly in the neighborhood of those lands. If this be denied to be the cause, we must ascribe the fact to other influences; but what other cause shall we name? The fertility of American soil is proverbial, and we therefore cannot look for the deficiency in that direction. Neither can we ascribe it to the climate, for although our winters are severe at the North, yet our summers are genial, and sunshine and rain fall upon the land, and forward the growth of plants as beneficently here as in any other section of the earth. Nor can we find the cause in our political institutions, for they are acknowledged to be as paternal and as liberal as any ever devised for the welfare and happiness of man. Neither can it be found in our religious institutions, for I believe no other people are so free in this respect as those of the United States. Nor yet in exorbitant and discouraging taxation; in this particular we are more favored than those nations which surpass us in the comparative amounts of their products. It is thought by some that one great reason is to be found in the absence of sufficient protection to American industry, and the consequent tendency of too great a proportion of our people, who otherwise would pursue other employments, to seek their support in the cultivation of the soil. There may be something in this, and it may be one of the causes, but yet I do not think it the greatest; for, suppose the population of this country to be proportionately as large as that of France or of England, every one at once perceives that then the tariff question would only be important as affording means to keep the governmental machinery in motion, and could not have a very serious bearing upon the agricultural production of the country. As it is, however, that question is undoubtedly important to us, until our population shall become thus large. Among other reasons, one is that the most profitable farming combines various kinds of produce, many of which are of such character that they must be consumed at or near home, as they will not, by their intrinsic value as compared to bulk and weight, bear transportation to any great distance, or cannot safely bear transportation at all. In either class would be found many of the articles which help to make up the farmer's profits, such as eggs, poultry, milk, butter, hay, all the articles

comprehended by the general name of *vegetables*, tender fruits and several kinds of grain, which it is here unnecessary to enumerate. These never pay unless there is a demand for them at or near the place where they are produced. Without such a demand, it is unprofitable to cultivate these articles at all. Thus we are debarred from growing the very articles which would be least exhausting to our lands.

Probably the worst effects of our system of exchange of products, with few exceptions, with other nations upon the agriculture of this country is, that in return for their goods, which have great value in a a small bulk, we annually send to them thousands of tons of highly fertilizing elements which a wise system would require to be returned to the land for repeated production.* Other nations, England especially, imports, at great cost, guano and other fertilizers, the expenditure for which is well repaid; while we, boasting the richness of our so-called inexhaustible lands, are blindly shipping away a constant stream of the most concentrated and valuable manures in the form of cotton, tobacco, wheat and Indian corn; and while they, with sedulous care, are constantly making their naturally poor lands richer, we are every year rending our rich lands poorer.

However large may be the individual profits accruing from such a foreign commerce, the nation must be a looser; for, agriculturally speaking, other nations are constantly adding to their capital, while we are surely, and more rapidly than is generally believed, growing poorer and poorer—we reap the shadow, they harvest the substance.

I have said that the main reason of our agricultural inferiority was to be found in the sparseness of our population. Now, it is evident that if the density of that population were three or four times greater, or even six times, as will eventually be the case, the home demand would absorb a much larger proportion of the agricultural products of our land, if not the whole of them, and the exhausting tendency of our foreign commerce would then be obviated, or least greatly lessened. And here we may observe that the most populous countries of the globe never export breadstuffs or other agricultural produce to any great extent, but rather import them, their exports consisting mostly of manufactured articles, in great part derived from the bowels of the earth, or, if produced by agriculture, the greater part of their value being conferred by mechanical labor.

The Western States have few manufacturing establishments, certainly not sufficient to consume any considerable portion of the surplus of Cereals and other provisions; consequently, they have no home demand, as in populous manufacturing districts. A large portion generally remains after supplying the domestic consumption, which must seek distant markets; the greater part of which goes to Europe and other foreign parts. Agricultural produce is bulky, and cannot be transported four or five thousand miles, partly inland, without reducing its value to a comparatively low price where it is raised. This is one of the principal causes of the present depressed state of the agricultural interest in the West; and as long as this cause remains active, so long will there be a lack of inducement for Western farmers to make the earth yield supplies to its utmost capacity. At the same time that the want of home markets keeps the price of Western produce down, (except when European crops are short,) the cheapness of Western lands prevents the wages of labor being lowered to a price corresponding with that of agricultural commodities; for when laborers do not receive sufficient wages for their services, there is to them a remedy in the public lands, from which they can pre-empt a farm upon one year's credit, or, if they have savings, they can at once purchase homesteads. This state of things, happy as it undoubtedly is in one sense, by giving facility to the poor man to secure a farm, has, however, this bad effect upon the agricultural improvement and thorough culture of the soil, that, by keeping the price of labor at a higher point than the productive value of that la-

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*The amount of breadstuffs of all kinds, exclusive of rice and potatoes, imported and exported from the United States during the fiscal year ending June 30, 1858, are as follows:

| | |
|---|---|
| Foreign imports free of duties | $5,395,933 |
| Foreign imports paying duties ad-valorem | 95,964 |
| Total imports | 5,491,897 |
| Domestic exports | 33,698,490 |
| Foreign exports | 21,517 |
| Total exports | 33,720,007 |
| Excess of exports | 28,228,110 |

bor warrants, it causes the farmer to cultivate a large surface of land as cheaply and rapidly as possible, rather than a smaller surface in a slow and thorough manner; the interest on the capital invested in the land on which the crops are raised being comparatively a secondary consideration, for the cost of the produce is almost entirely made up of the labor expended in producing it.

In densely-populated countries this order of things is reversed. There the land is so extensive that it seldom yields more than 3 per cent. upon its cost, while the wages of labare low on account of its superabundance. Therefore, the land owner must, from necessity, maintain the fertility of his fields by exacting for them the most complete culture and the highest manuring, which he is enabled to do by the cheapness of labor and the high price he can almost invariably obtain for his products.

I have said that the American farmer is compelled to cultivate as large a surface as he can. This necessity is attended with another evil, which greatly detracts from the general production, namely, the scarcity of laborers at harvest-time, which often makes it impracticable for him to secure his grain or hay as well as he would, had he abundant labor at his command. Our harvest-fields are frequently made, from necessity, a sort of race-course, where every man strives with his neighbor to reap or bind fast, regardless of the large proportion of grain, sometimes amounting to one-eighth, or even more, of the whole crop, which is wasted or lost. In Europe, everything is saved, mostly by the farmer, but also by the poor people and children who glean every ear which has escaped his careful gathering. Our comparative deficiency of production is made to appear, by this cause, even larger than the reality. Another consequence of the scarcity of labor is, that, in general, our lands, not being so well prepared for the reception of seed, a greater amount is required; making probably a difference of half a bushel of wheat per acre. This, trifling as it may seem, must make a difference of at least 3,000,000 bushels in the aggregate production of the United States. Much more seed might be saved by the use of drilling machines, which, leaving the grain at equal distances in the ground, will seed it sufficiently, and better than could be done by hand, with about one-quarter of the amount usually put in. Such machines are deserving of all favor, when we reflect that their use largely enhances the crop, and that seed wheat absorbs every year about one-eighth of the produce of the preceding season. Their general introduction would probably save 12,000,000 bushels of wheat annually, which, being already earned, and passed contingencies of seasons or other risks, would represent at least 18,000,000 of bushels in prospect.

In the United States, we have decidedly better harvesting weather than they have in Western Europe, yet, for want of sufficient help, with large amounts of grain and of hay exposed to storms, a much greater proportion is injured or destroyed from wet here than there. Many million bushels of grain are yearly lost in the United States from this single cause. However, the recent introduction of reaping machines, which save the grain as perfectly as could be done with the most careful hand-labor, and at far less expense, is doing much to remedy some of these evils, where the nature of the land is such that they can be used; that is, where neither stumps nor stones stand in the way. These machines performing with five or six men as much work as double that number could do without them, have the effect of making laborers more abundant at harvest-time.

Another injurious consequence of a sparse population is an excess of birds and wild animals, which prey upon the husbandman's crops, fruit, poultry and stock.

Generally, American farms are undoubtedly too large, especially at the West, for them to receive the high culture required for their production of so large a yield to the acre as they are able to produce. Too much is attempted, to be done thoroughly. Manure collection and the preparation of composts are not so much attended to as they deserve. We rely too much upon what we are pleased to term the "inexhaustible fertility of our soil." I am told that some forty years ago, the French settlers about Detroit were in the habit of depositing the manure that accumulated about their stables, in large heaps upon the ice of the river, which was the most expeditious way of getting rid of what they deemed a nuisance. Others thought it cheaper to remove the stables themselves rather than the rich heaps which obstructed access to them. I have seen in Wisconsin what I consider a scarcely less objectionable practice, setting fire to the straw after the grain has been threshed—a practice which

is still prevailing to some extent on the prairies. A more exhausting and ruinous course could hardly be imagined. The consequence of all this is, that our lands, which, under proper management and a judicious rotation, would be capable of yielding average crops of wheat of 25 to 35 bushels and upwards to the acre, seldom realize, one year with another, more than 14 bushels—a sad state of things, when we reflect that the average yield of naturally poor soils in England and Scotland is not less than 33 bushels.

A want of system in the distribution of the labors of the farm, and in the application of the principles or dictates of true economy, is so evident everywhere at the West, that the mere mention of the fact is sufficient to entitle it to be classified as one of the causes of our agricultural deficiency.

Everything considered, sheep are perhaps the most valuable of the domestic animals reared on our lands, on account of their little cost and large returns, and also by their improving greatly the land on which they graze. How, then, shall we qualify the fact that many of our prominent farmers have been compelled to abandon this branch of industry on accounts of the depredations of dogs and wolves? This evil demands the interference of State legislation.

Another defect in our agricultural practices is the apparent absence of a knowledge of causes and effects which generally prevails. As long as the land under tillage seems capable of producing the few articles which are raised by farmers here, mostly wheat, corn, potatoes, and oats, so long are they entrusted to the soil with the expectation that the yield will be as large as when the land possessed its original fertility; and when, as is almost sure to happen, the expectations formed are not realized, the blame is laid to the extreme dryness or moisture, to heat or cold, or perhaps to the baneful influence of the moon—to everything in fine, but the true reasons, neglect to restore to the land those elements of fertility of which the soil has been robbed by former crops, the want of sufficient tillage, and of proper ration.

In view of the rapid impoverishment of our lands, it does not require prophecy to foretell that, if the destruction of the human race is ever to take place, it will surely come by the absolute exhaustion of the elements of vegetable productiveness in that land which a beneficent Being has given us for an abode and an inheritance. It will surely come when the earth shall be barren and desolate, made so by the sordid avarice of the very men who had the mission to adorn it and make it fruitful. It will come through the *starvation* of the last descendant of Adam in the last once fruitful and smiling, then barren and desolate valley.

It would, indeed, be a singular fact, if it were true, that out of the many varieties of plants which the earth produces, only four or five could be raised with profit. In reality wheat and corn are about the only articles which are thought to be capable of profitable transportation to an Eastern market; the Western farmer, whose groceries and dry goods almost invariably come from that quarter, is obliged to raise these two staples, which nearly alone supply such an exchange. This commerce, for many causes, has a tendency to keep the Western States poor and to depress their agriculture.

In spite of these drawbacks, how much cause we have for encouragement in the present, how great reason to hope for the future! Let us but think of what has been achieved in the past—how many cities have been built——how many millions of acres have been subdued and made to contribute to the comfort and happiness of man within a single generation. Would it be reasonable, even in this fast age, to be dissatisfied with vast and valuable results—far outstripping those of any century since the creation of man—because we have failed, as yet, to equal the degree of perfection attained in countries having for their inheritance the accumulated capital and labor of centuries? Surely not. Everything cannot be done at once. Agricultural perfection is the work of time. The forest must be cleared; the stones be removed; the sod broken; the marsh improved; the swamp drained and reclaimed; buildings erected; fences built; roads opened and made passable; school-houses constructed and endowed, and agricultural science disseminated among the people.

The Annual Reports of the Patent Office and the agricultural papers throughout the Union, are doing much to promote rural industry, and make known the various defects of our practices. But they are hardly sufficient. A more permanent good could be done to the rising generation by the establishment, in every State, of an agricultural college with an experimental farm, endowed with sufficient liberality, where farming could be taught, both as a science and as a me-

chanical operation—where theory should be constantly confirmed by practice. In these institutions, many plants may be cultivated; native grapes, for instance, which, resisting the severity of our winters, might, by proper management, be made to produce wine with certainty, without danger of being killed by frost; an experiment worth trying, but which few individuals would undertake on a sufficiently large scale, for fear of want of success and consequent severe loss. Many other experiments might be mentioned, which, if successful, would greatly add to the wealth and comfort of the people.

It may not be out of place here to observe that the nations which thrive most by their agriculture are those that cultivate the greatest variety of products; for, when one article fails, another may succeed and make up for the deficiency. A season may be unfavorable for wheat or potatoes, and good for corn; or unsuitable for the three, and yet good for fruit, vegetables and grass. Hence the people who cultivate the greatest number of staples, have probably seldom, if ever, occasion to lament, as we sometimes do, an almost total failure of crops. At any rate, one important point would certainly be gained; that inasmuch as farmers are predisposed to follow a routine from which it is difficult to move them, their children, educated at these agricultural colleges, would work by the teachings of science or common sense, and better methods than now prevail would be certain to be speedily adopted. These institutions, with their libraries and other appendages, would remedy a great evil among us, who are, properly speaking, an agricultural people. In general, the agriculturalist is not so liberally educated as men belonging to other professions, although probably no other calling really requires such extensive and varied knowledge of the laws and secrets of Nature.

## Barns and Shelter for Stock.

Mr. John Johnson writes to the *Ohio Farmer* as follows:

In traveling through your State last August and September, I seldom if ever saw a barn for grain or hay, or even a shelter for cattle. This I think very bad economy. There is a great waste of grain from letting it stand in shocks. I was told it stood thus even for months, until the farmers got time to thresh it, and then I was told they generally took the straw away from the machine by horse rakes, and left it laying in heaps on the field to rot. The hay put in barns would be a great deal more profitable to feed than when put in stacks. I think barn hay is worth one-half more than stack hay, to feed to either cattle or sheep, when put up in stacks, especially such small stacks as I saw in Ohio, the majority containing not over from two and a half to three tons. If farmers will stack their hay, why not put from ten to thirty tons in a stack, and then, if properly put up, there would be much less waste. The stacks would be more solid, and excluded from the air, which almost ruins the hay in these small stacks. If the hay was cut earlier, and put in large stacks, it would be much better; but houses for both hay and grain soon pay for their cost, which I know from experience. Then their poor cattle and sheep have no shelter in winter, but have to stand out in all storms, and often to lay in snow, with the thermometer at from twenty above to twenty below zero. This appears to me to be very unprofitable to the owners, and unmerciful to the dumb brutes. If they would erect good sheds for their sheep and cattle, and barns for their grain and hay, then they might keep their stock as it ought to be kept, and make large quantities of valuable manure, and I am much mistaken if a great deal of the land in Ohio does not now need manure nearly as much as we do here. I did not see a manure heap in Ohio, only where cattle had stood or been fed in the woods, and the manure left there to waste. I noticed, I think in the *Cincinnatus*, (which some person kindly sends me,) that large sums have of late been expended in Ohio in building churches and school-houses, which is very laudable, as a State without education and religion can never prosper; still, with the thermometer at zero and my cattle and sheep exposed to the pitiless storm, I don't think I could sit very comfortably in a church, no matter how elegant or how comfortably warmed, even while hearing the most eloquent preacher.

Every few years we read of great mortality among the cattle and sheep in Ohio, and it never will be otherwise until they are better cared for in winter. No doubt some may say, who is this that dictates to us? we know our own business; or even some may say, what right have I to judge them? I

would tell them, I have long been a thinking, working farmer, and know from practice what I write about. I have for over thirty years endeavored to improve the condition of my brother farmers, and I well know that good shelter and good feeding are the only way that farmers can be remunerated by keeping stock. True, for some years past, they have brought high prices, and even if kept in bad condition they might pay, but prices have been going down for some time, and may continue to do so until they are as low as they were fourteen years ago, and then "scallawags" would not pay for taking to market. When I first began erecting sheds here for my sheep, there was nothing of the kind in the country, and gentlemen whom I looked upon as men of good judgment in many things, told me it would be money worse than wasted, as my sheep would not thrive in yards and sheds, which were not congenial to their habits. I answered that I could give them their choice; if they liked better to be out, they could go. Now you very rarely meet with a farmer any where in this State, at least where I have been, but has shelter for his sheep and cattle in winter. Only apply thought and observation, farmers, and you will soon see the necessity of shelter for both sheep and cattle. Take out some straw in a cold morning, and throw it down among your sheep and cattle, and see how they will fight for the liberty to lay on it. This must convince any man that shelter and a good bed are important.

## To Prevent Rats Undermining Cellar Walls.

The stability of cellar walls is sometimes seriously affected by rats digging underneath them and thus weakening the foundation. In order to prevent such injury, after the cellar walls are completed and pointed, you must dig a small trench inside of them, about one foot wide and half a foot deep. Now fill this trench nearly full of small stones and water-lime mortar; then cover the stones and mortar with the earth taken from the trench. If thus you guard the bottom of the walls, you will find all the efforts of rats at undermining to be utterly vain; they will have to go sneaking out at the very door or hole by which they entered. Some people say that rats from the outsides dig down under the wall, and thus under the cellar; but this is a mistake. The fact is, they enter the cellar by the door or some hole, and then, if this entrance is closed against them, they dig a passage out under the wall. Such passage they cannot make if the inside trench is as described, as they always begin to dig close to the bottom of the wall; and hence, when they encounter the stones and mortar, they are disheartened and abandon the undertaking. If plank close to the wall should lie on the cellar bottom, they will commence digging at the inside edge, although it be a foot or more from the wall. If a quantity of potatoes should be piled up in the middle of the cellar, the rats will begin to dig under the pile, or even under the bottom of the chimney, perhaps instinctively expecting thus to work their way out. But to guard against their digging operations cover your cellar-bottom with a thick coating of water-lime and sand, and the saucy depredators won't trouble you any more.

[*Rural American.*

*For the Southern Planter.*

## Rainy-Day Thoughts.

### ON RAISING HORSES AND MULES.

It is a rainy day—*mirabile dictu!* The clouds that lower over our heads have been for a long, long time, "in the deep bosom of the ocean buried." The corn fields attest the withering effects of protracted drought. Welcome, thrice welcome to the farmer, is the refreshing shower. Even if too late to revive the wilted corn, it is not too late to restore to an arable condition the parched earth, and measurably to relieve the faithful horse from the sore toils of the fallow-field, always exhausting, even under the most favorable circumstances. Indeed, at this season of the year, throughout this section of Virginia, we always find our horses, for the most part, in low order. This is, to some extent, attributable to the extreme heat, and to the length of the days, but chiefly to our negligence in not providing them of sufficient size to fit them for such heavy work. For instance, of nine work-horses of my own, the largest are fat, while the small ones are all poor, and I think any observant farmer will find his own stock in the same condition. To remedy the evil, I propose that proper attention should be paid to the selection of our stock of brood

mares, remembering that, by their good form and gentle disposition, they should be well adapted to breeding for heavy draught purposes, and of course, that good size, large bone, and muscular power are all important. They should not be too compact. They should have an eye of a yellowish cast of rather oblong shape, a placid countenance, and a quiet disposition. These characteristics secured, we should then have the material to build upon, and by patronizing horses of the same general character, but with sufficient compactness, we could rear such animals as would turn our soil with more uniformity, at greater depth, with more ease, and at less cost. Such a line of conduct pursued by the farmers in the Valley of Virginia and that of Pennsylvania, has given their horses a world-wide reputation for all the properties of a first class draught horse. Even the most indifferent are brought into this Piedmont country and sold at figures 20 to 50 per cent. higher than our own stock; though we have paid in many instances as high as fifty dollars for the getting of our foal, whilst the farmer in the Valley has paid a barrel of corn or perhaps (which is frequently the case,) has a stallion of his own which he uses ordinarily as one of his work-stock, and breeds from him without any expense. These are facts which should open the eyes of our own farmers to the subject. Instead of rearing colts from small mares by thorough bred horses at a cost per season of twenty-five to fifty dollars, with all the uncertainty of getting a colt, we should be regularly sending off all our small stock to a market within a sandy soil where small horses answer well the purposes of the planter or farmer, and supply their places as fast as possible with brood mares of large size.

We rear horses for profit, yet it is as strange as true, we are large contributors to the capital of Kentucky, Ohio and Pennsylvania for mules and horses. This is a tax, important in itself, and should find a corrective. We have no statistical information upon which to base a correct statement of the amount. We are, however, aware of the tax, and each farmer will find in the future, (if he does his duty,) some way to remedy this species of taxation.

With large mares put to large horses, or (which is more profitable) bred to jacks of your own raising, or buying one for your own use, and permitting him to go to but few mares, you would greatly increase the chances of getting colts and save you from the enormous tax paid to Kentucky for her most worthless mules annually sent to our market. Your colts would cost you by this system comparatively nothing. There would be almost a certainty each year of a colt with much less liability to lose the mare than in breeding colts from the horse. The size of the jack is of secondary importance, as the mule partakes more of the size of the dam than of the sire. The mule is much less subject to disease or accident than a horse; is more hardy, matures and is ready for labor much earlier, and commands at two years old, from one hundred to one hundred and fifty dollars.

For us of Piedmont to succeed in rearing mules and colts, not only for home use, but for the markets of adjoining States, is but to will it, to know no such word as can't. It can be done, and done more profitably than by the grazing of cattle at a profit of from ten to fifteen dollars per head. So let us to the work: we have commenced the breeding of sheep; our flocks are equal to any in the union for size, fleece, and health. Our cattle are of the best breeds; our hogs are far-famed for their sweet and juicy hams. The factories of this region already consume a considerable portion of our wool, and they are growing in importance every day, and that too without asking any special bounty at the hands of Congress for their fabrics. Indeed, we are equal to any enterprise, and should never halt until we rid ourselves of this very unnecessary tax levied upon us by our sister States for work-teams. We, the farmers of Piedmont, have everything to encourage us in our pathway of improvement. Let us then put, and keep the ball of enterprize in motion in every department. We have title deeds to a country between Tide-Water and the Blue Ridge replete with all that heart can desire, combining more advantages with fewer objections than any part of our blessed country. Its water is plentiful and of the purest—its health unsurpassed. Contiguous to the best markets of the Union—with an adaptation of soil to the greatest variety of products—with an educated, refined and law-abiding people, whose veneration for the Union is unsurpassed by any portion of the thirty-four States. With such blessings conferred upon us, what can Piedmont not be in a generation to come?

Let her young men first remember that improvement is the word, and that their education has just commenced when they step from the threshhold of college upon the great theatre of life. Let them abbreviate their moustache to a point of neatness, and use their hands about something more profitable than stroking it and twisting it into a spiral shape with a gentle turn of the digets, in order to save them from masticating this ornamental part of the animal. Let them lay aside their cigars and forget their toddy. Let them remember, a pack of cards is the devil's book—cease its study, or it will prove their ruin. If such follies may have been taught them at college, they certainly were not at home. But discarding all such follies, let them learn to handle the hay-fork and the plough-handle, not that it may be necessary to your support only, but that such labor constitutes the practical education, without which all their beautiful theories will avail nothing. So let me suggest to the young men especially, those who have been pampered in indolence and the neglect of business by indulgent parents, to lay aside their follies that they in their day and generation may add another stone to the monument already commenced, which shall commemorate the enterprise, the thriftiness and the virtue of the present generation of Piedmont. ORANGE.

*For the Southern Planter.*

## On the Improvement of Poor Land.

MR. EDITOR:

Having been for many years a farmer on a moderate scale, cultivating land generally poor—some by nature and some from a bad system—I have great interest in the improvement of our poor lands in Eastern Virginia where I reside, and with which portion of our State only am I well acquainted. Below us, our brother farmers, many of them at least, have marl in abundance, and if they do not improve their lands, it is owing to their neglect of the writings of Edmund Ruffin on Calcareous Manures. But we have no such opportunities, unless at an expense which we believe too great to be borne with regard to present or even ultimate profit. The lands in our region differ materially in quality, and are consequently affected differently by the same fertilizers, more especially by gypsum or plaster. On some parts of the same plantation its effects on clover are perceptible on a few spots in a very remarkable degree, while on other spots I have not been able to discover any noticeable effect upon vegetation. This, then, can only be partially used as a stimulant or fertilizer. Lime has been but little used in our neighbourhood. Some say they see little or no benefit arising from the small experiments made with it; others speak well of it, but think the cost, to us, is too great to be extensively used for the benefit derived from it. I have made a few experiments with it, upon a small scale, but have never been able to discover any decided benefit from it until recently, and that on a peculiar soil consisting of very light, black alluvion, coloured, no doubt, by the standing water, (stained with the leaves of trees and shrubbery,) within the basin or pond in which the soil was deposited, and for which water there was no outlet for centuries, nor until the land was ditched and cleared perhaps seventy or eighty years ago. This land though often cultivated in corn, wheat, and oats, never to my knowledge produced a good crop of either. The land after being plowed up is as light as a bank of ashes almost, and looks remarkably rich. It produces briars and sorrel in abundance.

A few years ago I set fire to a kiln of about two hundred bushels of oyster shells, but soon after a very heavy rain commenced, and continued to fall so that much of the lime was imperfectly burnt. I however beat up the half burnt shells, and mixed all together and spread it on land plowed for corn. The lime extended a short distance into the edge of this pond; the balance, or much the greater part of the pond or basin, had no lime, but instead of lime a mixture of Mexican and Peruvian guanoes was applied I saw little or no difference in the product of corn; yet the limed corn was a shade greener through the season, and there might have been a little difference in the size of the ears in, favour of the limed, but if there was any difference in the size of the stalks, it was in favour of the guanoed.

The following spring the whole was seeded with oats, and after harrowing them in, with clover also. The corn rows ran on the adjoining higher land down through the pond. Last summer, 1858, the oats were cut, and it appeared that although the whole

oat crop was light, (partly from the season,) yet the clover seemed to take well. I observed last fall that the clover on the high land, both guanoed and limed, was quite good for such land, but as soon as I reached the pond, the clover was much better on the limed side of the line than it was on the guanoed; the surface was freer from volunteer grass and weeds,—and what I wish to be particularly noted is, that *I saw scarcely a sprig of sorrel on the limed part*, and an abundance on the guanoed, distinguishable to the very line, which line had been marked by a blazed tree.

At this time, April 24th, 1859, I can see little or no difference in the growth of the clover on the high land, but as far as you can well see it, the clover in the pond is far better where the lime was spread than where the guano was used; in fact, the clover and the part not limed seems to be nearly destroyed, and weeds and sorrel have taken possession, while but little sorrel or weeds are to be seen on the limed part.

But to return to the subject of the improvement of our land. Generally, in my neighbourhood, the permanent improvement of land seems to be but little thought of. To make the most that can be made with guano, seems to be the ruling passion. Corn, wheat, and tobacco are our principal crops—with some oats. I have been a little amused often, and I must confess a little sorry too, when I hear of Mr. Such-a-one having a splendid lot or crop of wheat, the best in the whole neighbourhood, the owner showing it with the greatest complacency, as if he deserved a medal for his art in agriculture; while at the same time if you should turn your head to the right or left, you may behold the signs of Virginia farming given in, I think, one of Governor Wise's Anti-Know-Nothing speeches.

I will not say that the use of Peruvian guano, as it has been practised among us, does not and has not, to some extent, improved our lands. I think I have seen its good effects in some neighbourhoods on extremely poor land. I feel very much tempted to tell an anecdote about one of these great crops of wheat; but lest the joke might reach the ears of my friend I desist.

I come now to the point. What must we poor-land farmers do to improve our lands permanently, paying heavy taxes, and living with tolerable comfort while we are about it? I once (some thirty odd years ago) asked such a question of the venerable Editor of the Farmers' Register. I think he recommended lime. And were I to ask him again, he would probably say lime! Whether he would or not, I should like to hear from him on the subject. The want of a good *system* is the difficulty with the farmers in my neighbourhood. What shall that be? It must be an *easy* one, or only a few will follow it. It must be IMMEDIATELY remunerating; if so, many will spend money freely, as is proved by the very liberal outlays for guano. The same system may not be equally well adapted to all soils, even in the same district of country, as is seen in my experiment with lime above detailed.

The great difficulty with me in improving my land has been my stock. I have only five fields for regular rotation, and with my present system, which I know is a very bad one, I am compelled to graze a clover field the first year it comes to perfection. This is death to the clover and land both; therefore, for my wheat crop, which is a fallow of the second year of clover on the same field, I only improve the land by the application of guano. I do not, however, confine myself to Peruvian, but come as near lime as I can, by mixing two parts of Mexican, containing from 54 to 63 per cent. bone phosphate, with one part of Peruvian, at about the rate of 80 lbs. Peruvian to the acre. I have generally made very good crops of wheat with this mixture, and the quality excellent,—without some disaster, such as joint-worm, chinch-bug, or, as last year, blight, scab, or whatever else you may call it.

You see, now, that my five-field system is wheat, corn, oats, clover two years, &c., &c. I believe grazing closely very injurious to lands which are extremely poor, while we are attempting to improve them. I believe without grazing we may make lands quite productive in a few years, with Peruvian and phosphatic guanoes mixed, or good phosphotic guano alone and clover, with good plowing. I will give a sample from memory. Near the dwelling in which I live, built some ten or twelve years ago, was a piece of land, just before my eyes as I now write, excepting a spot about the middle of it, where there stood years before an old dwelling. It was as poor a piece of land as I ever saw. The hen's-

nest grass grew very thinly, and hardly at all on some of it. It had been exhausted by long cultivation and grazing without manure. (This lot of land is not a part of my regular shifts, so I could manage it as I pleased.) It was plowed up and cultivated in corn. Of course there was not much corn made, except where the old houses had stood. Just at that time—perhaps the year before—a little guano had been used in the neighbourhood. I concluded after cutting a very poor crop of oats, following after the corn, to fallow it the same summer for wheat, and to use Peruvian guano upon it. Peruvian guano then sold for about fifty-three or fifty-four dollars per ton in Baltimore. I put on it about 280 lbs., which cost me about $7 50 per acre. I made by measure about twenty bushels per acre, and sold the wheat at $1 25 per bushel. I seeded clover on the wheat in the month of February. The clover, however, did not succeed. I cut only a few of the best spots, and that from necessity, the second year. I had been convinced that phosphate of lime would be more likely to improve the land than Peruvian guano; so, in the fall of the second year of the clover, I fallowed the land for wheat, and bought Mape's Superphosphate of Lime, at about $50 per ton, and put at the rate of $12 50 of that per acre, and seeded nearly two bushels of wheat per acre. I made about twenty bushels of wheat per acre; but the wheat was not so large and tall, nor were the grains so large as the first. I sold that wheat also for $1 25; and renewed the clover. After standing about two years, it had a considerable coat of clover, and running briars were very plenty; I concluded to fallow and cultivate in corn. I did so, and it was a very good crop. I made a little over four barrels per acre. I then seeded in wheat, spreading Mexican guano alone. The wheat crop was ruined almost by chinch-bug. I suppose I did not make over five bushels per acre, and the wheat indifferent. I seeded timothy, but it took badly. Last fall, 1858, fallowed for wheat. It was as much as I could do on much of the land to turn under the coat of clover and weeds with Watt's No. 12 and 13 plows, with three mules to each. A corner of the lot, about four acres, was cultivated in tobacco. The whole lot at this time is in wheat, and is just before me as I write; and though late, looks very well. No guano put on the land, except near the edges a little was spread where the land appeared poorest.

I should not omit to say here, that this lot of land is naturally of inferior quality, as the amiable James M. Garnett once said about another tract, it was "*born poor.*" Had this land been as closely grazed as my rotation shifts, I doubt whether it would have been anything like as much improved as it is.

Yours, THOS. B. ANDERSON.

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*For the Southern Planter.*

## Experience in the Use of Fertilizers.

KING WILLIAM Co., Sept. 6th, 1859.

*Mr. Editor:*

It is so seldom that my name or that of any other farmer from the county of King William is seen in the Planter, that I hope you and the kind readers of your invaluable periodical will pardon me for a few remarks, in which I wish to give my observation and experience as to the use and comparative effects of various kinds of fertilizers, artificial and natural.

When Peruvian Guano was first introduced in this country, its superiority over all other manures was not questioned, and the farmer bought it at a remunerating price. In consequence of the increased demand for the article, and the monopoly of sale held by the Peruvian Government, the price rose—several other guano deposits were discovered in the meantime, but upon analysis none were found so rich in ammonia as that brought from the coast of Peru—and hence did not meet with so ready a sale. At this juncture the manufacturer steps in between the grumbling farmer and the Peruvian Government—and says to him, I can sell you a compound fertilizer at a reduced price, in all respects equal, if not superior to Peruvian guano.

Messrs. A., B. & C., advertise for sale "Manipulated Guano," warranted to contain 8 per cent. of ammonia, and from 40 to 50 per cent. of phosphate of lime, and equal to any fertilizer ever offered in market.

Messrs. D., E. & F., invite the farmers to buy their "Phospho-Peruvian guano," (warranted to contain 8 per cent. of ammonia and 45 per cent. of phosphate of lime) in preference to Peruvian because less costly, more permanent in effects, &c.

Messrs. G. and H. call the attention of the farmers particularly to their regularly analyzed and warranted article called "Super-Phosphate of Lime."

Some samples of the above fertilizers are analyzed by scientific men, and found to contain the per cent. of ammonia and phosphate of lime, or other ingredients that the manufacturer warrants them to contain.

Now I appeal to you fellow-farmer to say if, under existing circumstances, you are not bewildered in your choice of a fertilizer that will, most probably, increase your crops and add fertility to your soil. If you will follow my advice you can be relieved of your bewilderment without any risk. I would say to you, *purchase a fertilizer neither of Messrs. A. D. or G.* or *of the Peruvian Government;* but *pursue the five or six-field system of cultivation,* and buy *lime (if accessible) and sow peas and clover.* By this judicious mode of farming you will not only increase the productiveness of your land, at comparatively little expense, but vastly enhance the value of it, so that your children and grand-children may reap an abundant harvest, and look back with pleasure and pride at the husbandry of their forefathers.

Suppose your soil is deficient in calcareous matter, as is the case with most soil in this section of Virginia, and lime or marl is not accessible. In this emergency I would say to the farmer (provided he has much poor land like myself) *buy sparingly* of some kind of fertilizer. What kind of fertilizer he should buy I am somewhat puzzled about giving advice; but will give my observation and experience, and let him decide for himself—and first, as to DeBurg's superphosphate of lime. In the fall of 1856 I bought of Ed. Wortham & Co., Richmond, Va., agents for DeBurg, six tons of superphosphate of lime. I applied it on a piece of fallowed land at the rate of 300 pounds per acre and harrowed it in with the wheat. On an adjacent portion of of land I applied Peruvian Guano at the rate of 150 pounds per acre. On another portion of adjacent land I applied no fertilizer. There was but little difference in the quality or texture of the soil experimented upon. The effect from the Peruvian Guano was very apparent, but the effect from the superphosphate of lime was not visible, nor have I ever perceived since that time that the land has been benefited. The same field is in corn this year, and the corn on that portion covered with superphosphate of lime in 1856 is no better than the rest. My observation, in several intances, coincides with my sad experience. As to Rhode's superphosphate and others, I can say nothing, as I have never seen any tried. The fall of 1857 I was afraid to make another experiment with a manipulated fertilizer; and consequently purchased altogether Peruvian Guano, which would have had a fine effect on the wheat crop, but for the rust and scab which seriously affected most of the wheat crops in this section.

In the fall of 1858 I bought 4 tons of Elide Guano, 2 tons of Peruvian Guano, and 2 tons of Kettlewell's Manipulated Guano. I made several experiments with these guanos. The first experiment was on six acres of land of same quality. On one-third of it I applied Elide Guano—on one-third Peruvian, and the remaining third Kettlewell's Manipulated Guano. On each portion the guano was sown broadcast and harrowed in with the wheat. During the winter and early part of the spring the Elide Guano looked better than the Peruvian—but at the time of harvesting I could see no difference. Kettlewell's Manipulated Guano never looked as well at any time as either of the two other kinds, and the difference was very perceptible about harvest time. The same quantity of each kind of guano was used in the experiment. I did not measure the wheat from each portion of land, as I was satisfied as to the result of the experiment without it.

The rest of my Kettlewell's guano was drilled with the wheat at the rate of about 175 pounds per acre. The effects on the wheat crop was very visible, but fell far short of my expectation. A piece of land of inferior quality to that drilled with manipulated guano, was sown broadcast with a mixture of one-third Peruvian and two-thirds Elide Guano, and the wheat drilled by itself. The wheat on this land was much better than on that to which Kettlewell's Manipulated guano had been applied, although the last was applied in the drill and the first sown broadcast with a less quantity per acre.

I made another experiment to see whether Peruvian by itself, or Peruvian mixed with Elide Guano was the best; but could see but little, if any difference between the two. A portion of land covered with a

heavy pea fallow produced more wheat and of better quality than any of the land covered with mixed, or manipulated, or Peruvian Guano. My mixed guano was composed of one-third Peruvian and two-thirds Elide Guano, which made a ton of the mixture cost $46 66⅔, estimating the Peruvian at $60, and the Elide at $40, the price I paid for each. Kettlewell's Manipulated Guano cost $47 50 per ton, although 200 pounds per acre was not so beneficial as 150 pounds of my mixed guano. I saw one crop of wheat this year on which Kettlewell's Manipulated Guano had been applied at the rate of 200 pounds per acre, and the owner of the crop and myself both agreed in the opinion that the application did the wheat crop no good. However, I have heard of some applications of this fertilizer that proved more satisfactory.

Although I was pleased with the effects of Elide guano, still I would not advise the purchase of it, because of the wet condition it comes in, which renders it difficult to sow; and besides the ammonia escapes from it very fast if exposed for a length of time, as tested by some that I kept through the winter.

I have never tried any of Reese's Manipulated Guano, but I saw one experiment made with it in 1857, with which I was very much pleased. In that instance Peruvian and Reese's Guano were sown side by side, and I could see no difference. I have seen others who made experiments with it, and did not like it so well.

Mr. Frank Ruffin has commenced the manufacture of a manipulated guano in the city of Richmond; and the farmers wishing to buy a manipulated article, I would advise to buy it of him, as I know him well personally, and what he says can be relied on. I am certain he would not intentionally deceive the farming community. I have been through his establishment, and was pleased with the process of manipulation and the quality of ingredients used. I have purchased two tons of Ruffin's Manipulated Guano, and mean to give it a fair trial, with Peruvian, and a mixture of Peruvian and American Guano. So Mr. Editor, you may probably hear a little more of my "observation and experience as to the use of fertilizers" next fall, if you are not sick of it already.

PAMUNKEY.

*For the Southern Planter.*

## Superphosphate of Lime.

TO ED. SOUTHERN PLANTER:

*Esteemed Friend:*—The following is the receipt which I promised to send thee for making superphosphate of lime.

Prepare a bed on some hard piece of land by scraping away the loose earth, on which place mould from the woods 6 inches thick. The diameter of the bed should be about 8 feet, and the edges raised in a ridge a foot high—in the basin thus formed, place 10 bushels of fine bone dust, on which pour about 10 gallons of water, or more if necessary, to wet the bones thoroughly. Then add one carboy (about 150 pounds) best sulphuric acid, and keep well stirred as long as any gas rises from it. Let it stand 3 days, then add 150 pounds of the best Peruvian Guano, and sufficient *dry* woods mould to put it in good condition to sow by hand,—it is then ready for use, and should be sown on, and raked in with the wheat, or where a drill is used, raked in before the drill, but never plowed in, as it should be kept within 2 or 3 inches of the surface.

The above quantity will be sufficient for 3 acres of land, and will, I think, in its immediate effects, be equal to an application of 200 pounds of Peruvian Guano per acre. The cost about as follows:

| | | |
|---|---|---|
| 600 pounds of Bone-Dust at $30 per ton, | | $9 00 |
| 150 " best Sulphuric Acid, 3 cts., | | 4 50 |
| 150 " best Peruvian Guano, 3 cts., | | 4 50 |
| | | $18 00 |
| 200 pounds best Peruvian Guano, per acre, on 3 acres 600 lbs. at $60 per ton,..... ..... | | $18 00 |

As I have said before, I am led to believe from my experiment, that on the first crop the effects of the two above mentioned applications will be about equal; but the after effects or permanency of improvement is decidedly in favor of superphosphate. When, by rotation, the field where I had made the experiment came to be grazed, I noticed that the cattle were much fonder of grazing on that portion of the field, and kept it grazed much closer. I should add too, that when it come to be cropped again, with a like application of guano over the whole field, the yield on that portion was decidedly the heaviest. In the fall of 1857, we measured up from 10 acres, (on a

large portion of which the superphosphate had been applied 3 years previous) 138 barrels and 2 bushels of corn—very nearly 14 barrels per acre, the largest yield I have ever seen on high land. I intend to repeat the above experiment this fall, and would be glad if some other farmers would try it.

Respectfully thy friend,

JOHN B. CRENSHAW.

## Agricultural Geology.

BY JOSIAH HOLBROOK.

### No. I.—Elementary Instruction.

No class of the community has an equal interest in geology with farmers. No science is so interesting to farmers as geology in connection with chemistry. The two sciences cannot be separated and justice done to either. While the elements of our globe, especially of soils, require chemical tests to determine their character, these very elements are absolutely essential for experiments to determine the fundamental principles of chemistry. Oxygen, the most powerful chemical agent in creation, is also the most abundant material in rocks and soils. The one as an element, the other as an agent, are alike essential to each other, and both indispensable, as at the foundation of all agricultural science.

A knowledge of each is as feasible as it is important—entirely within the comprehension of a child six years old. Each is a science of facts more than of abstract reasoning—of facts, too, equally instructive and delightful to every young mind.

Take an example: The child has placed before him two glass tumblers—the one containing quartz, the other lime, or sand and chalk. The name of each is of course as readily learned as the name of iron, lead, gold, tree, horse, or any other object in nature or art. Into each tumbler is poured some sulphuric or muriatic acid. In the tumbler of lime the pupil observes an action—in that of quartz no action. He is told this action is called effervescence. He hence learns to recognize lime and quartz, and the more certainly from the recollection that the one effervesces with acids and the other does not.

Here is an example of geology and chemistry, alike useful to the farmer and interesting to the farmer's child, or any child. The same simplicity and direct fundamental instruction run through the whole of both of these exceedingly practical sciences.

I may hereafter point out a few of the leading principles of these two sciences; their connection with each other; their essential importance to all classes, and, most of all, farmers; their exceeding fitness for the early instruction of children, and the entire feasibility of having them among the "first lessons" taught in each of the eighty thousand American schools.

### No. II.—Simple Elements.

Oxus is the Greek word for *acid;* ginomai, in Greek, means *make;* hence the literal meaning of oxygen is *acid maker.* Combined with sulphur it forms sulphuric acid; with nitrogen, nitric acid; with carbon, carbonic acid, &c. Respiration, combustion, and fermentation are the three principal operations producing the combinations of oxygen and carbon; the results, carbonic acid.

Acids combine readily with metals, earths, and alkalies—as iron, lime, and potash. By chemists these combinations are called salts, designated by the termination *ate.* Sulphuric acid combining with various bases, produces sulphates; nitric, nitrates; carbonic, carbonates. Sulphate of lime is gypsum, or plaster of Paris; sulphate of iron, copperas; of soda, glauber salts; of magnesia, epsom salts. The carbonate of lime is common lime-stone, marbles, chalk, and many beautiful crystals. Carbonates of iron, copper and lead, are ores of those metals.

About a century ago water was found to be composed of oxygen and hydrogen, and common air of oxygen and nitrogen. About half a century since oxygen was found by Sir Humphrey Davy to be an element of rocks, of course of soils, as it was of the alkalies—potash and soda. The other elements in the earths and alkalies, combined with oxygen, were found by the same great chemist, to be metals very peculiar in character.

It hence appears that oxygen is an element in air, earth, and water, existing abundantly in solid, liquid and ærial forms. In the whole it constitutes nearly half our globe. It is, of course, the most abundant element in the material world. It is also

the most important agent in producing changes in matter essential to human existence. It is very appropriately called *vital air*, as neither animal life nor any life can exist without it. It is no less essential to combustion than to life. It also acts with great energy upon metals and other solid substances. In this action it produces three very large and very important classes of bodies—oxides, acids, and salts. Iron rust is the oxide of iron; the dross of lead, oxide of lead; burnt lime, the oxide of calcium; pure potash, the oxide of potasium; pure soda, the oxide of sodium; silex or flint, the oxide of silicum. The combination of one part oxygen and four of nitrogen constitutes the atmosphere; three parts oxygen and one nitrogen form nitric acid—aquafortis. Combined with other substances, it forms numerous acids—saltpetre is the nitrate of potash. The large quantity of oxygen it receives from the nitric acid fits it for a material in gunpowder—giving to that powerful agent its principal power.

A plate, tumbler, and scrap of paper, with a little water, will enable any teacher or parent to perform an experiment on oxygen equally simple, instructive, and interesting. In a deep plate pour some water. On the water place a scrap of thick paper, piece of cork, or other light substance; on that another piece of paper or cotton moistened with oil. On lighting the paper or cotton, place over it a large empty tumbler. The combustion continues for a few seconds, and when it is extinguished the water occupies about one-fifth of the space in the tumbler, showing the necessity of oxygen for combustion, and that it constitutes about one-fifth the air we breathe. What man, woman or child would not like to be familiarly acquainted with an element so abundant—an agent so active as oxygen, especially when such an acquaintance is equally simple, useful and delightful?

### No. III.—Elements of Rocks.

Rocks are the oxides of metals. Silex, the most abundant ingredient in rocks, mountains, and soils, is the exide of silicum. This oxides constitutes nearly one half of the solid matter of our globe. It is the principal element of quartz, in all its varietie, which are exceedingly numerous, and some of them very beautiful. Quartz is the only mineral found everywhere. Sand is pulverized quarts. Pebbles are fragments of quartz, rounded by attrition. Gunflint is quartz, breaking with a conchoidal (shell like) fracture. Jasper is red quartz, with a fine compact texture. Amethyst is purple quartz, frequently found in six-sided crystals, which is the common shape of quartz crystals in its different varieties. Agate is clouded quartz in numerous varieties, some of which are much used for watch-seals, finger-rings, breast-pins, and other ornaments. Carnelian is quartz of a fine texture and of a yellowish red colour. Chalcedony, blood-stone, catseye, and many other gems, are varieties of quartz.

Most, perhaps all, the gems used in the breast-plate of Aaron, the high-priest, were quartz of different textures, colours, and hues. The precious stones presented by the Queen of Sheba to the King of Israel were probably quartz. The stones mentioned in the Book of Revelation, as forming the streets of the New Jerusalem, with all the gems referred to, were but varieties of the stones used for paving our streets, and of the earth moved by the plow and the hoe of the farmer, and of the dirt carted for filling our docks.

The colouring matter giving most of the beautiful hues to gems, and an endless variety of colours to quartz, is the oxide of iron. The oxide of silicum and the oxide of iron are hence united in this same most abundant mineral in the world.

Next to quartz, felspar, or clay formed by the decomposition of felspar, is the most abundant element of soils. This, too, is composed of several oxides of metals in chemical combination. Felspar is also very extensively united with quartz in the formation of rocks, not by chemical combination, but mechanical mixture. The felspar and the quartz can be separated by the hammer. Not so with the oxygen and silicum, forming silex. Chemical agency alone can separate chemical combinations. Such combinations in rocks, soils, and other mineral bodies, are exceedingly numerous, complicated, and delicate. The most common stone that meets the eye in any part of the world is composed of two oxides. The oxygen and the metals each united by chemical affinity, and then the two oxides are again combined by the same agency to form a "*common stone*," evidently worthy of more respect than it *commonly* receives.

An experiment: Pour upon a little pearl-ash in a tumbler some strong vinegar. An effervescence will follow, producing carbonic acid. A burning candle immersed will be extinguished, showing that carbonic acid is fatal to combustion. It is equally so to life.

### No. IV.—Elements of Soils.

Felspar is composed of four oxides—silex, alumina, or clay, iron, and potash; silex predominates. Of quartz, in all its varieties, it is almost the entire element; of felspar, it is the principal; aluminous or clay soils contain frequently twice as much silex as alumina; the quantity of iron and potash in felspar is small, not often over two or three per cent.

It appears then that sand is composed of two oxides or chemical combinations again combined by the same agency. Felspar or clay is composed of four oxides, also combined by chemical affinity, to form a compound still more complex than quartz or sand. The quartz and felspar are combined by a mechanical mixture to form rocks and soils.

It hence follows, that in these two elements of soils, quartz and felspar, or sand and clay, are not less than six combinations of ultimate principles, or oxygen and metals, all by chemical affinity, and two combinations at least of those compounds forming those two elements. These six chemical compounds, again compounded by chemical agency, are then united by mechanical mixtures to form rocks and soils.

Quartz and felspar are not only the essential elements of soils, but also among the most important materials in the arts of civilization. The principal material of glass is quartz; that of porcelain, felspar. The presence of potash, soda, or some alkaline substance acting as a flux, is indispensable in the manufacturing of each of these important articles of domestic economy.

After performing the important agency of producing vegetation—of course furnishing our wheat, our corn, our beef, and our pork—quarts of a porous character constitutes the French burr, for changing grains into flour. Pulverized quartz, cemented by iron into sandstone, forms our grindstones, for sharpening the axes and chisels of the mechanic and the knives and scissors of the house-keeper. For some animals it is essential to the process of digestion; fowls cannot live without it.

Everything, animate and inanimate; every product of nature and of art; every human being in every position and condition of life—the sturdy farmer, the busy mechanic, the industrious house-keeper, the delicate refined lady, the polished gentleman, the enlightened teacher, the wise statesman, and the noisy politician; in a word, everything which has physical existence, bears visible testimony to the necessity of this important element of mountains, rocks, and soils—of quartz, sand—"*a common stone.*"

Experiment.—Shake a tumbler, containing a little newly-slaked lime and some water; let the tumbler stand till the lime settles and the water becomes clear; pour the water into a tumbler, and blow into it air from the lungs through a quill or pipe-stem; the clear water becoming turbid with white flakes or a sediment, by the carbonic acid from the lungs uniting with the lime in the water, forming the carbonate of lime.

### No. V.—Granite Formations.

Mica is a compound of oxides, more compounded than either quartz or felspar. It contains all the oxides entering into both these minerals, with the addition of manganese, much used for bleaching salts, (chloride of lime) Mica also contains traces of the silicate of magnesia—the article used in the manufacture of epsom salts and other chemicals. The silicate, as its name denotes, contains silex, or the oxide of silicum. It has been found by the progress of geology in large quantities, both in Pennsylvania and Maryland. From it have been made various chemicals, and among them epsom salts, (sulphate of magnesia,) at so cheap a rate, in such quantities, and of so good a quality, as entirely to supersede the importation of this article, so extensively used for medical purposes. In connection with this silicate and other magnesian minerals, chrome ore (chromate of iron) has been found, and chrome yellow (chromate of lead) made from it, with such success as to reduce the price of that valuable paint from fifteen dollars to twenty-five cents a pound; thus bringing the benefits of geology and chemistry to every individual in the community

—at least to every man and woman who rides in a carriage with yellow paint, and to every child who uses an atlas with coloured maps.

Mica is not an important element in soils, and in rocks is less abundant than either quartz or felspar. Though not abundant in rocks, it is one of the three materials of granite, and has an important influence in modifying the character of rocks in fitting them both for agricultural and architectural purposes. It gives to gneiss and mica slate, both granite formations, a facility in being worked into slabs of greatly extended surface, fitting them for side-walks, bridges, floors, farm enclosures, and numerous other purposes. These two abundant rocks in granite formations can be readily formed into slabs of an extended and smooth surface, by the use of the hammer, chisel, and wedge; while most rocks, not containing mica, require the drill in addition to the other instruments named.

Good specimens of mica slate may be seen in the walks from the National Capitol leading to Pennsylvania and Maryland avenues. It is obtained from Bolton, Connecticut, twelve miles east of Hartford. Gneiss is the common material used for side-walks in Washington, as it is for the basements of all the public buildings now in progress in the national metropolis. It is obtained from the banks of the Potomac, from five to eight miles above Washington. In this exhaustless and valuable deposit, are interspersed extensively very brilliant cubical crystals of the sulphuret—not sulphate—of iron, known among miners as "*fools' gold*," and strikingly illustrates the old adage that "all is not gold that glitters."

EXPERIMENT.—Any person drawing a piece of felspar across some quartz, and then the quartz across the felspar, may ascertain which scratches the other, and of course the comparative hardness of these two essential elements of soils, the oldest friends and the strongest "unionists" upon our globe.

## No. VI.—LIME FORMATIONS.

Lime formations are more *ates* than *ides*. Carbonates are most abundant, various, and useful, frequently very beautiful. Common limestone of different textures and colours, most, perhaps all, the marbles, chalk, and crystals, of various forms and hues, are the carbonates of lime; about forty-four parts carbonic acid, and fifty-six quick-lime—oxides of calcium.

Next to the carbonates of lime, sulphates are most abundant and useful. Common gypsum, a powerful manure; alabaster, much used for ornaments upon a beautiful polish, crystals of considerable variety and beauty, are the sulphates of lime.

Fluate of lime is another calcareous formation. It is known as flour spar, also Derbyshire spar. It receives a fine polish, when it is used for various ornamental purposes. From the fluate of lime fluoric acid is obtained, which has the power of acting on glass. By covering any piece of glass with a thin coat of wax, then drawing through the wax letters or any figures, and exposing the glass to fluoric acid, etching is produced on the glass. The fluoric acid is set free from the lime by charging it with sulphuric acid.

Nitrate of lime, though not common, is found in some considerable deposits. It has been supposed that it would furnish a good material for producing the oxygen gas for the calcium light. Bones are the phosphate of lime. Chloride of lime is a manufactured article, formed by exposing lime to chlorine. It was first manufactured some forty years since, and is now a most important article in the manufacture of cotton fabrics. It has great bleaching powers.

Every child knows that lime formations, especially carbonates and sulphates, are alike essential for the purposes of agriculture and architecture. They are essential to the greatest fertility of soils. By a proper mixture of quartz and felspar, or sand, clay, and lime, a soil becomes permanently fertile. The three may be considered the essential elements of soils, though sand and clay, without the presence of lime, produce vegetation. Both the sulphate and the phosphate of lime probably act more as temporary stimulants of vegetation than as essential ingredients in soils.

By taking a review of the *ides* and *ates* already presented, as forming the elements of mountains, rocks, and soils, no one can well fail of being struck with the simplicity, beauty, and practical utility of geology and chemistry, as at the very foundation of the most practical knowledge, of course peculiarly fitted for the very "first lessons" both in schools and families.

Experiment.—By applying the thumb nail and the point of a knife to the different lime formations, especially the carbonates and sulphates, it may be found which give to the former, and whether all yield to the latter. Their hardness, compared with each other, also with quartz, and other minerals, may thus be ascertained.

### No. VII.—Alkalies and Acids.

Lime is an alkaline earth. As an element of soils it is far less abundant than quarts or felspar. As a chemical agent it has more power than either. Neutralizing acids is one of the most important agencies of all alkalies. Lime performs that agency both in agriculture and domestic economy. Take a case in the former. Every farmer is familiar with two kinds of sorrel growing on plowed ground. The most abundant is called sheep-sorrel, and frequently sour-dock. Botanists call it rumex ascetocella. It frequently covers plowed fields with a thick coat, containing a large amount of acid. By quick-lime this acid is neutralized and changed into a salt, probably favourable to vegetation, while the acid is unfavourable. A case in domestic economy—common ashes are the carbonate of potash, as is ley obtained from them. In making soap, the purer the potash the better, especially as it avoids the necessity of putting red hot horse-shoes into the soap to drive out witches, or even waiting till a full or new moon for making soap. By mixing lime with the ashes it removes the carbonic acid from the potash, forming the carbonate of lime; leaving the potash a purer and stronger alkali, and more powerful in assimilating the water and the oil by uniting with both, which is the chemistry of soap-making.

Lime is also used as an alkaline agent in many of the arts, and with great effect in iron furnaces and glass-making—the coarsest kind of glass. For most kinds potash or soda is used. Whether in reducing ores to metals or quartz to glass, lime acts as a flux, causing a more ready fusion. While lime, as a flux, aids the fusion of iron ore, charcoal takes from it the oxygen to aid the combustion, as most iron ores are the oxides of iron. Cast-iron still retains a portion of its oxygen, which is removed by further exposure to charcoal as a heating agent. It is thus reduced to wrought iron. By exposing wrought iron to intense heat, while bedded in powdered charcoal in a closed oven, thus entirely excluding air from it, the charcoal or carbon is absorbed in small quantities by the iron, by which wrought iron is changed into steel, which is carburet of iron, or carbon and iron. Carbonate of iron is an ore of that metal, which is said to be changed from the carbonate to the carburet, or from the ore to steel by a direct process.

Experiment.—If some pearl-ash (sub-carbonate of potash) be put into one tumbler, and some copperas (sulphate of iron) into another, and both exposed to the air, one substance will be covered with a white powder and the other attract moisture so as to become a partial liquid. The one is said to effloresce, the other to deliquesce. By trying the experiment any one can readily ascertain by which operation each is effected.

### No. VIII.—Ultimate Principles.

Oxygen, calcium, carbon, sulphur, phosphorus, nitrogen, hydrogen, chlorine, and flourine, are *ultimate principles* of matter—simple elements, never yet decomposed or rendered more simple. They all enter into lime formations. Oxygen and calcium are the elements of quick-lime. Oxygen and carbon form carbonic acid. The oxide of calcium, combined with carbonic acid, forms the carbonate of lime—the material of extensive mountain ranges, of lime-stone in all its varieties of texture, color, and other properties. Coral formations, extending many thousand miles in different parts of the earth, are the carbonate of lime, and used for the ordinary purposes of that mineral. Marbles, existing in several hundred varieties, are also carbonates of lime. So is chalk. So are several hundred crystalline forms of this important element of our globe. These crystals, though presented under two or three hundred different shapes, can all be reduced to one shape, shown in rhombic spar, which, if broken into fragments smaller than the head of a pin, presents in every fragment a rhombic or diamond-shaped crystal.

All the carbonates of lime are composed of three simple elements or ultimate principles, viz: Oxygen, the great supporter of combustion; carbon, the principal element of coal in all its varieties—whether mineral or vegetable, of course the most important

combustible upon our globe; and calcium, a metal, also combustible. The oxygen first exists in two combinations, viz: with carbon and calcium. These two compounds are also combined, of course still more compounded, producing the most abundant carbonate, and one of the most abundant rocks and useful minerals upon our globe.

Next to the carbonates of lime, the sulphates are the most abundant and useful of lime formations. These are also composed of three elements, and the same as in the carbonates, except that sulphur takes the place of carbon. The oxygen and the sulphur form sulphuric acid; that, combining with the oxide of calcium, gives the sulphate of lime. This abundant deposit of lime formations also presents very numerous appearances. All the sulphates of lime, or nearly so, give to the thumb-nail. The carbonates yield to the point of the knife, but not to the thumb-nail. The carbonates effervesce with any strong acid, even vinegar, which effervescence shows what is called life in an eye-stone, which is the mouth-piece of certain shells; all shells being the carbonate of lime. Sulphuric acid has a stronger hold in its various combinations than most other acids, and hence is not displaced either by carbonic, muriatic, or nitric acid. Consequently the sulphate of lime does not, like the carbonate, effervesce with any common acid. The thumb-nail, the point of a knife, and any common acid, are hence sufficient tests, for ordinary purposes, to distinguish the carbonates of lime from sulphates. The sulphate, like the carbonate, appears in many beautiful crystalline forms.

Experiment.—By collecting such varieties of these two lime formations as any one can easily procure, and arranging them upon the mantelpiece, or in a case, a beautiful "Calcareous Cabinet" will be formed. These specimens, tested by each other, by the thumb-nail, the point of a knife, a piece of quartz or glass, any acid, even vinegar, also by the sight, feel, and taste, will furnish much rich instruction and delightful amusement to the possessor. If any one doubts it, let him try the experiment. If he has no doubt, he will try it of course.

### No. IX.—Calcareous Crystals.

Bones are the phosphate of lime; so is a beautiful crystal called apatite. This crystal is found in granite rocks, is of a green color, hexedral shape, and resembles the beryl and emerald. The phosphate of lime constitutes a part of marl beds, and greatly increases the fertilizing power of that powerful fertilizer. It is also one ingredient of milk. In these various relations it exists in no small abundance, and performs no unimportant agency, either in animate or inanimate creation. It surely ought to be known, at least by every farmer, and of course taught to every farmer's son, and daughter too.

Derbyshire spar is the fluate of lime. It receives a beautiful polish, and is much used for urns and other mantel ornaments. It also appears in beautiful crystals, both in regular cubes and octahedrons, or equal eight sided crystals, precisely the shape of alum crystals, easily formed by dissolving alum in hot water, leaving the mass, while cooling, to arrange its particles around wire put into the form of a card-basket, or any other fancy article preferred. Nitrate of lime is another calcareous formation, less abundant and less useful than either of the other *ates* before named.

Each of the lime formations now given is composed of three elements, or ultimate principles. Two of these elements are the same in all—oxygen and calcium, or the oxide of calcium. The other elements entering severally into the compounds are carbon, sulphur, phosphorus, fluorine, and nitrogen; which, after being acidified by the agency of oxygen, combining in each case with the same oxide, form the carbonate, sulphate, phosphate, fluate, and nitrate of lime.

All these lime formations, except the nitrate, frequently appear in beautiful crystals. Some of the carbonate crystals are rhombic spar, pearl spar, dogtooth spar, tabular spar, satin spar, arragonite, and others, amounting in the whole to two or three hundred distinct crystalline forms of the carbonate of lime. Some of the crystals of the sulphate of lime are selenite, (moon stone,) fibrous gypsum, radiated gypsum, anhydrous gypsum, &c. The principal, perhaps the only crystal of the phosphate of lime, is apatite, already named, in the form of a six-sided prism, not often more than an inch or two in diameter. The phosphate of iron sometimes presents interesting crystalline forms.

Some of the most beautiful and instructive exhibitions of the wonderful science of

crystallography are in the fluate of lime. The two principal crystals are those already named—the cube and octahedron—viz: six and eight-sided figures. By cleavage, these two crystals can be changed from one to the other—the cube into the octahedron, or the octahedron into the cube. Both these crystals, and their process of transformation, were beautifully exhibited by specimens formed of pasteboard with great skill and taste, as the richest possible amusement of some girls in a school in Washington, for the Scholars' Fair of New York. They were much admired and largely commented upon by the crowd of visitors.

EXPERIMENT.—Divide a piece of thin pasteboard into equilateral triangles, figures with three equal sides, say an inch and a half in length. Slightly cut the divisions by the point of a knife, for the convenience of folding them into various desired forms or boxes. Thus prepared, the paper can be readily folded into shapes to illustrate the primary crystals of the fluate of lime, alum, (sulphate of alumina,) gold, iron, lead, and very numerous other minerals.

### No. X.—CALCAREOUS COMBINATIONS.

Intense heat expels the carbonic acid from the carbonate of lime. Oxide of calcium is left. This oxide rapidly and largely absorbs water. It then becomes the hydrate of lime, as the result of slaking. The water absorbed by this process becomes solid—more so than ice. It has the same solidity of the lime itself, as it is a part of it in chemical combination. The water in changing from a liquid to a solid, gives up its latent heat, then becoming sensible heat, as is familiar to every child, from witnessing the slaking of lime while passing the street. The changing of latent to sensible heat, as manifested by the operation of slaking lime, familiar to every one, arises from a sort of fundamental principle in chemical science. This principle furnishes one of the most important items of knowledge in the whole range of science, or possible for any human being to possess—*the expansive power of heat.* It explains thousands upon thousands of interesting operations, constantly going on before our eyes, alike under divine and human agency—both in nature and the arts. It can also be as readily learnt by the child of five years as by the man of fifty.

The oxide of calcium and the hydrate of lime both possess strong alkaline powers. All alkalies have a strong tendency to combine with acids—producing neutral salts. Nitric acid (aquafortis) and caustic potash, each powerfully corrosive, combine with each other readily, rapidly, and intimately, producing saltpetre, having little or no corrosive power. Muriatic acid and soda, also corrosive in a separate state, readily enter into a chemical combination, and produce common salt, an indispensable article upon every table. It is not uncommon to have life sacrificed to an ignorance of the relative powers of acids and alkalies, not to mention stains and other injuries upon garments and other articles in daily use by every housekeeper; showing the relations of these two important agents in domestic economy.

As lime, an alkaline earth, is far more abundant than potash, soda, or ammonia, the three principal alkalies, farmers, mechanics and house-keepers can use that for its alkaline powers to far greater advantage, in many cases, than either of the pure alkalies. As the alkaline power in this abundant element of our globe destroys or neutralizes acids, both of natural and artificial production, farmers can use it for changing acids in numerous plants into salts, and probably powerful fertilizers; and house-keepers can use it for cleaning vessels, becoming acid by use in domestic economy, and in very numerous cases greatly to their own convenience. and not unlikely to the *pleasing of their husbands.*

EXPERIMENT.—Place a drop of sulphuric acid upon a piece of black broadcloth, and a red stain will be the result. Cover the stained cloth with some alkali, and the color will be restored. Dozens of similar experiments may follow.

### No. XI.—HYDRAULIC LIME.

Hudor is the Greek word for water. Ginomai, or gennao, added, gives the origin of the word hydrogen. Metron, pathos and aulos, added to hudor, gives hydrometer, hydropathy, and hydraulic. Hydrate of lime is newly-slaked lime, containing twenty-one per cent. of water and seventy-nine per cent. of the oxide of calcium. Hydraulic lime is *water cement.* It was most fortunately discovered in large quantities at the very commencement of the Hudson and Erie canal, in the rock excavated for the work. Before this discovery, made by an agent who had visited Europe in behalf of the work, the calculation was to import this

indispensable article from Europe. It has since been found in very numerous and large deposits, adding immensely to the facilities and the progress of the vast works of internal improvements already completed and now advancing by American enterprise. No one work, probably, made so large a demand for hydraulic lime and water cement as the Croton Aqueduct of New York.

The various uses, both in architecture and agriculture, for this material, are numberless and nameless. For most public works it is indispensable. For numerous domestic purposes it is exceedingly convenient. It is so powerful as a cement that two masses of stone cemented by it will sometimes break in another part of the mass before separating at the point of junction.

The oxide of iron, in connection with a portion of alumina, or clay, causes its great cementing power. In preparing it for use, it is burnt like common lime-stone. Instead of slaking, it is ground, when, with a mixture of sand, it is formed into a mortar, and ready for use.

Though numerous deposits of this very valuable material have already been discovered and brought into use, advancing immensely the improvements and the wealth of the country, deposits still more numerous doubtless yet remain unknown. Once let each of the eighty thousand schools, and the six millions of families in our country, become an "*Exploring Agency*," to discover the resources of science and of wealth under their feet and within their reach, and numberless beds of hydraulic lime, marl, valuable ores, and other minerals both rich and beautiful, will be brought to view and put to their proper use. Another discovery, still more important than lime, marl, or gold, will certainly be made in the operation. It has already been made in very numerous cases. This most important discovery, certain to be thus made, is, that bad boys are good boys—the worst the best. Leaders of rowdy gatherings will be, they have been, very often leaders in exploring expeditions: the more efficient for being juvenile, voluntary and gratuitous.

Experiment.—Let any teacher or parent request his pupils or children to find what curious and beautiful minerals they can, and the result will be, the commencement of a "*Geological Cabinet*" for the school or home of the young explorers.

### No. XII.—Hornblend.

Hornblend is more tough than hard. So its name indicates. It enters largely into rocks. Hornblend rocks form some of the most beautiful and sublime mountain and landscape scenery in the world. The Giant's Causeway, in the north-east part of Ireland; the Palisade , on the banks of the Hudson river; the Bluffs, called East and West Rock, each about two miles from New Haven, Connecticut; Mount Holyoke and Mount Tom, on the Connecticut river; the richest landscape scenery on the Columbia and other rivers in Oregon; and many other views, both rich and beautiful, in different parts of the world, are hornblend rocks. The scenery about Edinburgh, Scotland, is said to resemble very nearly that about New Haven, Connecticut, exhibited by the same geological formation—basaltic columns. In both these cities, it is the common and almost only building material, admirably fitted for the Gothic style of architecture. Some poet said of the citizens of Edinburgh, who have very much impaired the natural scenery about the city for the purposes of architecture, that they had so little taste that they sold the sublime and beautiful by the cart-load. These columns are very much in the form of hexedral prisms, from six inches to a foot or two in diameter. The length of the blocks forming the prisms are frequently about equal to their diameter. Each block is concave or hollowed at one end, and convex or rounded at the other, the concave and the convex surfaces exactly fitting each other. The sides of the prisms are also as exactly fitted as the cells of a honey-comb, and of the same shape.

The most remarkable exhibition of this natural mountain mechanism is in the Giant's Causeway, where these hexedral columns, so perfectly matched, cover a great surface, and rise to the height of two or three hundred feet. The inhabitants of the country, at some ancient period, supposed it to be the work of a race of giants living there at a period still more ancient.

The property of toughness in hornblend very much modifies the character of the rocks of which it forms a part. For many purposes they are the most durable of all rocky formations. The Russ pavements, introduced into New York, are formed of a rock from Staten Island almost entirely horn-

blend, having a little quartz in fine grains interspersed through the mass. Though called Staten Island granite, it is very different, and entirely superior to any granite formation correctly so called. No rock upon the globe could probably be found more durable or better fitted for such pavements than this hornblend rock taken from Staten Island.

EXPERIMENT.—Draw a circle by a pair of dividers. Not changing the distance of the legs, place one point in the circumference of the circle drawn, dividing it into equal parts. It will thus form in the circumference six points equally distant from each other. Unite these points by lines drawn by the dividers, and the result will be a regular hexagon, showing the shape of basaltic columns, quartz crystals, beryl, emerald, apatite, cells of the honey-comb, and many other specimens of "NATURAL MECHANISM."

## No. XIII.—HORNBLEND ROCKS.

Quincy granite is no granite; it is sienite. So are most of the Egyptian granites. This rock took its name from Syena, the name of a town in Egypt, where it abounds. Geologically, granite and sienite differ but slightly. In the relations of the two rocks to agriculture and architecture they differ essentially. Quartz and felspar are essential ingredients both of granite and sienite. Of the former, mica is the third ingredient; of the latter, hornblend. Granite is composed of quartz, felspar and mica; sienite of quartz, felspar, and hornblend.

Mica and hornblend differ so essentially in their chemical combinations and mechanical structure as greatly to modify the rocks of which they form a part, both in their relations to soils and buildings, into which they enter. Both contain silica, alumina and oxide of iron; but hornblend contains twice the amount of iron of the mica, and a considerable portion of lime. Hence, when becoming a part of soils, it produces greater fertility.

Mica is exceedingly fragile in its character, readily changed into plates and fine scales to an unlimited degree of thinness; while hornblend is tough, and not easily changed by mechanical action. It hence gives much greater strength and durability to sienite, of which it is an ingredient, than is possessed by granite, of which mica forms a part. For pavements or any other use exposing the rock to friction or pressure, sienite and other hornblend rocks have a decided preference to any granite formations, of which granite, gneiss, and mica slate are the principal.

Hornblend enters into rocks of almost every proportion, from constituting nearly their whole mass to a slight sprinkling, appearing in black specks on the surface, as may be witnessed in the "Merchants' Exchange," Astor House and many other buildings in New York, and in the Bunker Hill Monument, and very many of the valuable buildings in and about Boston. The same material is more or less used for buildings in nearly all the principal Atlantic cities, from Boston to Charleston,; also in New Orleans.

Hornblend so nearly resembles black mica, as frequently witnessed in rocks, as not to be readily distinguished by the eye. The point of a knife, however, will at once determine whether the black specks are hornblend or mica, as the latter will cleave off in fine scales, but not the former—determining whether the rock is granite or sienite, and of course whether it is not fitted for a certain desired use. Hornblend rocks are perhaps more widely scattered over the country in the form of boulders than almost any other geological formation.

EXPERIMENT.—Any farmer, while passing over his fields, and especially farmers' sons and daughters, whether in their fathers' fields or on their way to school, by observing and collecting specimens of rocks meeting their eye, may readily determine whether they belong to granite or hornblend formations.

## No. XIV.—STRATIFIED AND UNSTRATIFIED ROCKS.

Granite, hornblend and lime formations constitute more than nineteen-twentieths of mountain and rocky masses upon our globe. The highest peaks of mountains and the lowest depths of excavations yet witnessed are principally granite formations. Early upheavals of the earth, in its geological history, are supposed to have given to this rock—formed when it was said, "Let dry land appear"—both the highest and the lowest position in the piling of mountains.

All granite formations are composed essentially of three ingredients—quartz, felspar, and mica, combined by mechanical

mixture rather than chemical combination in almost every proportion of these ingredients. Quartz is the most abundant of the three ingredients, and sometimes of itself constitutes large rocks, and even mountain ranges. Felspar, also, in some rocky masses, is the most abundant ingredient. When the rock is principally felspar, interspersed with irregular lines of quartz, giving it somewhat the character of Hebrew letters, it is called graphic granite, from the Greek word *grapho*, to write. In graphic granite the mica is entirely, or nearly, wanting, being composed almost wholly of felspar, with a slight sprinkling of quartz. Such felspar rocks frequently decompose by the action of air and water, forming porcelain clay, called by the Chinese *kaolin*.

A large deposit of felspar, of a good quality for chinaware, also for porcelain teeth, has been opened and worked to some extent in Wilmington, Delaware. That deposit, also one in Haddam, Connecticut, have furnished large quantities of felspar for porcelain establishments in this country, in addition to considerable quantities exported to other countries for the same use.

A portion of granite formations are stratified, having a slaty structure. Another portion is unstratified—the three ingredients, especially the mica, being thrown in every imaginable position. Those stratified are called gneiss and mica slate. The distinction between gneiss and mica slate is the absence of felspar, in the latter; the rock being composed of quartz and mica, of a homogeneous structure, with a smooth, but frequently undulating surface. It is more friable, and less durable for footwalks, bridges, floors, and other purposes exposing it to friction, than gneiss. It is also less readily split into slabs of a large surface, and is hence the far most limited of the two rocks in their application to purposes of architecture.

EXPERIMENTS.—A teacher in Philadelphia once said to his pupils: "Boys, all who have their lessons to-day at eleven o'clock may go with me on a geological excursion." Every boy had his lesson thoroughly at the hour named—the first *thorough* lesson ever got by several of his pupils. Similar experiments continued, changed his worst scholars into his best.

In one of the New York Public Schools the teacher was greatly annoyed by several truant boys, drawn to the docks of the city by the attractions upon the wharves. He at length offered to the punctual scholars exercises in drawing, also an opportunity to form cabinets of geology for the school, their homes, and sending abroad. His incorrigible truants became his most punctual scholars, and the very worst boy in school was soon known as an artist, and, as such, invited by a clergyman of the city to become the associate and the teacher of his children. Do not "working schools" and houses of refuge forcibly illustrate the adage that an ounce of prevention is better than a pound of cure?

## No. XV.—Position of Rocks.

Next to granite formations, hornblend rocks occupy the highest positions upon our globe. To some extent the hornblend and granite formations are intermingled with each other. Mica and hornblend are not unfrequently found in the same mass or even range of rocks. This combination, composed of quartz, felspar, mica, and hornblend, is called sienitic granite, as it contains all the ingredients found both in granite, and sienite. Gneiss rocks also contain very often both mica and hornblend; the former giving them a slaty structure, the latter increased durability. Hornblend-gneiss is an appropriate name for such a combination. Masses of pure hornblend sometimes have a slaty structure, as found in considerable quantities in the vicinity of New York and Baltimore, in both of which cities it is used for building purposes. It may be called slaty hornblend. Fine grains of quartz are frequently interspersed through hornblend of a slaty structure, properly called hornblend slate. Crystalized hornblend is not uncommon. Such crystals are found in considerable quantity and of much beauty in Franconia, New Hampshire, in connection with iron mines, wrought there to some extent. Micacious iron ore, or mica, largely and richly impregnated with iron, is found in Franconia, furnishing interesting specimens of mineral cabinets, as well as raw materials for iron-masters.

Next to granite and hornblend rocks, lime formations constitute the highest mountain ranges. Calcareous minerals, though less abundant, are more various and beautiful than are found in either or both of the formations of granite and hornblend. Corals are immensely various and exceedingly beautiful. In the immediate vicinity

of Bermuda is a field of corals, some twenty miles by ten in extent, which, seen through water several feet deep and perfectly transparent, presents an object of great beauty and richness. The prisoners at that English establishment are frequently employed to procure, by diving, specimens of coral from that exhaustless field of beauty and richness, which are sent to numerous cities and individuals upon both continents for ornaments upon mantle-pieces. In many places coral rock is used as the only building material. For forts it is probably preferable to any other material. It is more difficult to shatter by cannon balls than any other rock. Though not hard, it is tough. Coral is the carbonate of lime. The Potomac marble, used for the pillars in the assembly chambers in the American Capitol, is calcareous pudding stone. It is composed of pebbles of the carbonate of lime, of various sizes, from that of a man's head to grains smaller than a pea.

EXPERIMENTS.—Some eighteen years since the Boston boys, and girls, too, prepared small elementary cabinets of geology for all the members of the Massachusetts Legislature, to be circulated among the schools in their respective legislative districts. The next Legislature ordered a geological survey of the State.

Not long after that patriotic enterprise in Boston, the Philadelphia boys, of course aided by the girls, prepared small geological cabinets, which they sent to all the counties in Pennsylvania, and, in addition, a large collection to the library rooms in the State Capitol, during the session of the Legislature. That same Legislature ordered a geological survey of Pennsylvania.

Within a year past the Washington boys and girls have prepared mineral specimens in great numbers, especially the materials of the national public buildings in that city, which they have distributed by various public functionaries, both of this and other countries, very widely over the world. The result of such a force; with a momentum so rapidly increasing, must be, at no distant period, a "CABINET OF NATURE AND ART" in every school in our Union, the whole making some eighty thousand "EXPLORING ACADEMIES" to develop and apply the mineral and other natural resources of our country; also to provide a *safety-valve* for the surplus boy power now exhibited in lawlessness and violence.

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## No. XIV.—MINERAL CABINETS.

Cabinets of Geology and Mineralogy, beautiful, rich, and instructive, may be collected from granite, hornblend, and lime formations. The varieties of quartz are numberless and nameless. Crystals of quartz are commonly known as diamonds. Many thousand travellers passing Little Falls of New York have heard the cry, "Do you want to buy some diamonds?" These diamonds are crystals of quartz, collected by children from the cavities of rocks in the vicinity and sold at a York shilling a handful. In Barnum's museum of New York is a quartz crystal about the size of a man's body. Single crystals of quartz, from the size of that just named, down to those not larger than the head of a pin, are uniformly hexedral prisms, pointed at each end by hexedral pyramids. Quartz crystals frequently appear in groups, furnishing richer mantel ornaments than the most costly girandoles, for which many millions have been paid within ten years past. Arkansas is rich in these articles of beauty and taste. In Missouri crystalized quartz, of great splendor, and in any quantity, is found lining the cavities of rounded masses of stone, externally as rough and uninviting as any mass of rock in the roughest stone wall in any farm enclosure. These masses, called geodes, are of all sizes, from that of an orange to a bushel basket, and even larger. Though rough without, they are beautiful within, somewhat regardless of the common way of the world in putting the best side out.

Crystalized quartz is sometimes more transparent than glass, and is thus fitted for spectacles, not liable to be scratched like the common article. Crystals of quartz are frequently of a beautiful purple hue, bearing the name of Amethyst. Smoky quartz also appears in beautiful, indeed, splendid crystals. "A CRYSTAL CABINET," confined to quartz alone, can easily be procured, sufficiently beautiful and splendid to secure the admiration of the most obdurately stupid.

At Ackworth, New Hampshire, beryls, larger than a man's body, the largest known in the world, have been taken from granite rocks in very great quantities—many cart loads. These, like quartz crystals, are hexedral prisms, though somewhat irregular. From this location of beryls, mica or

isinglass has been procured in very large plates, and in such abundance as to supply the American market, entirely taking the place of that formerly imported from Russia. A beautiful black crystal, called schorl, is extensively deposited in granite rocks, and and frequently dispersed through masses of white quartz, in needle shape, size, and form, furnishing beautiful cabinet specimens, and even splendid mantel ornaments.

In granite formations generally, but most in mica slate, garnets are deposited in very large quantities. When this rock, of rather a frail character, largely disintegrated by rains and frost, crumbles down, garnets are sometimes so thickly spread upon the ground as to be easily shovelled up by the bushel. Garnets also sometimes appear in hornblend. They are in rounded crystals, of different number of sides—frequently dodacaedrons or twelve-sided crystals. Common and precious garnets are the two general divisions; the latter sometimes used as ornaments for rings, &c. These crystals vary in size from that of a pin's head to several inches in diameter.

EXPERIMENT.—Some boys in a New York school much in a mutinous state, were invited by a visiter to take an excursion to collect minerals to be distributed among the pupils in the several departments—girls, boys and primaries. The proposal was, of course, most gladly acceded to, resulting in specimens showing the elements of the globe, all labelled, and taken at the close of the school, on the same day, by the hands of every pupil, from the largest to the smallest, numbering more than three hundred, for the beginning of "FAMILY CABINETS." The same school stood among the first in the city in scholarship and orderly deportment.

### No. XVII.—CABINET OF GEMS.

Crystal quartz are gems. So are numerous other varieties of this most abundant mineral upon our globe. The varieties of agate are very numerous, and some of them among the most beautiful of the gems. They are also very abundant in many places. Crystals of quartz, agates, jaspers, carnenelians, amethysts, and other precious stones confined to the quartz family, are so abundant in different parts of the world as to make it easy for any one of the six millions of American families so disposed to procure CABINET GEMS, alike beautiful and useful.

Among lime formations are more than two hundred varieties of crystals. Some of them are not unfrequently combined with quartz crystals. This combination gives increased interest to each. Hence it is easy to procure from calcareous crystals varieties so numerous, rich and beautiful, as to form a cabinet of lime formations, to be placed by the side of the silicious specimens, each increasing the value of the other.

The varieties of granite are so numerous and so different as to furnish specimens of that class of building materials for a cabinet so arranged and labelled as to provide most useful lessons of instruction, and, at the same time, to be admired for their beauty. The marbles, also belonging to the calcareous formations, present several hundred varieties. These are frequently so arranged and combined in tables and other articles of household use as to form objects of great beauty and attraction. They can also be collected and arranged by the younger members of every family into a CABINET OF MARBLES, greatly to their own instruction and the gratification of their friends.

From the granite, hornblend, and lime formations, a collection of building materials may with great ease be so arranged and labelled as to form an "ARCHITECTURAL CABINET," combining most happily the beautiful and useful. Not less beautiful and useful may be an AGRICULTURAL CABINET composed of minerals most useful to farmers. Such a cabinet may be prepared by every farmer boy in the land within a twelve month, if requested or even permitted by his parents. Surely, no school in the country, or the world, ought to be without the various cabinets named, especially as the specimens for them are to be found in connexion with the three principal rocky formations of our globle. They are hence brought within the reach of everybody. If they are beautiful and useful, and require little more effort to obtain them than stooping to pick them up, no good reason can probably be given why they should not be possessed and understood by each of the eighty thousand schools and the six millions of families in our Republican Union.

EXPERIMENTS.—Within five years past the New York schools have made it a part of their system to prepare specimens of

their improvement as "offerings to patriotism." The uniform result is, that the schools and the pupils who are most abundant in such offerings are also the first in scholarship, and especially distinguished by self-respect and orderly deportment. Hundreds of the pupils, by this honorable distinction, have also been sought for to fill places alike respectable, profitable and useful.

*From the Ohio Cultivator.*

## How to make an Orchard.

The orchards in the older settled parts of the State, have mostly been planted forty or fifty years. They were planted as soon as the pioneer could erect a cabin for his family, and clear off a spot to plant out an orchard. The land was new and fresh, the surface soil was light, the subsoil was close and substantial; all calculated to promote the speedy growth and maturity of the trees. The clearing and fencing, the farm and other necessary employments, occupied our time until we saw our orchards would be ruined if not pruned. In doing this, many very large branches had to be taken off, and the necessary precaution was not taken to prevent the trees from suffering severely by the operation. Grafting very large trees has the same bad effect on the main stock. In short, the fruit trees in this country at the present time present a miserable prospect for raising anything like a fair crop of good, well-matured and fair fruit. Most of the old orchards are evidently fast failing, and now is the time to select the right place on the farm for a new orchard, select the *right kind of trees* from the right place, and the *right kind of fruit*, and planted in the right way, and in every respect cultivated as Nature has designed it should be, and the farmer and every other person who has the advantage of raising a fruit tree, will make the most valuable improvement he possibly can for the expense.

I will now give my views as it respects all the foregoing requirements. As it respects the *right place* on a farm, I would say, seek a northern slope and a stony or gravelly soil, stony or gravelly land is the most essential of any one consideration. The *right kind of trees* are those not large but thrifty and grafted at the root. Before a fruit tree is taken from the nursery, it should be marked so the same side will stand south after planted in an orchard that it did in the nursery. If this is thought unnecessary, look at a very thrifty shoot and you will see a difference in the colour of the sides north and south. The *right way*.—Let the tree be raised from the nursery in a careful manner. Much depends upon this, follow every root to its extremity, and carefully remove all roots without breaking or bruising. If there is a tap-root, cut it off. The place to plant a tree should be prepared some days previous to its being planted, the soil removed should be under the influence of the sun and atmosphere before it is replaced over the roots of the tree. The soil should be taken off about six or eight inches deep, five feet across. The tree when planted should stand but a trifle lower than in the nursery. If planted too deep, it will do no good until new fibre roots are produced from the tree near the surface of the ground. Much depends on the healthy condition of the fibre roots.

When the tree is set in the place designed and the sun side right, let each root be taken straight out from the tree, and if the place dug out is too small, let it be extended. When all the roots are thus extended, draw mellow soil over them, and fill up to the fibre roots, which should be combed out with the fingers and placed nicely in fine rich soil, then all gently pressed down and the tree firmly tied to a stake. Never plant a tree when the ground is wet and heavy. It is just as consistent to plant a hill of corn on wet land and then tramp on it until all is mortar, as to tramp over the fiber roots of an apple tree in the same condition. The distance of apple trees apart in an orchard, should not be less than twenty-four feet.

In cultivating apple trees in an orchard, much care should be taken to keep the soil mellow near the tree about the fibre roots, for the healthy condition of the fibre roots of an apple tree is essential to the prosperity of the tree as the healthy condition of the vitals of an animal is to their vigour and prosperity.

On our clay land nothing is better than gravel placed about the trees. It loosens the soil and protects the tree from suffering so much from the drouth. Late in the season when fruit is well grown and the tree needs all its vigour to fully mature the

fruit, so it can receive the flavour nature has designed, the drouth is most likely to come, and clay ground is sure to suffer the most. An orchard needs but little manuring, generally the soil is rich enough to grow trees as fast, as is good for the trees. To take lime and mix with water, and let it remain a few days, then fill with water and let it settle clear, then wash the trees with the water, and put the sediments about the trees, is manuring enough on most land.

An overgrown tree is not sure of being a speedy bearer; the wood must be matured before it will bear. When a graft is set in a large stock of a top of a tree, it will grow very fast and thriftily, but will not bear until it receives a certain degree of maturity, while an inferior twig of the old stock will be full of fruit. Another evil of growing trees too fast, is, the fruit buds get so far advanced in the fall that they get winter-killed. When such buds are formed on wood properly matured, they never winter-kill. The apple is a fruit designed for high latitudes, and if properly managed, is a sure crop under the common course of nature. Great care should be taken in pruning the tree when first commencing to shape the top, not to suffer an improper branch to accumulate to a great size before it is removed, whereby the tree must suffer greatly and perhaps be destroyed by it. When a young orchard begins to bear, it is usually a constant bearing orchard every year, but after a few years it has its bearing year every other year. All this is for want of proper pruning. The top and root should be kept properly balanced, that is, just as much top should be suffered to remain as the roots can properly sustain. We have already considered the consequences of having too little top whereby the branches are too vigorous. When the top overbalances the root, the root can not fully sustain the top in its growth of wood, and the growth and maturing of the fruit, and preparing a proper set of vigorous fruit buds for a succeeding crop. Now the roots stand taxed by the laws of nature all this while, and in case of defalcation, there must be of necessity a derangement. An excessively large top fully loaded with fruit, taxes the roots with the nourishment to sustain and grow the tree, mature the fruit, and produce a healthy and vigorous set of fruit buds for the next year, all this the roots cannot comply with.

The main contest is between the growth of the tree and maturity of the fruit. Both participate in the affliction. The tree is stinted by the demands of the fruit, and the fruit by those of the tree. While the abundant fruit buds come in too late for bearing that year, the next spring they come forth and barely blossom, then dwindle away, giving the tree entire ascendancy for that year to grow and produce a healthy, vigorous set of fruit buds for the next year's crop, which appear the next spring so vigorous that they seem to withstand almost anything, and continue on the tree as before. To prove this theory I would call the attention of all careful observers to all full-bearing trees of this description: that a full-bearer is never a constant bearer of winter fruit, but a thin bearer, especially early fruit, is generally a constant bearer. The Golden Sweet is an early apple, the tree a thin but a constant bearer. Our common cherry trees are generally constant and full bearers. The reason of this is, the fruit leaves the tree in time for the vigour of the tree to prepare an abundance of vigorous fruit buds for the next year. Just so with the currant bush. It is a full and constant bearer, early in blossom, and stands more adversities than any other fruit; the reason is the fruit is gathered early, and the bushes are early prepared for the next year.

If this practice is correct, an orchard can be so pruned that it will constantly produce fruit in a uniform manner, and of the best kind. But if we continue to permit our trees to be surrounded by ant-hills, destroying the fibre roots of the trees and causing the constant decay of the trees and a drooping over, like consumptive people, we shall find ourselves destitute of fruit from our own neglect.

DANIEL J. DURFEY.

*Licking Co., Ohio.*

## Galls and Wounds on Horses.

GALLS ON THE SKIN.—A horse newly put to work, and working in a new harness, or under a new saddle, which touches parts not inured to the pressure, is very likely to have the skin of the back and shoulders abraded.

Unless there is an absolute necessity for

the animal to be used, he should, in all cases, be allowed a few days rest, that the wound may heal and become somewhat hard; even then, until the hair has fairly grown out, the greatest care must be used to see that the chafing of the harness is entirely obviated, as when the skin is in the least sore it is peculiarly susceptible to irritation. When a gall is fresh and bleeding, nothing will so soon dry it and cause it to cicatrise, as a little dry table salt sprinkled upon it.

After the wound is in a measure healed, if it be absolutely necessary to use the horse, a careful examination of the harness or saddle should be made, and padding should be taken out, or parts of the leather removed, to prevent any part of it from touching the wound. To prevent friction, when caused by the saddle or collar, there is nothing so useful as a piece of raw sheep-skin, worn with the *flesh* side next to the horse. In riding long journeys, it is the safest plan to have such protection always under the saddle.

If the chafing is caused by loose straps striking and rubbing against the skin, they should be covered with sheep-skin having its *wooly* side turned toward the horse.

Saddle galls are unlikely to occur, if the saddle fits the back, and is left on the horse for at least one hour (and it had better remain on two or three hours) after he is put into the stable. If convenient, he should be saddled half an hour before going out, as it is much better that the saddle should become warm, or slightly softened by the insensible perspiration of the back, before the rider's weight is put upon it.

The following is a good lotion for galls of the skin:

| | |
|---|---|
| Sal ammoniac, | 1 ounce. |
| Vinegar, | 4 " |
| Spirits of wine, | 2 " |
| Tincture of arnica, | 2 drachms. |
| Water, | half a pint. |

Mix.

If no other remedy is used, a mixture of burnt leather, gunpowder, and lard should be occasionally rubbed on the gall to prevent the growth of white hair.

Sit-fasts, and their treatment, are thus described by Stonehenge:

"Sit-fast is merely a name for an obstinate and callous galled-sore, which has repeatedly been rubbed by the saddle, and has become leathery, and disinclined to heal. If time can be allowed, there is nothing like a small quantity of blistering ointment rubbed on; or the application of a small piece of fused potassa; or even the nitrate of silver in substance, or bluestone; all of which will produce a new action in the part, and if followed by rest from the saddle, will generally effect a cure."

Flesh Wounds.—The following, on the treatment of ordinary flesh wounds, is from Dadd's Modern Horse Doctor:

"Incised wounds are those inflicted by sharp instruments. On the human body they often heal without any subsequent inflamation beyond what nature sets up in the restorative process; but the difficulty with the horse is, that we cannot always keep the parts in contact, and therefore it is not so easy to unite them. * * * * If the wound is seen immediately after infliction, and there seems to be the least probability of healing by first intention, we place a twitch on the horse's nose, and examine the part. If there be found neither dirt nor foreign body of any kind, the blood had better not be washed off; for this is the best healing material in the world. The edges are then to be brought together by interrupted sutures, taking care not to include the hair between the edges of the wound, for that would effectually prevent union. Nothing more is needed but to secure the animal so that he cannot get at it. If he is to be kept in the stable, without exercise for any length of time, he had better be put on half diet.

"Contused wounds are generally occasioned by hooks, or some blunt body connected with the harness or vehicle. They generally leave a gaping wound with bruised edges. We have only to remember that nature possesses the power of repairing injuries of this kind—of filling up the parts and covering them with new skin; all we have to do is, to attend to the general health of the animal, and keep the wound in a healthy condition. Our usual application is the compound tincture of myrrh. If the part assume an unhealthy aspect, a charcoal poultice will rectify that. If such cannot be applied, owing to the situation of the wound, dress it with pyroligneous acid.—*Herbert's Hints to Housekeepers.*

## Fixed Facts in Agriculture.

Somebody has made up the following list of "fixed facts" in agriculture. Though calculated for the Eastern States, many of the facts are of general application:

1. All lands on which clover or the other grasses are sown, must either have lime in them naturally, or that mineral must be artificially supplied. It matters but little whether it be supplied in the form of stone-lime, oyster-lime, or marl.

2. All permanent improvement of lands must look to lime as its basis.

3. Lands which have long been in culture, will be benefited by application of phosphate of lime, and it is unimportant whether the deficiency be supplied in the form of bone dust, guano, native phosphate of lime, composts of flesh, ashes, or that of oyster-shell lime—or marl—if the land needs it.

4. No lands can be preserved in a high state of fertility, unless clover and the grasses are cultivated in the course of rotation.

5. Mould is indispensable in every soil, and a healthy supply can alone be preserved through the cultivation of clover and the grasses, the turning-in of green crops, or by the application of composts, rich in the elements of the best mould.

6. All highly concentrated animal manures are increased in value, and their benefits produced by admixture with plaster, salt or pulverized charcoal.

7. Deep ploughing improves the productive powers of every variety of soil that is not wet.

8. Sub-soiling sound land, that is, land that is not wet, is eminently conducive to increased production.

9. All wet lands should be drained.

10. All grain crops should be harvested before the grain is thoroughly ripe.

11. Clover, as well as the grasses intended for hay, should be mowed when in full bloom.

12. Sandy lands can be most effectually improved by clay. When such lands require liming or marling, the lime or marl is most beneficially applied when made into a compost with clay. In slacking lime, salt brine is better than water.

13. The chopping or grinding of grain to be fed to stock, operates as a saving of at least twenty-five per cent.

14. Draining of wet lands and marshes adds to their value, by making them produce more, and by improving the health of the neighborhoods.

15. To manure or lime wet lands, is to throw manure, lime and labor away.

16. Shallow ploughing operates to impoverish the soil, while it decreases production.

17. By stabling and shedding stock during the winter, a saving of one-fourth of the food may be effected; that is, one-fourth less food will answer, than when the stock is exposed to the inclemencies of the weather.

18. A bushel of plaster per acre, sown broadcast over clover, will add one hundred per cent. to its produce.

19. Periodical application of ashes tends to keep up the integrants of the soil by supplying most, if not all, of the organic substance.

20. Thorough preparation of land is absolutely necessary to the successful and luxuriant growth of the crops.

21. Abundant crops cannot be grown for a succession of years, unless care is taken to provide an equivalent for the substance carried off the land in the land products grown thereon.

22. To preserve meadows in their productiveness, it is necessary to harrow them every second autumn, apply top-dressing, and roll them.

23. All stiff clays are benefitted by fall and winter ploughings, but should never be ploughed when wet. If at such ploughings the furrow be materially deepened, lime, marl or ashes should be applied.

24. Young stock should be moderately fed with grain and watered, and receive generous supplies of long provender, it being essential to keep them in a fair condition, in order that the formation of muscle, bones, &c., may be encouraged and continuously carried on.

25. Milch cows, in winter, should be kept in dry, moderately warm, but well ventilated quarters, fed and watered three times a day, salted two or three times a week, have clean beds, be curried daily, and, in addition to their long provender, should receive succulent food morning and night.

26. Full complement of tools and implements of husbandry are intimately connected with the success of the husbandman.

27. Capital is not only necessary to agricultural success, but can be properly used in farming as in any other occupation.

28. Punctuality in engagements is necessary to an agriculturist, as it is to a merchant.

29. Every husbandman should carefully read and digest matters connected with his business; his success being dependent upon a full knowledge of its principles and details, as is that of the lawyer, or physician, upon a knowledge of the science of law or physic.

30. Wheat, rye, oats and barley should never follow each other in course of rotation. There should always be an intervening hoe-crop between them.

*"Marion Visitor."*

## List of Wonders.

Among the thousands of marvelous inventions which American genius has produced within the last few years, are the following, compiled in an abstract from the Patent Office Report:

The report explains the principle of the celebrated Hobb's lock. Its "unpickability" depends upon a secondary or false set of tumblers, which prevent instruments used in picking from touching the real ones. Moreover, the lock is powder-proof, and may be loaded through the key-hole and fired off till the burglar is tired of his fruitless work, or fears that the explosions will bring to view his experiments more witnesses than he desires.

A harpoon is described which makes the whale kill himself. The more he pulls the line, the deeper goes the harpoon.

An ice-making machine has been patented, which is worked by a steam-engine. In an experimental trial, it froze several bottles of sherry, and produced blocks of ice the size of a cubic foot, when the thermometer was up to eighty degrees. It is calculated that for every ton of coal put into the furnace, it will make a ton of ice.

From Dr. Dare's examiner's report we gather some idea of the value of patents. A man who had made a slight improvement in straw-cutters, took a machine through the Western States, and after a tour of eight months, returned with forty thousand dollars. Another man had a machine to thresh and clean grain, which in fifteen months he sold for sixty thousand dollars. These are ordinary cases—while such inventions as the telegraph, the planing machine and India-rubber patents are worth millions each.

Examiner Lane's report describes new electrical inventions. Among these is an electrical whaling apparatus, by which the whale is literally "shocked to death." Another is an electro-magnetic alarm, which rings bells and displays signals in case of fire and burglars. Another is an electric clock, which wakes you up, tells you what time it is, and lights a lamp for you at any hour you please.

There is a "sound gatherer," a sort of huge ear-trumpet, to be placed in front of a locomotive, bringing to the engineer's ears all the noise ahead, perfectly distinct, notwithstanding the noise of the train.

There is an invention that picks up pins from a confused heap, turns them around with their heads up, and sticks them in papers in regular rows.

Another goes through the whole process of cigar-making, taking in leaves and turning out finished cigars.

One machine cuts cheese, another scours knives, another rocks the cradle, and seven or eight take in washing and ironing.

There is a parlor chair patented that cannot be tipped back on two legs, and a railway chair that cannot be tipped back in any position without any legs at all.

Another patent is for a machine that counts passengers in an omnibus and takes their fare. When a very fat gentleman gets in, it counts two, and charges double.

There are a variety of guns patented that load themselves; a fishing-line that adjusts its own bait, and a rat-trap that throws away the rat, and then baits itself and stands in the corner for another.

There is a machine, also, by which a man prints, instead of writes, his thoughts. It is played like a piano-forte. And speaking of pianos, it is estimated that nine thousand are made every year in the United States, giving constant employment to 1,900 persons, and costing over $2,000,000.

*From the Stock Journal.*

## Salt and Water for Stock.

It is a mistake, by no means uncommon, to suppose that there is very little for the breeder to do during the summer months in the way of providing for the wants of his stock. It is true that the same unceasing care and watchfulness which is so imperatively demanded of the farmer during the long and severe winters of the North, is not

now indispensable; but the prudent and thoughtful breeder will not forget that even at this season, when the grass is green on every hill-side, and the sleek coats and rapid growth of his animals attest the richness and abundance of the pastures, there are important matters which require his attention. Chief among these we would mention the provision of a constant and abundant supply of salt and clear fresh water. The importance of providing salt for stock is almost universally understood, and there are comparatively few farmers who entirely neglect it, but it is a common mistake to feed it at irregular or too great intervals, and without any regard to economy.

The best rule for salting animals is to keep it constantly before them, and they will then take it in such quantities, and only in such quantities, as their systems require; but if deprived of it for some time, they become so eager for it that they may eat so much as to injure them the first time they are liberally fed.

Salt boxes or troughs should be provided in every pasture, firmly secured and covered with a small roof, raised sufficiently to allow room for the animals to put their heads into the box under the cover. The small roof or cover is necessary to prevent the rain from dissolving the salt. These boxes or troughs should be kept constantly supplied with salt, and your stock will take just such a quantity as they require, and none will be wasted. It is well to locate them in such part of your pasture as you wish the stock to frequent; upon some dry knoll, if convenient, as more manure will be dropped in the vicinity of the salt troughs than upon other parts of the pasture.

Every effort should be made to supply each pasture with fresh running water.—When this cannot be done and the water must be drawn from wells, it should, if possible, be drawn daily, and not at long intervals and allowed to remain exposed to a burning sun until it becomes almost putrid. During the hot weather, water troughs should be cleaned often and kept entirely free from the vegetable fungus which will accumulate.

In many sections of the country fresh running water cannot be obtained, and the farmer is forced to rely upon artificial ponds to supply his stock. When this is the case, care should be taken to remove the rank vegetation and bushes from the banks, and thus expose the water as much as possible to the action of the winds, as it is thus kept in motion and in a great measure prevented from becoming stagnant.

## Cotton.

*From the Report on the* "CONSUMPTION OF COTTON IN EUROPE.

BY JOHN CLAIBORNE, ESQ., *Agent of the Patent Office.*

"It may be said that it would be difficult to over-estimate the importance of cotton in the movement of the industry and commerce of the civilized world. Since the inventions of Arkwright and Watt, in England, and Whitney, in our own country, its manipulation and fabrication have become so comparatively easy and cheap, and its adaptation to supply the wants or the luxuries of man have proved to be so multifarious, that the question of an adequate supply of it to the growing demand has become one of the very highest importance, being exceeded in interest by that of the cereals alone. Its influence in the well-being of the masses by furnishing employment, sustenance, and cheap clothing has long since been fully admitted; and such has been the impetus afforded by it to the invention and improvement of manufacturing machinery, that M. Audiganne, [a French author,] remarks that, "It was certainly a curious sight, that, of the different aliments afforded by cotton to labor, and the services rendered to man at this day by this substance, of which the consumption has increased tenfold four or five times in less than sixty years. Cotton is manufactured among the greater part of the nations that figured at our side in the Palace of Industry. Nearly all had sent there samples of their fabrication—samples more or less numerous, more or less remarkable, but always worthy of attentive examination. *The degree of advancement of each people in the career of industry might be measured by its skill in the treatment of cotton.*

Illustrating its commercial and political influence as between the United States and Great Britain, Dr. Engel says of it: "That England and the United States are bound together by a single thread of cotton, which, weak and fragile as it may appear, is nevertheless, stronger than an iron cable."

No wonder, then, that the question of the adequate supply of this mighty and all-powerful agent soars at this day so far above

many which, at the beginning of the present century, far outranked it in their bearings upon the interests of civilized man; and it may not, in this connexion, be deemed out of place, to allude, briefly, to the history of of the supply in Great Britain, which has long been the principal receiver of the raw material, not only to meet her own growing demands, but to be distributed, to some extent, among those European countries which commercial supremacy has made tributary to her.

* * * From the statement of Mr. Sharp, of London, given below, it will be seen how vast has been our own contribution of the raw material to Great Britain and Europe generally, and how much more reliable as a source of supply our cotton fields are than those of any or all other countries, as their production between 1851 and 1855 was five times that of the East Indies, and that, while during that period, all other countries exported to Great Britain 937,024,275 pounds, our own sent her 3,424,502,024 pounds, or more than three and a-half times as much.

In his first table, Mr. Sharp sets down the import from the United States into the United Kingdom, in 1856, at 780,040,016 pounds, that from the East Indies at 180,496,624 pounds, and the total from all other countries than the United States at 243,846,512 pounds, leaving a balance in our favor of 536,193,504 pounds, and also showing that in that year also we contributed more than three times as much to European supply as all other countries combined, while it must be remembered that our domestic consumption was advancing so rapidly as to require for its use 652,739 bales, which, estimated at 450 pounds each, were equal to 293, 732,550, or more than the import into England that year from all other countries than our own.

Mr. Samuel S. Littlefield, editor of the New Orleans Price Current, than whom there is no better informed or more reliable authority on the subject of cotton and the cotton trade in the Union, estimates the value of our crop of 1857, 2,931,519, bales, after making all allowances for differences in their weights in different sections of the country, at an average of $50 per bale, making the total sum of $146,975,950.

From what has been said under the various heads of this report the following conclusions as to the influence of raw cotton among the nations who are our chief customers for it may be drawn:

1st. That it contributes vastly to their social well-being by furnishing labor, sustenance, and cheap and comfortable clothing to many thousands of their subjects or citizens.

2d. That to commerce it contributes immensely by furnishing a great variety of articles, by which its exchanges are in a considerable degree regulated, and large profits continually realized. That to capital, it offers the means of profitable investment and returns, and aids greatly in its accumulation.

3d. That its political influence arises from the fact, that, by opening and extending commercial relations between different nations, it has created sympathies and ties of common interest, which make the policy of peace and its attendant blessings far more easy to maintain than was once the case; that it adds to the national wealth and resources and by furnishing employment and support to many thousands who might, otherwise be without either, it makes contented those who would, through idleness or suffering, become burdens to the State.

4th. That the permanent and adequate supply of raw cotton thus becomes to Great Britain and Continental Europe a subject of vital importance, and indeed of absolute necessity; and that any considerable diminution in the crop of the United States would cause the gravest inconveniences, while the occurrence of any state of things whereby it should be entirely cut off would be followed by social, commercial, and political revulsions, the effects of which can scarcely be imagined."

## Use of Charcoal.

In many parts of the country where charcoal is or has been largely made, particularly in the vicinity of iron furnaces, the old braze of charcoal hearths can be obtained in great quantities. Near railroad depots, where the contents of the spark-catchers are thrown out at the end of every trip, and at distilleries, accompanied by rectifying houses, where pulverized charcoal is used in the rectifying of whisky, large quantities may be had at low cost. By underlaying the bed in stables with charcoal, the urine is readily absorbed and rendered inodorous; the excretory gases given

off from the bodies of animals are taken up, and the atmosphere rendered sweet. Where the ventilation is not perfect, the animals suffer severely from being surrounded by the excretory gases given off from the surface of bodies. Some idea may be had of the advantages to be derived from the absorption of these gases, from the fact that, if the horse be enclosed in a silk bag, varnished and tied around his neck, and leaving his head free to breathe the atmosphere, he will die in twenty-four hours, simply because the bag will contain the gases given off from the surface of the body, keeping them in contact with the animal, which should be got rid of as fast as liberated. All this will be absorbed by charcoal, and in the cleansing of the stable this charcoal may pass to the compost heap, where it will continue its office of absorbing ammonia, and even after it reaches the field it is an ever-attendant chemist, taking care of all the results of decay until growing plants use them. Soils of all kinds are improved by the presence of charcoal, and as itself is not absorbed by plants, it forever remains to re-perform its office.

Clay soils are rendered more free by its admixture. It assists soils by retaining what would be lost in the atmosphere by evaporation without it; it prevents early freezing of soils, and its dark color assists in receiving heat from the sun's rays; indeed the chief difference in texture between the old garden soil and that of the field, simply arises from the charcoal (carbon) consequent upon the decay of vegetable matter in the old garden soil. It is for this reason that garden soils are so much darker colored than those of the field alongside, and it is for this reason also, that manures applied to soils of dark color are so much longer retained, and are so much more efficient than when applied to soils in which the carbon is deficient. In mountainous districts it is quite common to drive cattle to the coalings, as the old charcoal hearths are called, for the earliest spring pasture; for around the edges of the old charcoal hearths the grass grows much more luxuriantly than elsewhere, and notwithstanding this hint the farmers in such districts continue to neglect carting the charcoal braze to their farms. If charcoal braze be thrown on top of a fuming dung heap, it will absorb all the gases arising from the fermentation of the mass, and retain them until the roots of the plants abstract them. Pig-pens should never be without charcoal dust where it can be procured; in privies it deodorizes the contents and thus forms a valuable poudrette.—*The Working Farmer.*

*From the Country Gentleman.*

## Cheap and Valuable Paint.

MESSRS. LUTHER TUCKER & SON—Yours, requesting me to send receipt for paint, was duly received. At the time it was not in my power to furnish it, for the reason that the book containing it was not in my possession. After many inquiries yesterday I found it in the hands of a neighbor who borrowed it same years since. I did not originate the composition, but found it in the second volume of Chaptal's Chemitry, (pages 68 and 69,) an old work published in 1807.

It is intended as a substitute for white lead paint, and is composed of

Skimmed milk, 2 quarts.
Fresh slacked lime, 6½ ounces.
Linseed oil, 4 ounces, and
Common whiting 3 pounds.

Directions for mixing are—"Put the lime into a stoneware vessel, pour upon it sufficient of the milk to make it like thin cream, add the oil a little at a time, stirring to mix thoroughly; add the remainder of the milk; then the whiting (made fine) is to be spread upon the surface, and the whole well stirred. It is then fit for use. It should be frequently stirred while using."

It is applied with a common paint or white-wash brush, and will dry in three or four hours. Two coats make a perfect paint. It possesses great solidity, will bear rubbing with a woolen cloth, and does not become dingy or yellow with smoke, &c., as much as lead paint.

I have used the composition only for inside of buildings on brick and wood. Twelve years since I painted the over-head flooring and timbers, underside of a store. It is now perfect; holds its color better than white lead; is much more economical, as the chief expense is the labor of putting on.

It is also recommended for out-door work by adding to the foregoing—2 ounces lime, 6 ounces oil, and 2 ounces white Burgundy pitch, the pitch to be melted in the oil by gentle heat, and added to the mixture.

*Vergennes, Vt* WM. H. WHITE,

*From the American Agriculturist.*

## Winter Management of Sheep.

BY A MICHIGAN FARMER.

The sheep is perhaps more sensibly affected by ill treatment than any other of our domestic animals; and it may be as truly said that none repay the owner as well for good keeping, and constant care and attention during winter. The losses usually sustained by the country at large, in consequence of negligence in the care of sheep during the feeding season, is immense.—During the winter of 1852–'3, a friend of mine lost seventy fine sheep. He trusted a careless man to take care of his flocks, being absent himself most of the time, and this man neglected to shelter, neglected to feed properly, to water, to salt, etc., etc., and the result was seventy rotten pelts in spring. Another farmer within my acquaintance lost, during the last winter and spring, upwards of forty, just from sheer negligence. And it is so the country over—immense numbers die every winter for want of care.

SHELTER.—Two purposes are served by shelters—they save food, and they preserve the wool from the highly injurious effects of storms and changes of weather. Where sheep are kept without shelter, the wool is wanting in those fine felting properties, which sheltered wool always possesses in so superior a degree. An old woolen manufacturer once told me he could tell, without fail, whether sheep had been sheltered or not, as soon as he began to work the wool.

Shelter is equivalent to food, in some degree. Food is required to keep up the animal heat—it is the fuel; the stomach is the fire-place, where it is consumed; and the body is the house to be warmed. The warmer a dwelling-house is, the less fuel is required. Even a belt of trees about the exposed portions saves a large amount of fuel. So with sheep, or other animals, the warmer they are kept, the less food is required to preserve the natural warmth of the body. Shelter, therefore, serves as an equivalent for food to a certain extent.

Furthermore: Good shelters reduce the losses to mere nothing. The most successful cases of the winter management of sheep are where the flocks are comfortably housed during the entire winter; and not allowed in the fields at all. I know of cases where this practice has been conducted for six or seven years, and the losses have not amounted to more than one-quarter of one per cent. The stables were well ventilated, and littered daily.

FOOD.—Sheep need a great variety of food. No animal partakes of so many different plants; hence they are fond of change, even from better to worse, sometimes, rather than to feed on one kind continually. A constant adherence to dry food, the winter through, is sure to engender the ailment known as *stretches*, which, if not attended to, often proves fatal to sheep. A feed of roots, apples, or any succulent vegetables, three times a week, will obviate all danger in this direction. To produce the finest and evenest fleeces, or an even-sized and even-lengthed fibre, nothing is more important than good food, and an even condition of flesh throughout the year. Fat at one time, and poor at another, will surely produce an uneven fibre, and materially injure the qualities of the wool for most manufacturing purposes. High feeding is certainly not favorable for the growth of the finest wool. Ruta-baga turnips in large quantities, fed to sheep during the winter, injure the quality of wool for fine fabrics, and so does Indian corn, when given plentifully. These articles of food, sparingly, do little harm—other grains, roots and beans are preferable.

WATER.—Many farmers hold to the notion that sheep need no water during winter; but surely there is no ground for it, for no animal drinks more freely, or with a better relish; and it is as essential to their health and condition, that they have a full supply regularly, as that they have a full supply of good food regularly.

Every good and experienced flock-master knows how important it is to keep sheep up in good condition in the fall, and to have them come to the sheds at this season in full flesh and health. No animal is so hard to bring up again, after becoming poor, as the sheep. Indeed, having had the experience myself, I speak feelingly on the subject. There is nothing more unsatisfying than the very humane occupation of nursing up a poor, weak, diseased animal, which has been reduced, and brought upon the sick-list by one's own carelessness and neglect.

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The thoughts of the diligent tend only to plenteousness; but of every one that is hasty, only to want.

## A Supply of Air Necessary to the Roots of Plants.

The main object of the practical farmer is to raise from the dead earth the living plant; and in order to do this, it has been found necessary in all countries, and in all ages of the art, to break up, and more or less to pulverize the surface soil. As this is the natural station for all our cultivated crops, and where they obtain a large portion of the necessary elemental food requisite for their development and maturation, certain conditions of the said surface become absolutely necessary. Moisture, warmth and air, in due proportions, are indispensable, both to the roots which are extended through the soil in search of mineral food, and to the stem and leaves which appear above the surface, one of whose chief functions being the absorption of gaseous matter from the surrounding atmosphere. An excess of moisture is commonly more injurious to plants than the extremes of heat and air; for when a soil becomes saturated with water for any considerable time, air is in great measure excluded from its pores, and the slow and constant evaporation which is going on at the surface, keeps down the temperature to a degree inimical to the healthy progress of vegetation. For a soil, therefore, to be made porous so as to freely admit air, warmth and moisture, with the capability of any superfluous amount of the latter freely percolating away, constitutes an axiom on which all our operations of ploughing, trenching, digging, draining, &c., are founded.

Soils, it is well known, vary much in their chemical composition and mechanical texture. The success of many crops depends as much upon the latter as upon the former; and in no case can the natural or artificial consistency of the soil be safely disregarded. Most of the winter wheat in Canada is raised on summer fallows; but the operation of fallowing is often so imperfectly done that a diminished crop of inferior quality is the inevitable result. Wheat, it is true, naturally covets a close soil; yet the deeper and more thoroughly it is pulverized, so as to allow air, warmth and moisture freely to come in contact with the roots of the young plant, the more freely will it grow, and the more abundant will be the produce. If, however, water should in any considerable quantity stagnate, so as partially to exclude air, and by surface evaporation produce cold, *underground draining is essential to the procuring of a profitable crop.*

That the contact of air to the roots of plants was always considered necessary, is evident from the oldest agricultural writers; but the principle was never so fully understood and acted upon as it has been of late years. The first and most striking instance confirmatory of the opinion was the fact of large, full grown, ornamental forest trees having been killed by their roots being too deeply covered up with earth when leveling lawns; and planters and gardeners have long been aware of the injurious effects of planting as well as sowing too deep. Formerly, it was thought that the earthy materials in which valuable exotic plants were to be placed could not be too finely sifted and mixed; whereas experience at length showed that the small particles of such soils soon run together and become a compact mass after heavy rains, thus operating against the extension of the young roots, and in great measure excluding the external air and moisture. Among coarser and looser materials, however, a considerable body of air was found to repose, and the more active fibres to extend much more luxuriantly than in closer and denser soils.

The gardener's improved practice is only another proof how much a porous soil and presence of air are necessary to the roots of plants; and yet we often see the most luxuriant vegetation produced by soils which are apparently very close in texture; such as alluvial soils and fertile clays. Both these descriptions of soils being composed of the finest atoms, become exceedingly close and compact if undisturbed; but when ploughed or otherwise periodically moved, the stirred portion attracts as much of the qualities of the air as suffices for the following crop. It is rather remarkable that while oak thrives best on a clayey sub-soil, it does not seem to affect rich alluvial land, owing probably to its closeness of texture, preventing all access of air to the place of the roots.

Aquatic plants, which live entirely submerged, although defended from external air, receive as much as they need from the surrounding water, which always contains a notable measure, besides nutritive bodies in solution, which form the pabulum of plants, whether aquatic or terrestrial.

Another tribe of plants are attached to the earth, so slightly that their system of

roots is nothing compared with the bulky heads sustained; and as these plants are mostly found on rocks, or on the dryest tracts of country, it is evident that the greatest portion of their nutriment is drawn from the atmosphere. Another tribe of curious and beautiful flowering plants is called Epiphytes, because they attach themselves to the stems and branches of trees, not to sustain themselves by extracting their juices, but to be supported in the deep shade and moist air of thick tropical woods. Some of these are called *air plants*, and grow as well in a basket without earth, suspended in a warm, damp, shady place, as if they were in their native habitat.

Thus it is apparent that atmospheric air is essentially necessary to plants, and as much so to the roots as to the stem and foliage; and it is this fact, as already observed, that justifies all the means of cultivation which the farmer and gardener have recourse to with a view of rendering the staple of the soil more loose and consequently more permeable to atmospheric influences.

There is one circumstance, however, which deserves to be noticed along with these general remarks; it is this, that all seeds require to be embedded in the soil, that is, they should be in close contact with the mould on all sides; and, that this should be completely secured, some seeds, in particular soils, require a mechanical pressure of the earth upon them, as wheat for instance. Now, we have only to consider that as the soil has been previously prepared, and more or less reduced to the finest practicable state, a considerable volume of air is incorporated therewith, and that this air, according to its temperature and the moisture of the soil, facilitates the germination of the seed, and continues to assist the development of the plant. To obtain this close embedding of the seed on light, porous soils, it is the practice to press it in—a practice which is found of service to wheat, peas, beans, and almost all small seeds; but which would be of no avail without the previous disruption and æration of the soil.

All these matters premised, it only remains to conclude with a general declaration that, in all our practices and means employed for the amelioration of the land, everything that can be added or taken away, every operation performed, and every implement used in the culture, should all have for their ultimate object, either directly or indirectly, the breaking up of the compact and impervious surface, so that copious and constant supplies of air may be freely admitted to the roots of plants.

*Canadian Agriculturist.*

### Subdivide the Cattle Yards.

In regard to the necessity for such division of cattle yards as will give equal opportunities to the animals confined therein, for progress and improvement, the *Prairie Farmer* says: "Large and small animals are turned in promiscuously together, and every farmer knows that the larger ones are very ferocious and domineering towards those much inferior, but careful not to provoke the wrath of such as are nearly equal. Turn those together that are of a similar size, and they will be more quiet. Calves generally are too much neglected, and come out small and puny in the spring. A good manager has a spacious stable for calves in one of his sheds, moderately lighted, and well sheltered from all currents of wind. This apartment is kept clean, the calves fed on good hay, and supplied with good water. They present very different appearances from other calves in the spring."

### To Cook Sweet Corn.

Trim off the husks, and immerse in boiling water, with a little salt. Boil gently half an hour: then take out the cobs, rub over some butter, pepper and salt, and brown before a quick fire. Another plan—and one which most persons prefer—is to boil as above; afterwards cut off the corn neatly; return to a pan containing a sufficient quantity of milk to cover; throw in a tablespoonful of butter, the same of sugar and salt, to flavor; simmer slowly for fifteen minutes, and serve up hot.

### Removing and Preventing Rust.

Some persons employ an acid to remove rust from knives. This should never be done under any circumstances. Nothing surpasses rotten-stone for scouring knives and forks. To prevent stoves and grates from rusting during summer, if situated in damp places, give them a thin coat of lard and rosin melted together, in the proportion of three parts of the former to one of the latter.

*From the Farmer and Gardner.*

## Bone Manure.

Mr. Editor: The important position occupied by the United States, in an agricultural point of view, demands at the hands of our farmers, closer attention to any and everything calculated to advance their profession, than, as a general thing, they have hitherto been willing to bestow. As a class, our farmers are careful enough in some directions; but very neglectful of their best interests in others. This characteristic was brought forcibly to my mind, some time since, while standing on a shipping wharf in one of our large cities. A vessel was loading with bones, and upon inquiry of the captain, I ascertained that they were to be shipped to England. The question which naturally presented itself to my mind was, "Have we no use for these bones here, that they are being shipped to England? or are they so much more valuable to the English than to the American farmer, that the former can afford to pay, in addition to our regular prices, the cost of shipment, three thousand miles across the Atlantic?" Leaving your readers to determine this point at their leisure, I propose offering a plain remark or two, in relation to the value of bones as a manure.

The English and Scotch farmers have for many years regarded bones as one of the first, if not the very first manure in point of importance. They use them in a great variety of forms, and in the growing of some of the crops, (turnips especially,) considered them indispensable. Some idea of the extent to which they are used, may be gleaned from the following facts: Almost every seaport of any consequence on the eastern coast of Great Britain, has one or more mills for the crushing of bones into a condition to be used for manure. The town of Hull stands foremost in the list, having it is said, not fewer than from thirty to forty vessels, in the docks at one time freighted with bones. In 1835, the quantity imported into Hull alone, was twenty-five thousand seven hundred tons. In 1837, the value of the bones imported into England, was £254,600, equal to a million and a quarter of dollars. Since that time the importations have been doubled. I have no means at hand of knowing what quantity of bones has been imported into the United States, but I dare affirm, that it is not one-tenth the quantity named above. Why? Why should we not import bones? or, at least, why should we not prevent their exportation?

So far as permanency is concerned, my own impressions are, that bones stand without a rival. They are, to be sure, not adapted to every kind of soil, but still may be regarded as susceptible of general use. Some farmers allow six years as the period during which bones will act favourably on pasture lands; on grass lands, successively mown, four years; and the same length of time on arable land. Others again, give them still longer periods, but all agree that as a permanent fertilizer, they commend themselves to the earnest attention of every farmer whose supply of farm-yard manure is not equal to the requirements of his land.

I am not able to speak learnedly from my own chemical knowledge of the mode in which bone manure operates upon the soil and plants; but, from a most excellent treatise on the subject, I learn the following:—The principal element in the manurial action of bones, is the phosphate of lime. This salt is scarce in soils, sparingly dispersed, and speedily exhausted; and yet it is indispensable to the vigorous growth of nearly all cultivated plants, and forms the principal stimulant to the vitality and power of several. Dr. Thompson asserts it to be a constant ingredient in plants, and a very conspicuous ingredient in the inorganic or ashy part of not a few of the most valuable. According to the most eminent chemists, 39.3 per cent. of phosphate of lime is found in the ashes of the grain oats, 44.05 in barley, 6.2 in the ashes of the straw of wheat, &c. These larger proportions show how indispensable the phosphate of lime is to the health and growth of nearly all our most useful plants, and constantly, how pervading an influence is exerted upon them by bone manure. It is asserted that turnips, potatoes, and white clover, are so powerfully affected by the presence of phosphate of lime in the soil, as to be mainly dependent upon it for their luxuriance and vigour.

Another of the values of bone manure, especially when applied in a crushed condition, is their extraordinary capacity for absorbing and retaining moisture. "It is frequently observed that when any vigorous plant upon a boned field is pulled up, it will

bring up small pieces of bones with its roots; and when minutely examined, it will be seen to have grasped the little pieces and pervading their cavities with its radical fibres, while these cavities will be seen to be clammy, or even copious with the liquid nourishment on which the spongioles were feeding. The very contact which the radical fibres of young turnips obtain with bone manure, and which they cannot, with any of the ordinary methods of application of farm-yard dung, has been assigned by some farmers, as the reason of the paramount power of bones over the turnip crop."

But I have already extended this article beyond my intended limits. I am aware that farmers, as a general thing, do not like lengthy dissertations. Breaking off abruptly, therefore, I may, if this article is acceptible, present a few more arguments in favour of the use of bone manure in our country.

Yours,

*8th mo., 2d,* 1859. A. T. B.

## A Valuable Discovery.

An ingenious discovery, consisting in the compression of fodder for horses and cattle, to reduce its bulk, and facilitate its transportation, has been made by a Veterinary surgeon, Mr. Maudin of the French Imperial Guard, and adopted by the Minister of War for the late campaign. Thus subjected to a practical trial, it has fully answered the expectations entertained by the inventor, and earned the highest testimonials from the officers of the cavalry. The fodder required for a journey or campaign is compressed into small tablets, in a manner similar to that previously in use in Europe, of compressing vegetable substances. The new process which has just been published, is described as follows:

"The hay and straw are chopped fine, the oats or corn crushed, and then mixed in proportion to the nutritive qualities afforded by each. Upon this mixture is poured a mucilagineous residue of linseed, and the whole is pressed into a hard cake, only requiring to be dried in an oven. Not alone are these cakes more easily transported than the materials of which they are composed in their crude state, being reduced to a much smaller volume but they are more easily preserved also, being less subject to atmospheric influences, dampness, &c."

Although suggested by the emergencies of war, and promising to render most excellent services to the commisariat department of all nations, this new method of preparing provender for horses and cattle is of especial value to this country, affording as it does, such great advantages to emigration parties into the far west, exploring expeditions, and encampments in distant regions.—*Pennsylvanian.*

*From the Wisconsin Farmer.*

## To Cure Cows of Garget.

Messrs. Editors:

I hear many complaining this spring that their cows are nearly spoiled by garget, (a peculiar thickness of the milk.) Having tested and proved the iodide of potassium, sometimes called hydriodate of potassa, I can confidently recommend it as the best remedy for that disease I have ever used, believing it, if properly used, a specific for that disease, when the disease exists simply —that is, unconnected with other and perhaps more active ailments. The dose may be from ten grains to half an ounce. I have never given over one scruple. The dose I prefer as a standard is twelve grains, given, if the disease be bad, twice a day, otherwise once a day; dissolved in a spoonful or two of warm water, and put into a handful or two of bran, which the animal will lick up readily. The best time to give it is between meals, say some two or three hours after feeding. If in summer, let the cow remain in the yard over night, give dose early in the morning, letting the cow remain at least one hour after. I think the small dose I name preferable as it will cause no irritation, but if continued a week or two will gently and surely remove the disease.

Yours truly,

David Williams.

*Springfield,* Wal. Co., Apr. 3, 1859.

## The Value of Leached Ashes.

A Western Agricultural paper says, "*thoroughly leached* ashes contain *no potash.*" I have noticed that ashes cannot be thoroughly leached of their potash, even by the application of hot water, as enough of alkaline salts has remained to affect the skin

of my fingers. The presence of acids, or the action of the roots of growing plants, can alone extract all the potash from wood ashes. But as leached ashes contain, beside potash, all the mineral elements of plants, they cannot fail to be an excellent manure for all light and thoroughly exhausted soils. One of the best farms I ever saw in Rhode Island was brought up, from an exhausted barren sand that supported no vegetation, to clover bearing, by the aid of leached ashes alone. Milch cows and swamp muck, afterward, with the aid of clover, induced great fertility.—*Genesee Farmer.*

### Fruit and Fruit Trees.

Two of the best farmers within range of our knowledge—one a resident of Coos county, New Hampshire, and the other of Orange county, Vermont—have communicated the manner in which they secure good fruit. It is thus: They dig at some distance from the body of some favorite tree until they find a root, which they cut off. The part disjointed from the tree is then turned up so as to appear above the ground. It sends forth shoots the first season, and bears, in a few years, fruit precisely like that upon the parent tree. Let those whose trees are decaying, or who wish to increase good varieties, try this experiment; it is but an hour's work.

### Coffee—How to Make It.

The following is given as the genuine French operation of "getting up" coffee:

It is scorched in a hollow cylinder, which is kept constantly revolving over a slow fire, and not a grain of it allowed to burn. Secondly, it is ground very fine, and, thirdly, when it is to be used a portion of this is placed in a finely perforated pan or cup, which exactly fits into the top of the boiler, coffee-pot, or vessel you wish to use. Boiling hot water is then poured on, and it percolates gradually throughout, carrying with it all the essential principles of coffee. As soon as percolation is completed, the pan is removed, containing all the grounds, and then boiling milk is added to the infusion, and your coffee is made. In no instance is your coffee boiled, and this is one reason why the *cafe au fait* and *cafe noir* are so much admired by all who take them.

*Ohio Valley Farmer.*

### Molasses Candy.

Dr. Cummings, of the Brattleboro' (Vt.) *Phœnix*, thus treats his readers to a recipe for making molasses candy:

"Take two cups of molasses, one of sugar, one table-spoonful of vinegar, a piece of butter the size of a walnut. Boil briskly and constantly twenty minutes, stirring all the time; when cooled enough to pull, do it quickly, and it will come white rapidly."

Use the above proportions, and follow directions, and you will have good candy.

### Something Worth Knowing.

One day last week, while purchasing a lot of dried fruit, we discovered small pieces of sassafras bark mixed amongst it, and upon enquiry were informed that it was a preventive against the worm. It is said that dried fruit put away with a little bark, (say a large handful to the bushel,) will save for years unmolested by those troublesome little insects, which so often destroy hundreds of bushels in a single season. The remedy is cheap and simple, and we venture to say a good one.—*Lexington Flag.*

### How to Keep Horses Fat and in Condition.

"If I were asked to account for my horses' legs and feet being in better order than those of my neighbors, I should attribute it to the four following circumstances: First, that they are all shod with few nails, so placed in the shoe as to permit the foot to expand every time they move; secondly, that they all live in boxes instead of stalls, and can move whenever they please; thirdly, that they have two hours' daily walking exercise when they are not at work; and, fourthly, that I have not a head-stall or rack-chain in my stable. These four circumstances comprehend the whole mystery of keeping horses' legs fine, and their feet in sound working condition up to a good old age."—*Miles.*

### Patience.

"I remember," says the celebrated Wesley, "hearing my father say to my mother, 'How could you have the patience to tell that blockhead the same thing twenty times over?' 'Why,' said she, 'if I had told him but nineteen times, I would have lost all my labor.'"

## THE TWO GREAT EVILS OF VIRGINIA AND THEIR ONE COMMON REMEDY.

[There is not a more perplexing problem, nor one more difficult of satisfactory solution than the adoption of some feasible, humane, and just method of disposing of the free-negro population in the slaveholding States. That free negroes are already a nuisance in every neighborhood infested with any appreciable number of them, and that their presence among our slaves "operates injuriously" to their "morals, happiness, and contentment," is patent to the experience and observation of all. That the increase of the evil will be in the inverse ratio of the growth of population and the relative decrease of the means of their obtaining an honest livelihood is equally apparent. Hence, the obvious necessity,—by a early forecast,—of considering the best mode of applying some timely, safe, and judicious remedy. In this view the suggestions of our correspondent are entitled to a calm and deliberate consideration. They present the outline or general features only of his plan, as he has wisely withheld the minuter details, until comparison of opinion and the full discussion of the subject shall more clearly develop and establish the principles upon which the measure for abating the nuisance shall proceed. We will only add, in favor of the immediate consideration of the subject, that the longer the application of the remedy is delayed, the more harsh and summary is it likely to be, when under the aggravated pressure of the evil, public sentiment shall be thereby aroused and excited, to decisive action.—Ed. So. Planter.]

*To the Members elect of the General Assembly of Virginia:*

Gentlemen:

The selecting of this time, in advance of your legislative service, to ask your attention to an important subject, is not without a sufficient reason. As legislators, you are as yet disengaged and at leisure. There is now nothing in operation, (as will be from the first moment of your meeting together at the Capitol,) whether, as in some cases, of public business engrossing and monopolizing all your time and efforts for particular services—or, in others, the calls of social enjoyments and pleasures—or in other cases, of the too seductive claims of indolence and dissipation—which hereafter may be like to prevent your carefully listening to and considering any novel or troublesome scheme, which may be conveniently passed by and dismissed. Therefore I trust, as well as earnestly entreat, that you will permit me to direct your thoughts, for a short time, to the consideration of the very grave matters of public interest on which I shall presume to address you. The time which you may now conveniently give to individual reflection on the matters to be suggested, in advance of your meeting together for joint action in legislation, will the better enable you to come prepared to discuss and reason upon this question, and to decide discreetly and judiciously, and for the best interests and greatest benefit of the commonwealth. Even if my opinions and propositions of reform shall be deemed crude or impolitic, or unworthy of being adopted, still they may serve the more humble, yet, not the less useful purpose, of inducing those who have more wisdom, and also the power to act, to study the general question; and, by suggestion, even though indirect, my attempt may cause some of you to devise, and all to concur in enacting, some better plan than mine for moderating, if not entirely removing, the two great and growing evils which I shall attempt to encounter. These are, 1st, the nuisance of the class of Free Negroes, as now existing and increasing in Virginia, and, 2d, the attempts, and partial success, of Northern Abolitionists, in seducing our slaves to abscond, and assailing and endangering the institution of negro slavery. The first of these is the great domestic evil of Virginia, caused by her own erroneous legal policy of permitting the emancipation of slaves. The other is the great foreign evil and danger, of very far more weight and importance to Virginia, and to all southern interests, than the former, or than all other public evils. I shall attempt to prove that in one and the same new measure of policy will be found the effectual and complete remedy for both these very different evils. The established policy of banishing from the territory of Virginia, (with the alternative penalty of enslavement at home,) all the free negroes except the industrious, self-supporting, and worthy, will not only effect the direct purpose of removing all the worst features of that existing nuisance, but also, indirectly, will hereafter effectually prevent all the important and dangerous operation

and influence of northern abolition and incendiary action, which has been, and can now be, exerted upon the south, by the hostile anti-slavery people and states of the North. This latter and indirect effect of the proposed new policy will be far more important and valuable than all the direct benefit in view, of merely abating the existing nuisance of the presence of the worthless free negroes. Yet, I fear, that the novelty of the proposed remedy, as a preventive check to the hostile action of anti-slavery fanatics, is likely to prevent my reasoning from receiving the respect of an attentive hearing.

The consideration of the secondary and indirect influence and effect (on the hostile and fanatical northern states,) will now be suspended, and postponed for the treatment of the proposed policy, as the direct means for removing the nuisance of a free negro population.

### THE FREE-NEGRO NUISANCE, AND ITS PROPER REMEDY.

It is not designed here to discuss the expediency or propriety of negro slavery as a general question—nor any of the minor points of the general proposition. I do not address any but approvers of the existing institution of negro slavery. For all these, as for myself and my designed deductions, I may assume as premises, already sufficiently proved, and fully admitted, and requiring no further argument to sustain, the following preliminary propositions:

1. That the institution of negro slavery, as existing in Virginia, is a great public and private benefit, and its integrity and security ought to be effectively defended and maintained:

2. That the negro, (with very few exceptions to the general rule,) is naturally of inferior intellect, and incapable of self-government and guidance; and that enslavement is his proper and normal condition—and enslavement to the white man, as in this country, is his most useful and happy condition:

3. That the emancipation, heretofore, of negro slaves, has generally operated injuriously to themselves and their descendants—to the morals, contentment, and happiness of the remaining slaves, and to the interests of their masters—and also to the detriment of the great and common interests of the people at large.

Every negro in this country, or his or her ancestors, came in as a slave. Every negro, legally free, has reached that condition by his ancestors or himself having been emancipated by a former master. In latter times, thousands of individuals have become illegally released from slavery, by absconding, (and mostly by being induced and aided by northern abolitionists to abscond,) from their masters, and escaping to and being protected in the northern states. But the actual present condition of every free negro in the United States has been produced in one or other of these modes, subsequently to the previous and legal condition of slavery of the individual, or of his or her ancestors. Thus, the free condition of all negroes in this country is novel or superinduced, artificial, and abnormal—and contrary to Nature and to general expediency—and repugnant to the well-being and happiness of the class of freed-negroes, as well as of every other class of the the whole community. The great political problem which is required to be solved, is the recovery of the free negroes from their false position in this slave-holding community, or their removal beyond its limits.

There can be no question of the general truth, that the free negroes, as a class, or the far greater number of the individuals, are ignorant, lazy, and improvident,—poor if not entirely destitute of property—and altogether careless, or otherwise, incapable of improving, or rising above their very low condition. Very many are drunkards, and more are partly supported by petty thefts and other violations of law, or of morality. It is admitted that there are many of better habits—and a few who are industrious, provident, and even worthy and useful, though always inferior members of the community. But, taking the whole together, the injury to the community, from the presence and offences of the more numerous worthless and vicious of the class, far out-weighs all the benefits which have been, or can be, derived from the industrious and useful members.

The early emancipations of slaves in Virginia, as in other states of the Union, were induced by the mistaken kindness and benevolence of the owners—who supposed that they were rendering benefit to the slaves thus converted to free men. Founded on the general and false opinion of the

natural equality of the black and white races, the sickly anti-slavery philanthropy became prevalent in England and in France, and was extensively propagated in this slave-holding country. Under such influences, many slave-holders, (and not a few of these had been among the most neglectful or cruel masters,) when preparing for death, sought to relieve their consciences, and smooth their passage to heaven, by emancipating their slaves. These acts of supposed piety, in dying sinners, were induced and encouraged by their religious guides in many cases—and were especially prompted by the writings and teachings of the negrophilist school of that time in England, and also in this country. The soil was then especially favourable to the germination of such seeds. For slavery had come to be generally considered as an economical and political evil, by a large proportion of the more intelligent slave-holders in Virginia. It was not until after the abolition-fanaticism of the northern people and states had become both active and malignant, and after Professor Dew's excellent "Essay on Slavery," (the first important defence of the system offered in modern days,) had been published, that the revulsion began. At the present time, there are few intelligent and well-informed persons in all Virginia, who do not deem negro-slavery to be, in every respect, a beneficial institution.

The death-bed or testamentary emancipations of negroes were not formerly, as mostly now, confined to weak-minded old women and men, who have been seduced to these acts by the teachings of northern anti-slavery apostles, or agents of the Colonization Society—the end of the latter influence being emigration, voluntary or forced, to Liberia. Many men of strong or brilliant intellect formerly participated in the great error—and also sin, and cruelty, it might justly be termed, if the good and humane motive did not serve to excuse the wretched effects. The sound and practical mind and judgment of George Washington, and the powerful intellect of John Randolph—endowed almost with intuitive perception of political truths—did not save them from falling into, and acting in accordance with this great error, and thereby producing all its miserable results, to the objects of their designed favor and benevolence.

There is no doctrine of the modern science of political economy more firmly established, and generally admitted, than the proposition that the population of a country will increase with, and to the same extent, and be limited by, the means for subsistence. So long as these means exceed the necessities of the inhabitants, the population will increase—faster or slower, according as food may be of easy or difficult attainment. When population has reached the limit of the supply of food, it must cease to grow. If not restrained, in advance, by prudential and preventive checks, the excess of population, without sufficient means for subsistence, must perish by misery, if not by actual starvation. Even in countries far advanced in improvement, and which are yet prospering, and growing in population in general, (as England,) the lowest and most destitute classes, if considered alone, have already, in population, reached, and passed, the limit of subsistence—and therefore these lowest classes are continually diminishing in numbers. But this diminution is not observed, and made evident by statistical reports, because all the places vacated by death are continually supplied, and more than supplied, by new recruits, who have sunk to this from their former more elevated positions in classes generally prosperous. Thus while the paupers and day-laborers of England, if left to be supported from their own resources only, (or as if there were no law for the compulsory support of the poor—) would be continually and rapidly losing individual members, by death, and very much faster than the vacancies are supplied by births in the same classes, still these destitute classes are more than kept up, and even continually increased in numbers, because absorbing still more individuals from other and higher classes.

Now if all the present individuals of the most destitute classes in England could have put on them, for distinction, a mark obvious to the slightest observation, and this mark was also affixed to all their posterity, it would be seen clearly that the whole marked number was regularly and continually decreasing, dying out, and disappearing, because of suffering from hunger, and every other kind of misery, consequent to poverty and destitution. It is true that a few members of even the most destitute class, or some of their children, would be so meritorious and fortunate as to rise above their condition,

and to prosper, and become removed to richer classes. But when counting in these few exceptions to the general rule of destitution, ending in extinction, it would be found that the whole original number thus designated as the most destitute, would be thenceforward constantly decreasing—and for the greater part, would be passing on to intolerable suffering, and next, by death, to extinction. The poor-law system of England, which provides means of subsistence from compulsory public contributions for those who cannot subsist by their own labor, serves to retard this final result of the extremity of want, and in some measure to moderate the rigor of the natural limit of subsistence. But the same system, by operating to encourage marriages and thus to increase the excess of population, even increases and exasperates the evils of poverty, and, in the end, will cause suffering and death to many more miserable wretches than it had served to relieve in earlier cases.

In our younger and more plentiful country—where as yet abundant subsistence is to be obtained by a very moderate exertion of labor—the general evil of population pressing upon the means for subsistence is still far remote. But the same laws of food and population operate here as in England—and when causes are of equal power, there will be like effects produced. With us, though, in the general, food is abundant, and population deficient, and both are like to so continue for many years, for the community taken as a whole—still, even now, with the most destitute class, the means for subsistence are deficient, and population is checked, and limited, and in cases of many families, absolutely diminishing. And the most destitute class in both the southern and northern states is that of the free negroes. Further, this class, in their color, have such a manifest and also hereditary mark of distinction as was supposed above, but which is impossible in any other case of a people of one race. This class, in the northern states, is much the most miserable and destitute; and if the number in the north was not continually and largely added to from southern slaves, by new emancipations, and by fugitives, there is no question but there would be seen, in regular progress, a rapid diminution of the whole class, because of the deaths caused by vice, destitution, and misery, greatly exceeding the number of births. And even in the southern states, where the means for subsistence of free negroes is yet abundant for all the industrious and frugal, still this class, taken together, is also our most destitute class, and to the increase of which the limit, of subsistence is already an important check, though not yet sufficient to cause general and absolute decrease of the whole class. In the northern states, the means for subsistence, whether honest or dishonest, are more difficult to be obtained by the negroes, in competing as they must do with numerous whites, not less necessitous, and as much degraded in position, but far more industrious, or energetic and skillful than the negroes. They are met and obstructed by such competition in every department of menial or other low service, or temporary and irregular jobs, which only are sought by free negroes, who avoid all continuous and laborious work. There, as in the south, the earnings of many of this class are eked out, if not exceeded in amount by petty thefts. So much greater is the temptation, or pressing necessity, for resort to crime, in the north than in the slave-holding states, that in 1850, one free negro of every 65 in Massachusetts was a prisoner, or convict, for crime, when of the same free negro class in Virginia, poor and vicious as it is, there was only one such convict for every 572.*

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* See "Compendium of the 7th Census" (official document,) pp. 83 and 165, for authorities for the following facts, for 1850:

Free negroes "in Jails and Houses of Correction—"

In Massachusetts 97 in 9,064 free negro population, [or one prisoner to every 93½.]

In Virginia 24 in 54,333, [or 1 prisoner to every 2,264.]

Free Negro "Convicts in Penitentiaries—"

Massachusetts, 42 [or 1 felon for every 215¾ free negroes.]

Virginia, 71 [or 1 felon for every 765 free negroes.]

If adding together the free negroes "confined in Jails and Houses of Correction" and free negroes, felons,—"Convicts in Penitentiaries," for each of these states, there will appear these averaged numbers and proportions:

Of Massachusetts, prisoners and convicted felons, 139, or 1 in 65.

Of Virginia, prisoners and convicted felons, 95 or 1 in 572.

Which shows, that in proportion to the respective population of this class, there were very nearly 9 times as many free negroes in Massachusetts imprisoned for criminal offences, on charges, or convicted felons, (excluding those punished by death,) as in Virginia for the same year.

In the south, there is, at present, not only a better field for the labors, and more sure rewards from the honest industry of the free negroes, but also much better chances for them to live partly or wholly by depredations on the property of the whites, with but slight chances for detection. This is owing to their small comparative numbers, and to their being interspersed among the much larger slave population. The free-negroes serve to induce, to conceal, and to aid thefts by the slaves—which thefts, on their masters' property, slaves have ample facilities to commit, but which they would not be tempted to commit, or be able to secure the fruits of, but for the assistance of free negroes as receivers and conveyers. Also, in their comparatively small numbers, the free negroes, among a large slave population with which they are closely connected, have increased facilities for direct thieving, and the concealment thereof. Further, every male free negro prefers to have a slave for his wife, and will be so provided if permitted by too careless indulgence. In this manner he will not only have his wife and children supported by the owner, and a lodging provided for himself, but much of his own food will be obtained from his wife, and directly or indirectly, to the loss of her master. All these circumstances serve to make it easy, as yet, for free negroes to subsist in the slave-holding states; and they serve to retard the full operation of the law of want and misery restraining all increase of population—which already operates on the more destitute free negroes of the northern states, and the destitute whites in England. But, in the fulness of time, and with the diminution of means for honest subsistence, (and without a change of policy,) we shall have, in Virginia as large a proportion of destitute sufferers, and of criminals, of this class, as now are in Massachusetts.

There are still other reasons for the greater mortality of free negroes than of other classes. It is their general and strong preference to reside in towns rather than in country places, because in towns they can best find demand for menial services, and the light and irregular labor which only they are disposed to undertake; and also social intercourse with many other idlers of their own class. City life is more unfavorable to the growth of population, even for the higher and best provided classes—still worse for the poor, and worst of all for free negroes. In towns, comparatively but few of the males of this class choose to burden themselves with the support of a wife and children. The males are more apt, and have more facilities, than in the country, to indulge in habitual intemperance and debauchery. The young females are rarely chaste, and in many cases the mulattoes are habitual prostitutes. Nearly all the individuals are, or the children will be, of mixed blood. And though this kindred to the superior race brings with it proportional increase of intellect and intelligence, yet under these circumstances, there will also be with this benefit, as much increase of vice, debauchery, and the consequent penalties, disease, self-neglect, and death. It may well be understood, that in cities the growth, or continued succession, of the free-negro population must be especially checked—and that it will there diminish much more rapidly than elsewhere, or than would any other class of population. In addition, it is an established fact that mulattoes are generally of more feeble constitution than either of the parent races of unmixed blood; and the change in succeeding generations, to children of mixed blood, will the more rapidly serve to diminish the numbers of the free negroes residing in towns. All these causes of decay, and gradual extinction of the free-negro class, for obvious reasons, are more operative in large than in small towns, and very much more now in the the towns of the Northern than the Southern States.

It would afford very interesting and instructive information on this subject, if it were required, and reported, in the census tables of the free-negro population, how many of each locality were born free, and how many had acquired their freedom subsequently. It is obvious to the statistician, that, without preserving this necessary distinction, as well as knowing (more particularly than has been yet reported,) the places of birth as well as of residence, the census reports of this class are worthless for showing the true measure of increase by natural procreation in any localities, or the absolute decrease in other localities. If these facts were ascertained and noted in the census reports, it is probable it would be manifest that even now the deaths of this class exceed the births, and that the numbers are decreasing in most of the larger Southern

towns, and that the decrease is general in all Northern towns, and also the total free-born negro population of all the older Northern States. And it would then still more plainly appear, that the actual increase (as appears by mere enumeration,) of this class, throughout all the non-slaveholding States, is due, not in the least to procreation, or excess of births over deaths, but to the continual ingress from the South of emancipated and fugitive slaves.

It is a melancholy reflection that any class of human beings shall be thus passing to final extinction. It is a repulsive theme, to reason and speculate on the consequences of such working of the stern law of population. And it may seem heartless to deduce, and present as compensatory benefit, any good or profitable results, from such condition of human degradation, vice, and misery. But it is an inevitable law, and operation of civilized life, and of dense populations, and especially of all town populations, that the lowest, the most improvident, profligate and suffering class, shall be decreasing by the excess of deaths over births—and this law is even less severe in its inflictions here, than in older countries, and where the perishing classes belong to the highest race. As such deplorable general consequences must occur, and are inevitable, it certainly is in some degree a countervailing benefit to the community, that in the towns of our slave-holding States, the lowest class, which in the general, is gradually thus passing to extinction, includes most of the free negroes of those localities; and in this manner, independent of any other more general and speedy legal measures for removing this class, that natural causes will thus continually be extinguishing the worst portions, instead of making the like destruction of the superior race, if occupying the same low position. And the proper consideration of this operation should add to other economical inducements, to permit our free negroes the free indulgence of their almost universal preference, to seek residences in towns. There they are more useful—their vicious propensities may be more effectually restrained (by the general policy to be here advocated,) and, taken as a whole, the entire class in each town, will be mainly the diminishing and perishing class, and passing on to extinction.

By all the different operations, both of increase and decrease, the number of free negroes in the United States, in 1850, (the last census,) had reached 434,495. Of these, 198,328 were in the non-slaveholding States, and 236,167 in the slave-holding States. Of these, Virginia had 54,33; and therein so far exceeded all the more Southern States, that she would deserve the title of being the free-negro State, but for Maryland's much stronger claim to that bad pre-eminence, and deplorable condition. Maryland had, in 1850, 74,723 free negroes, to 90,368 slaves and 417,943 whites. In that commonwealth the emancipation feeling has done more harm than in any other holding slaves, and it is not yet either dead or inactive. Besides all the wealth that Maryland had previously sacrificed, in converting so many thousands of useful slaves to lazy or worthless free negroes, and then leaving them as abiding nuisances on her territory, and in the midst of the community, she has, within the last 27 years, in different modes, contributed, to the end of emancipation, more than half a million of dollars, through the Colonization Society, and its contemptible offspring, the republic of Liberia. Delaware, with only about 2000 slaves remaining, I deem as united in feeling and (supposed) interests with the non-slaveholding States, and should be counted as such—though her 18,073 free negroes were stated in the above enumeration as belonging to the slave-holding section of the United States.

The free negroes of the slave-holding States, in obedience to the causes stated above, are still increasing by natural procreation. In addition, they receive accessions from new emancipations in some cases, where still permitted as exceptions to general prohibitory laws—or by evasions of the law. This is especially the case in Maryland and Virginia, where the evil is already at its greatest height. Though at this time not one person in a hundred holds the former generally prevalent opinion, that the emancipating of a slave is a virtue in the master, or a benefit conferred on the slave, yet there are still a few owners who thus act, to the detriment of the slaves of their neighbors, and of the commonwealth. Since the laws of Virginia have prohibited newly emancipated slaves from remaining in the State, when that prohibition cannot be avoided, or evaded, (as has too often happened,) the usual present course is to send the freed slaves to Liberia. This course, when carried

out, at least prevents so much addition to the magnitude and increase of the nuisance of the free-negro population. But in other respects, the evils of emancipation are not lessened—and in regard to the future condition of the freed negroes, the evil is greatly increased.

Dismissing from consideration the Northern States, and also Delaware, as being essentially Northern and non-slaveholding, there will remain 210,055 free negroes to all the other 14 slave-holding States. In regard to these, and to the States in which they reside, like interests are involved, and the same opinions and State policy ought to govern and prevail. But as our present business is only with Virginia, I will generally restrict my present remarks on the evils in question, and on the remedy to be proposed, to this commonwealth alone.

The free negroes of Virginia, in 1850, amounted to 54,333. Now, they doubtless have reached the number of 60,000—which will be here supposed. Half of the whole, or 30,000, may be adults, or if younger, are such as ought likewise to be fully self-supporting—leaving 30,000 for young children, or aged or infirm adults, incapable of full self-support. Of the 30,000 capable of self-support, it will be a liberal allowance to suppose that as many as one-sixth, or 5000, are honest, sober, industrious and provident, and otherwise are worthy individuals, and productive and useful members of the community. According to this estimate of the deserving, there will remain five-sixths, or 25,000 persons, capable of self-support, who are either indolent, intemperate, of vicious habits, or subjects of criminal justice—and who, either thus, or for other causes, are not self-supporting by honest means, and are useless, injurious, and costly to the interests of the community. The young and infirm 30,000 may be divided into like proportions, according to the habits of their parents, so that one-sixth will be deemed supported by honest industry, and five-sixths, either partly or wholly, at the cost of the community. Thus, if 10,000 are sustained by honest labor, or honestly acquired property, and are either working usefully and profitably for the good of the community, or are in training for such future usefulness, there are 50,000 others who are now, or will grow up to be hereafter, of opposite habits, and who are, and will be, more or less costly, and nuisances to the community. This general condition of this class cannot improve, under their existing circumstances—and on the contrary, will change, with the progress of our country, to a still worse moral condition, and until it will become intolerable. Consider the present burden on the capital and industry of Virginia, in having to support, partly or wholly, 50,000 persons, that now compose this vicious and worthless, or destitute population! If all the various items of cost and loss were duly estimated, it is likely that these 50,000 idlers and thieves are as expensive to the commonwealth as it would be to pay and maintain a standing army of soldiers of half that number.

Although the free negroes are much worse off, even now, than our slaves, still their freedom seems to cause discontent to the slaves. They see among them other negroes, in no respect superior to themselves, in qualities or conduct, in possession of what they deem a great privilege, the unrestrained indulgence of indolence—while their want of consideration prevents their duly estimating the cost, or consequences, of such indulgence. It is the general characteristic of the negro race to prefer idleness to labour, and rest to profitable exertion, no matter how well labour and exertion may be rewarded—and to make the least possible provision for future wants. If whites were so enslaved, they would eagerly covet and strive to obtain their freedom, mainly for the purpose of labouring for their future aggrandizement, if such rewards of labour were available. The negro slave, if not seeing other negroes free, would scarcely think of his servitude as a hardship. But with this example of exemption from labour always before his eyes, he is taught to desire also to be free, and to be discontented and unhappy because he is a slave. He does not desire freedom to labour for himself, but to be idle. As a general rule, negroes will not labour, unless when under the immediate pressure of want, if free, or as slaves, under the direction and compulsion of a master. And because of their feeble intellect and will, the latter mode of compulsion is the most beneficial for their own interest, as well as for all other interests.

The State of Virginia is not the author of this great evil of freed negroes, nor is it blameable for the existence of the nuisance, otherwise than by the former and long continued indulgence of the legisla-

ture in failing to forbid every act of emancipation by the individual owners of slaves. In their conferring on their slaves the injurious gift of freedom, the former masters had no right to damage their country and its citizens—still less if the damage is to continue and increase through all subsequent time. And in receiving the gift of freedom, the former slaves thence derived no just claim that the Commonwealth should submit to suffer detriment and great injury, either for the present or the future. The experiment of permitting the subsequent residence of the emancipated negroes, and of their posterity, has been long and fully tried, and the results have been found to be extremely injurious to the Commonwealth. And this injury is suffered by the community without even the consolation of believing that the sacrifice has produced any benefit to the freed negroes—who, as a class, have thereby been sunk still lower in the scale of morals, habits, and even physical comfort, since they ceased to be slaves. In this view, the Commonwealth is under no moral obligation to continue, for all future time, to bear this grievous and gnawing burden. There is, clearly, a right of self-defence, to be exercised in abating this great nuisance—even if it could be done only by the simple and speedy remedy of requiring of all the members of the class to make their option between leaving the territory of Virginia, or, if remaining therein, of being re-enslaved. But there is no need of adopting so summary and stringent a procedure, for which public sentiment is not prepared, and which would shock many good people as a measure of monstrous injustice and oppression. This general and uniform policy has already been proposed and defeated in the legislature of Virginia. If again attempted, it will be again defeated. This certain prospect of failure is a sufficient objection to this plan—and therefore it is unnecessary to discuss its theoretical expediency or policy, or its accordance with, or departure from, the requirements of justice or benevolence. On other grounds, of punishment for crime, or of police measures to prevent crime, the desired ends may be virtually attained, as to all the vicious, worthless, destitute, and suffering free negroes. And if the remedy extends no farther at first, society will be greatly benefitted, and there will be left but a small part of the present burden, and that part not to be continued very long.

I will now proceed to consider the means for remedy, which appear to my judgment the most politic, and divested of all unnecessary and avoidable hardships, and yet effectual for the ends desired. The main and essential features of the plan only will be stated and discussed. It would be a useless waste of time to go into details, or to propose the modes of effecting minor measures, or of avoiding minor difficulties and objections, all of which would be proper and manageable subjects of legislative enactment, or details of a law made to carry out the general policy of removal, or abatement, of the great nuisance.

But first, let me premise that though the enslavement of great numbers of the now free negroes, for crime or misconduct, is a principal object of the general plan, I do not deem enslavement to be a proper substitute for punishment, or satisfaction for grave criminal offences. But statesmen, or others having power to direct the public mind, who differ with me in opinion, and deem slavery of negroes to be a grievous hardship, may, by a different course of reasoning, and of designed policy, arrive at the same practical end, at which I aim. If we shall agree, though upon different premises, on the propriety of subjecting all free negro criminals, who would otherwise undergo confinement in the penitentiary, to perpetual slavery, we shall, in that one respect, have agreed to a very important measure of public reform. As a punishment for crime, perpetual slavery is as legitimate as any other mode—and cannot be justly objected to by any, unless because of being too light, or too severe, (as supposed,) for the offence so punished.

As a general question, applied to the whole class of free negroes in Virginia, the change from their condition of freedom, degradation, and general want, to that of slavery, would be no cause or means of physical suffering, or punishment. Still less is it a punishment to subject a felonious free negro, as usual under our laws, to confinement for a limited time in the penitentiary. For his physical wants, the change is a great improvement of condition. Instead of his previous life of indolence, with scant and poor food, and without a bed, or a home in many cases, he is required to labour only moderately, is fed abun-

dantly, and on better fare than he had ever enjoyed before, is comfortably sheltered and lodged, and well nursed and cared for in sickness. The only punishment suffered, is the wholesome restraint from evil-doing, and from being idle, and roaming at large. For the negro, however unfit for freedom, is not the less desirous to enjoy what he deems its benefits—which are unlimited license to be idle. But even with these grounds of objection felt to penitentiary confinement, the free negro convict is, in almost every such case, much better off than when at large, and before being charged with crime. If our present very bad system, in this respect, shall continue unchanged until the difficulty of gaining bread both by honest and dishonest means, shall be much increased, our posterity will have free negroes to commit and confess felonies for the purpose of obtaining, on very easy terms, the abundant and good fare supplied to convicts in the penitentiary. They suffer no increase of degradation of character or position, by having undergone such conviction and confinement, as would occur to persons having previous good reputation, or capable of subsequently acquiring any, by good conduct. In short, penitentiary confinement for free negroes, as punishment for crime, is a ridiculous farce. Indeed, it seems not otherwise for white convicts, if they would be in straitened circumstances if released. Most of those persons whom I now especially address, saw during the last session of the legislature, the penitentiary convicts at work on the Capitol Square. Such lazy and slow labour never came under my personal observation but upon one other occasion, which was in another department of the public service. This was the work of the ship-carpenters, employed on the last built war-steamers at the United States Navy Yard in Portsmouth, Va., and who, I suppose, were then receiving not less than two dollars a day for labour much more lazily performed than that of the penitentiary convicts. Of both these sets of labourers, the bodily exertion did not seem to my view greater than needful to preserve health and good appetite,—and scarcely enough to make them fully enjoy the luxury of rest or sleep—or to cause our convicts to care about obtaining pardons from the Governor,

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It is not as sufficient punishment for grave offences, (falling short of the death penalty,) but as an accompaniment of other previous punishments, such as solitary confinement, hard labour on bread and water, whipping, branding, and mutilating, &c., (formerly used in Virginia, and still in some other States,) that I would propose perpetual enslavement for all free negro convicts. This would at once establish a policy which would keep out of the comforts of living in the penitentiary, and save to the Commonwealth the expense of support therein, of all the free negroes, who make up 72 to 100 of the native-born white criminals, confined. Immigrants, or sojourners from the Northern States and from Europe, make up nearly half, or 94 in 222 of our white convicted felons.) The converting of all the free negro criminals, for every grade of crime, to slaves, would generally serve to restrain them from future crimes, and render useful and profitable, by their labour, all of the now worst and most worthless of their whole class. Every minor offence, now subject to corporal punishment, should be commuted to banishment from Virginia, with the alternative penalty, for disobedience to the first sentence, of enslavement.*

TO BE CONTINUED.

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* According to the latest report of the Superintendent of the Penitentiary to the Legislature of Virginia, (Doc. 13,) there had been confined therein of convicted felons, from the first establishment of the Penitentiary in 1800, to Sept. 30th, 1856, of whites, 2571, and free negroes, 839.

On Sept. 30th, 1856, (the last day included in the report,) there were then confined felons as follows:

| | | |
|---|---|---|
| Whites, natives of Va., | 128 | |
| " natives of other States and of Europe, | 94 | To'l wh'ts, 222. |
| Free negroes, nat'vs of Va. | 88 | |
| " " other States, | 4 | 92 |
| Total number of felons then confined, | | 314 |

These figures show the following proportions:

| | |
|---|---|
| The total of free negroes (92) to total of convicts, (314) was 1 to ..... | 3.42 |
| The native-born free negroes, (88) to total convicts (216) was 1 to ..... | 2.45 |

By last census (for 1850) the free negroes made 54,333, and whites 894,800, total 949,133 free population of Virginia. The population

## On Securing Sweet Potatoes and other Root Crops.

The following method of securing that delicious esculent, the sweet potato, has been communicated by a friend and correspondent, who has tested its complete efficacy,—in his careful hands,—for sixteen years. His recommendation with those who know him would be regarded as the very highest authority.

His judicious remarks about the propriety of an equal care to provide suitable means for the preservation of this crop, as every "*sane*" corn-grower would exercise in providing a crib for the housing and safe-keeping of his corn, suggests to the provident, careful farmer, the importance of getting up suitable places for storing and preserving every useful kind of root crop. He should do this, not as a place of security only, but as an incentive to the larger cultivation of them, for the benefit of his stock in winter, and the improved economy of his husbandry, for it is undeniably true, that their cultivation is oftener omitted for the want of the means of keeping them securely than from an undervaluation of them as adjuncts to the grain and ordinary provender for the winter keep of stock.—[EDITOR.

*For the Southern Planter.*

### TAKE CARE OF YOUR POTATOES.

It will be remembered that a method was proposed for wintering roots, and especially sweet potatoes, in the last volume of the Southern Planter, (page 721,) which being founded on correct principles, and, what is of more weight, having stood the test of repeated experiment, promised important results to the growers of that valuable root who might think proper to adopt it. As far as information can be obtained, it has, as usual, succeeded, and will probably never fail if the potatoes are sound and ripe, and the plan duly carried out. Under ordinary circumstances it is one of the cheapest modes of root-storage that can be devised. In any dry outhouse or vacant attic or loft, make shelves of rough boards, light rails, or any convenient material, using dry chaff, saw-dust, or any non-conductor to exclude frost. The great ends attained by the proposed plan, are the reduction of *pressure*, and the thorough *ventilation* procured by the interposition of shelves or floors at vertical distances of about eighteen inches; if the shelves are so weak as to sag down and rest on the subjacent heap of roots, supporters should be introduced, or the benefits of the system will of course be lost.

The plan of bedding sweet-potatoes in the earth, (as recommended by an intelligent correspondent,) is well adapted only to very dry soils in dry seasons; in wet localities, or those provincially termed "slashes," potatoes thus exposed, rot almost invariably. No plan of storing crops can be considered cheap which does not effectually exclude the weather as well as the depredations of rogues. Would a corn-grower to the amount of 100 barrels per annum, who undertook to dispense with the corn-crib, be thought sane? True economy would recommend something more than the temporary fixtures above indicated. Those who have provided cheap houses or barns for roots, accessible in all conditions of the weather, but only by the key of the owner, can never be persuaded that the old, unsafe, and wasteful system is a cheap one.

J. L. D.

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was 1 free negro to rather less than 17½, of the total free (white and black) population. Thus, the free negroes in proportion to the total number of convicts, were as 1 to 3.42, and furnished more than five times their equal proportion of convicts; and counting native-born convicts only, of both whites and free negroes, the latter were 1 to 2.45 of all, and furnished more than seven times their numerical proportion of the whole number of both.

Gov. Smith's annual messages to the Legislature of Virginia present other striking facts, showing similar evidence of the greater amount of crime of the free negroes. In the message of 1846, the following statements were made from official statistics:

"In 1840, the convicts in the penitentiary were 107 whites (including foreigners,) and 82 free negroes. So the class of free negroes (then 49,842,) constituting only one-sixteenth of the total free population, contributed largely more than two-fifths of the convicts. Of slaves, (448,987 in 1840,) the same year, there were but fourteen transported, [for felonies, which would have been punished by Penitentiary confinement, if committed by free persons.] The free negroes, constituting only about one-tenth of our whole negro population, perpetrate about six-sevenths of the felonies committed by the whole of that class."

(Message of 1847.) "The free negroes, constituting about one-twenty-fifth of our entire population, [of Va.,] perpetrate about two-fifths of the crimes of the State."

The message of 1848 showed from the Penitentiary Report for that year, that, "the free negro perpetrates, at least, ten times as much crime, in proportion to numbers, as the white man." . . . . . , "Of the 81 [free] negro convicts now in the Penitentiary, ten are there for the crime of stealing and enticing away slaves."

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Without danger, danger cannot be surmounted.—*Publius Syrus.*

The Southern Planter.

RICHMOND, VIRGINIA.

## Stock Raising.

In this age, so marked by improvement and progress in most of the pursuits of man, it behooves the agriculturist to present as many evidences of good taste and skill in his profession, and as thorough a knowledge of what is best calculated to advance his own interests, and promote his happiness, by the thorough cultivation and fitting out of his farm and "surroundings," as we meet with amongst the cultivated, liberal and intelligent of other professions. That agriculture is entitled to the dignity, and honor of a science, no man may doubt: or at least if he does, he proves his own incompetency for the calling, and affords the almost certain guaranty of his own unworthiness of the name and success of farmer.

Certain principles have been laid down for draining and ploughing, and fertilizing our lands, deduced from the experience of our predecessors, who represent not speculative theories only, but a large amount of practical knowledge, the matured fruit of careful study, diligent labor, patient reasoning, and close observation. This gives them a right to claim attention and credence from all those persons to whom their instruction may be presented. Nor have we had instruction offered us upon the subject of the land alone. Thanks to the interchange of opinion and experience between stock raisers of every kind—effected through the columns of various agricultural journals of many nations, we have had the qualities, habits and aptitudes of almost every class of domestic animals, so thoroughly investigated, that we have very little difficulty in improving our stock, by following the advice which has been so often and freely offered. For our own State we can say that, although in every quarter, she evinces an interest in, and disposition for improvement in agriculture, still in many places, no interest whatever is felt in the improvement, or rearing of animals.

The period is not far distant when we shall be forced, in self-defence, to pay far more attention than we have hitherto done, to this subject, or we must become dependent entirely upon our neighbors of the "far west" for a very large amount of what we should raise at home. Already do we pay an immense amount annually, into the pockets of our Kentucky brethren for mules and horses. Nor is Kentucky the only State that finds a ready market with us for surplus stock, but the same may be said of Indiana, Ohio, and others. If we want an extra fine horse of speed and action, it is our custom to buy him from New York. *If we could not raise as fine animals with our resources, as can any of our neighbors*, then it might be good policy to submit to the present condition of affairs—but we appeal to every candid Virginian, if we have not had at our own stock exhibitions, as fine samples of Domestic animals of *every kind* as were ever raised on any other soil? With as great a variety of soil, capable of producing every kind of forage for stock, as is possessed by any State in the Union, why should we not depend upon ourselves for the stock we are annually buying in large numbers from breeders beyond our own borders? The improvements in machinery have been so great within the past few years, that we are almost compelled to "double teams" on almost every southern farm, while the high price of labor makes it economical and advisable that we should in all practical cases, substitute their use for manual labor. The necessity for following this course has been felt sufficiently strong to induce farmers to pay prices for mules which (with the present prices for farm produce) are almost ruinous—good animals bringing in our market from $160 to $200 each, which could some years since have been bought at from $60 to $100. While the demand for animals of this description has rapidly increased, the home supply has rapidly diminished—very few comparatively of our farmers taking any interest in stock raising, while many are of opinion, that they can purchase them cheaper than they can raise them. Purchasers of cows too, are beginning to find out that it is cheaper to them, and less troublesome, to pay a good price for a good milker, than to buy for a few dollars an animal which will give only a few pints of indifferent milk daily. Cows which will give from 3 to 6 gallons of milk a day, are in demand and sell readily at prices varying from $40 to $100—according to quality. For our supply of such

animals we pay liberal prices—sufficiently liberal at all events, to justify the breeding and rearing of improved dairy stock, without much risk of loss on the part of any breeder who is commendably prudent and economical in his expenditures. We would not advise farmers to buy a large stock of thorough-bred animals at high prices for home use; but such a plan is by no means necessary for the improvement of the stock which each one may have on hand. These may be improved rapidly and steadily, by the careful and judicious selection of breeders—while the occasional purchase of a good animal for "crossing" is judicious and desirable. A very important fact to be kept in mind by those who wish to adopt such a system is, that their young animals of every kind, require attention, and care, particularly in the first year of their existence, "calves should not be knocked on the head by the butter stick," say all those who rear good cows. If size is expected or desired of an animal, or early maturity, it must be well fed and protected from inclement weather while young, and any man who has once tried the experiment of wintering cattle in a good stable, will be convinced of the economy of time and money, so far as he is concerned, and of the greatest thrift, comfort and improvement of his animals—besides the increase of bulk and value to his manure heap, which will be a sure result. We have never been able to understand how any man with any of the "milk of human kindness" in his composition, could allow his stock to suffer from exposure to all kinds of weather, without protection of any sort on his part. Such disregard of his own interests, and forgetfulness of the precept, "the merciful man is merciful to his beast," can only be looked for in the counterpart of the man who found this fault with his manager for buying leather for plantation purposes—"such a thing never happened before, sir, as the want of hides to make leather for home use since I have been farming. Before you came, I always had, on the ridge of my barn, enough skins of the cattle which died in March, to supply us with all the leather necessary for our use, without having to buy a pound." We may occasionally find among us, a barn whose ridge-pole bears testimony to the observance of a similar system of economy on the part of its owners.

We repeat, that in our own State we have as great a variety of soils, capable of as thorough fertility, as can be found in any State in the Union. That we can raise as fine animals among us, as ever grew to maturity anywhere, the exhibitions of Virginia stock at the agricultural shows held in Richmond, Petersburg, and other places during the fall of 1858, abundantly prove.

Let each farmer then imitate the example of his progressive neighbor, and make some improvement in his stock by the exercise of his own good sense, and generous care of his animals: or if he has no such neighbor, let him be the pioneer in a good cause, and by his persistent efforts, wise counsels, and kindly aid and encouragement to others, induce them to follow in his worthy lead.

We want to see the time come quickly, when our markets are to be supplied by home-made farm products, and the leaks in our pockets, caused by the western horses, mules, and hogs, and northern hay, may be effectually stopped. The interest in improving our lands is beginning to be so generally felt by farmers in every condition, that we think there can be no danger of its diminution: but we know that a large number of our farmers need a thorough rousing from their neglect of stock breeding, and we would earnestly call their attention to the subject, and beg each one of them to begin at once, on a scale commensurate with his means, to atone for any past neglect of the subject.

## Dwarf Pears.

We mentioned the fine specimens of this delicious fruit, which had been given us by Mr. H. J. Smith, of Henrico county, in our last number. We have received from Mr. Wm. Smith, of this city, very flattering accounts of the yield of the Dwarf Pear trees growing in his garden, besides the additional pleasure of eating a part of one of his pears, which *weighed fourteen ounces* when plucked from its stem. Neither of these gentlemen raises trees to sell, and to give them "a puff" is no part of their desire, or our object, in calling attention to their fruit; but simply to remind our readers that "what has been done, can be done again," and if they can succeed in raising such fruit, that no reason exists why every farmer and gardner may not do likewise. A strong prejudice exists in the minds of many persons against the Dwark Pear, and much controversy has been the result of their introduction. Much of this war of words has probably been caused by dissimilarity of treatment of the trees, by the opponents in question. It seems to be generally conceded that the Dwarf Pear—growing as it does on so small a stem, and hav-

ing roots, in its early stages, without much lateral expansion—requires to be "shortened in"—*i. e.*, the top should not be allowed to spread itself in a proportion too great for the roots. Consequently, these trees require more care than the majority of farmers are apt to bestow upon them, and the negligence of the owner is excused by crying out "humbug" against the tree.

Our own "settlement" is, unfortunately, too new for us to have yet a-while any fruit—so that we have to speak from the experience of other folks in this matter, and not our own.

One of Mr. Wm. Smith's Dwarfs, had on it this season *forty-seven pears of fine size*, all of which matured. He does not know what to call it, as he bought the tree from a Frenchman. The fruit looks more like a quince than a pear—is very large, and has a flavor strongly dashed with rose-water. Can any of our fruit-growers say to what variety it belongs?

## "Pamunkey."

We return our thanks to "Pamunkey" for his communication, and hope he may be able to induce his friends and neighbors to follow his example. We confess it is a source of mortification to us, that the names of any of the *residents of his particular district of country*, are so seldom to be found in the pages of the "Planter."

We spent a very pleasant part of our past life "just there;" and when we left our old residence and friends behind us, we *brought with us* an interest in the improvement of the lands, and an affection and esteem for very many of the people, which we shall carry with us into the next world. While we appreciate highly the aid of all or any of our brother farmers in our efforts to advance the cause of agriculture, and to induce every farmer to do all he can, in creating a desire for agricultural information, or for imparting to others all the light which he can throw on it, as a science, we are particularly well pleased at any token of remembrance for ourselves or our journal, from that quarter. We know many *good* farmers in that section, and should like to hear from them frequently.

## A New Work.

*Letters on Modern Agriculture.* By Baron Von Liebig. New York: pp. 225. 1859. John Wiley, Publisher.

Through Mr. James Woodhouse, of this city, we have received from the publisher a copy of the above new addition to our agricultural literature. It would be supererogatory in us to offer our commendation of a work of this distinguished author. His name and fame are as familiar as household words to American farmers and to the general reader, who will seek with avidity after any emanation from his pen on scientific agriculture.

The object of the author in these letters seems to have been to rescue practical agriculture from mere empiricism, and place it under the control of true science; to develop the general laws which must regulate sound practice if the most successful and profitable results are to be attained; in other words, they are to serve "as a mirror in which the scientific principles already established, and certain erroneous doctrines prevailing in practice, are reflected side by side; and each individual must be left to draw his own conclusions, on comparing his own acts with the standard thus furnished."

The work is for sale by Mr. James Woodhouse.

## Farmer and Planter, (Columbia, S. C.)

We return our thanks most sincerely to the Editor of "The Farmer and Planter," of Columbia, S. C., for his generous and complimentary notice of ourselves and our journal in his issue of last month. The compliment we prize highly, since it comes from so worthy a source, while we earnestly wish that he may meet with the success to which he and his excellent paper are justy entitled.

We beg to assure him that our paper is *always mailed* to his address, and if it does not come to hand promptly, that we shall be happy to honor his drafts for back numbers.

## A New Paper.

The Farmer and Gardner is a new paper, of which we have received the first number. It promises to be an accession to the list of valuable agricultural papers, of which we have many of high character. The reader will find an excellent article on "bone dust," in our present issue, transferred from the pages of that paper.

## Concord Grape.

A fine bunch of grapes, of the variety called "Concord," was brought to our office a few days ago by Mr. E. G. Eggeling, Florist and Nurseryman, near this city. The bunch was large, (weighing 14 ounces,)—the fruit above an aver-

age, being about as large as the Black Hamburg, in appearance very much like it, with a very thin skin, a perfect bag of juice, and of the most delicate flavor. It is among the most hardy varieties, enduring the winter of New Hampshire without injury, and is, therefore, worthy of the attention of cultivators in our variable climate. The specimen exhibited was grown by John J. Werth, Esq., and plants can be furnished by Mr. Eggeling to persons desiring them.

## A "Dun" in Earnest.

We have before reminded our subscribers of the great benefits which they would confer on us, by the punctual remittance of the small sums which very many of them owe us. We have to pay our Printers for every month's work when done, and every paper we send out costs us, in cash, a considerable part of the price charged for subscription. We endeavor to discharge faithfully to our subscribers the duties we have assumed, and every man can understand the necessity for reciprocal fidelity on the part of all those who are bound by mutual obligations. We cannot leave our duties to run from house to house, saying to each man, "pay me that thou owest," and if we could, it would be a very disagreeable thing to say, when we meet with those whom we hope to be allowed to regard as friends. We can only, then, remind them that we are subjected to inconvenience and loss, not by any fault of our own, but by their negligence, and would urge our claims upon their own sense of justice and the generous courtesy which every Virginian is proud to claim as his birthright. Our accounts are sent out regularly, and we shall always be glad to have them promptly paid, and hold ourselves always ready to correct any mistakes which may be found on any of them so soon as we may be notified of the existence of error.

## Catalogues, &c., Received.

Fruit and Ornamental Trees, Vines, &c., from Isaac Pullen, Hightstown, Mercer county, N. J.

Fruits and Ornamental Trees, of Hopewell Nursery, near Fredericksburg, by H. R. Robey.

Alleghany High School, Session of 1859 and '60, situated at the Blue Sulphur Springs.

Premium List of the State Agricultural Society of S. C., to be held at Columbia on the 8th, 9th, 10th, and 11th of November, 1859.

J. M. Thurburn & Co's "Bulbs and other Flowering Roots," with directions for their culture and management.

## Information Wanted.

A subscriber desires to be informed through the medium of our columns, as to the best plan to be pursued in raising a "Chestnut Orchard." Will some of our readers oblige him and us by giving the instructions necessary. We are under the impression that some of our Caroline county friends have paid some attention to this subject, and we shall be glad to hear from them.

## Important to Milkmen.

We can see no reason why milkmen everywhere will persist in the habit of shipping such large quantities of water to our large cities, when water is so abundant and at such cheap rates. Why not evaporate the water and send the milk to the cities in nice cakes, which can be dissolved to suit the user's' taste and fancy.

Solidified milk is now manufactured purely and successfully in Duchess County, N. Y.; and for the benefit of the milkmen who are so largely engaged in the transportation of water, we will give here a description of the process of solidification.

The works consist of a large brick building, situated in a beautiful valley, seven miles from the nearest railroad station, in the centre of a milk-producing district. The basement is occupied by a large boiler and steam-engine; on the first floor are the evaporating pans; in the second story are the ventilators, drying, packing, and storerooms. The milk is collected from the farm houses around twice a day, as soon as practicable after milking, and kept in a cool cellar under the factory. At first the milk is warmed by steam, in a large tin cylinder, up to 170° F., and a quantity of white sugar dissolved in it. Second, the milk is placed in large shallow pans, two inches deep; these pans are all kept at the temperature of 170° by means of a water bath under them. The pans are covered with a wooden structure, through which a current of air is drawn by the ventilators above. The vapor is thus carried away as soon as formed, and does not oppose evaporation. To prevent any portion of the milk from becoming solid too soon, and adhering to

the pan, the whole mass is constantly stirred by steam power. After about five hours, the milk has become a sticky paste; the mechanical stirrer is removed, and its place supplied by a girl with a knife in one hand and a roller in the other, who prevents any portion of the paste from adhering to the pan, crushing the lumps to powder. After an hour of this work, the mass has become a dry mellow, white powder. All that remains to be done, is to keep it for a few hours in the drying room, and to pack it in tin boxes with a lid cover.

The composition of cow's milk is, for 100 parts of milk: water 87; butter, 3; cheese, 4½; sugar of milk, 5; salts, ½. The quantity of sugar added to the milk is 10 parts for 100 of milk, consequently one pound of solidified milk will make five of cow's milk already sugared; and make ten or more of such milk as is sold in the streets of this metropolis. But it is not necessary to dilute it in so much water, and those who can afford the luxury put the dry powder in their coffee.

Solidified milk keeps for months, simply by taking care not to leave it in unusually damp places. It has been carried to the Pole by Dr. Kane, and to the Equator on many vessels. It is used in the sick room in its solid form, when much nutriment is wanted in a small bulk, and it is congenial to the stomach.—*Scientific American.*

## Milk which does not yield Butter, and the means to Remedy it.

The author calls the attention of those who are chiefly interested in such cases, in which there is no disease of the mammary gland nor loss of milk, but a want of oleaginous matters in the fluid. In the causes of this deficiency of butter making quality, he concludes that there are *two* principal ones, viz: idiosynerasy and alimentation; but there is another which cannot be so easily defined, and which occurs in animals that are well kept, and whose milk has been previously rich in butter. It is to these that the remedy is principally directed. The remedy consists in giving the animal two ounces of the sulphuret of antimony, with three ounces of coriander seeds, powdered and well mixed. This is to be given as a soft bolus, and followed by a draught composed of half a pint of vinegar, a pint of water, and a handful of common salt, for three successive mornings, on an empty stomach.

The remedy, according to the author, rarely fails, and the milk produced some days after its exhibition, is found to be richer in cream. The first churning yields a larger quantity of butter, but the second and the third are still more satisfactory in their results.

A letter from a farmer states that he had fourteen cows in full milk, from which he obtained very little butter, and that of a bad quality. Guided by the statements of M. Deneubourg, which had appeared in the *Annales Veterinaries*, he had separately tested the milk of his cows, and found that the bad quality of it was owing to one cow only, and that the milk of the others yielded good and abundant butter. It was, therefore, clearly established that the loss he had so long sustained was to be attributed to this cow only. He at once administered the remedy recommended by M. Deneubourg, which effected a cure.

*Veterinarian.*

## Dairies and Bone Manure.

An English paper, in commenting upon this subject, remarks that the Cheshire dairy farmer, by the free use of bone manure laid on his grass lands, makes his farm, which at one time, before the application of bone manure, fed only twenty head of cows, now feed forty! In Cheshire, two-thirds or more, generally three-fourths of a dairy farm are kept in perfect pasture, the remainder in tillage. Its dairy farmers are commonly bound to lay the whole of their manure, not on the arable but on the grass land, purchasing what may be necessary for the arable. The chief improvement, besides drainage, consists in the application of bone manure. In the milk of each cow, in its urine, in its manure, in the bones of each calf reared and sold off, a farm parts with as much earthy phosphates of lime as is contained in half a hundred weight of bone dust. Hence the advantage found in returning this mineral manure by boning grass lands. The quantity of bones now given in Cheshire to an imperial acre of grass land is about twelve or fifteen cwt. This dressing on pasture lands will last seven or eight years; and on mowed land about half that period. But the grass land once boned and kept under pasture is never so exhausted as to be as poor as it was before the application.—*Rural New-Yorker.*


## Watch, Mother.

Mother! watch the little feet
Climbing o'er the garden wall,
Bounding through the busy street,
Ranging cellar, shed, and hall.
Never count the moments lost,
Never mind the time it costs;
Little feet will go astray;
Guide them, mother, while you may.

Mother! watch the little hand
Picking berries by the way,
Making houses in the sand,
Tossing up the fragrant hay.
Never dare the question ask,
"Why to me this weary task?"
These same little hands may prove
Messengers of light and love.

Mother! watch the little tongue
Prating eloquent and wild,
What is said, and what is sung,
By the happy, joyous child.
Catch the word while yet unspoken;
Stop the vow before 'tis broken:
This same tongue may yet proclaim
Blessings in a Saviour's name.

Mother! watch the little heart
Beating soft and warm for you;
Wholesome lessons now impart;
Keep, oh, keep that young heart true,
Extirpating every weed,
Sowing good and precious seed:
Harvest rich you then may see,
Ripening for eternity.

## The Sun-Flower.

What love is borne unto the sun
By this expansive flower!
It turns its aspect to the skies,
Whether they shine or lower.

And, as the luminary speeds
His progress through the day,
This heliotrope inclines its head
To greet him on his way.

And, when the sun withdraws his light,
And seeks his ocean-bed,
The plant contracts his flowers, and droops
As though his life had fled.

And, when the sun has ceased to sleep
Beyond the Western main,
And peeps above the earth, the plant
Erects its head again.

Whene'er the Sun of Righteousness
Shines on me from above,
Mine eyes are lifted, and my heart
Is lighted up with love.

Sometimes a vapor shrouds the sun,
And grief and sickness brings:
I wait—the radiance re-appears,
With healing on its wings.

When earthly objects tempt my heart
Midst grovelling scenes to stray,
This plant will teach me to look up,
And choose the brighter way.

Whatever love thou may'st profess,
My friend, for other flowers,
Be sure to let this helitrope
Be planted in thy bowers.

The fragrance of the blushing rose
From cares may set thee free,
And the shy lily of the vale
May preach humility;

But the sun-flower will teach thy soul
Where Christians should aspire;
It points above, whence thou may'st draw
A spark of heavenly fire.

* * * * * * *

SKURRAY.

## She Always Made Home Happy.

She always made home happy,
With her kind and winning ways,
With her voice of cheerful gladness—
With her cheerful hymn of praise.

She always made home happy,
Though she charmed no passer by,
With the beauty of her person,
Or the brightness of her eye.

Though no pearls or rubies glittered,
'Mid the ringlets of her hair,
In her heart there shone a radiance,
Of a Jewel far more rare.

She always made home happy!
Though her song was not divine,
Though no harp beneath her fingers,
Thrilled to notes almost sublime.

Though no artist, yet she painted,
Many a beam of heavenly love,
On the friendly faces round her,
That shall shine in realms above.

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As the present wheat crop is unusually full of cockle, every farmer ought to order one of our Double Screened Rockaway Fans at once, as it is the only Fan in the market that will clean the cockle from the wheat.

The price of our Fans in Baltimore is $34—and in Lynchburg $36. Orders addressed to us at either place will receive prompt attention. A liberal discount to the trade.

We respectfully refer to S. Sands, Esq., ex-editor of the "American Farmer," Baltimore, as to the character of our Fan; and Wm. Palmer, Sons & Co., our agents, Richmond, Va.

J. MONTGOMERY & BRO., Baltimore, Md.

July 1859—1y

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Oct—3t

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All well mixed together.

Planters and others are invited to examine the article. From the best information we can obtain, we believe the mixture is one of the best that can be prepared for the Virginia lands.

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