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.*

FRANK: G. RUFFIN, Editor. P. D. BERNARD, Proprietor.

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From the Soil of the South.

STRAWBERRY CULTURE.

We have learned our strawberry culture from long experience, and to our experiments we considered the climate and the nature of the plant. We found a mammoth fruit, and our object was to dwarf the vine without affecting the size or quality of fruit, for we had learned that all plants require different kinds of food in perfecting their stems, stalks and fruit.—We give the strawberry all it wants to perfect its fruit, and retain the luxuriant habit of the vine, by a cold and simple diet, thus enabling it to brave the heat of our summer suns, and to help the fruit stalks, instead of putting all its capital on its back in the way of clothing. We will not pretend to say that all strawberry plants can be cultivated in this way; we believe they must go through a thorough acclimation, and be gradually disciplined to their humble fare. All fruit cultivators are aware that an over luxuriant tree seldom produces much fruit; hence root pruning has been resorted to, to check the too rapid growth of wood, and it invariably forms fruit where none or little grew before. It is upon this principle that we cultivate the strawberry.

The soil that seems best suited to the growth of the fruit is a sandy loam. The natural location of the bed has much to do with its productiveness; as moisture is one of the greatest elements in perfecting the fruit, the bed should be as near a stream of water as possible. New land is preferable to old—we care not how rich the old may be, or how poor the new may be. Before planting it should be mellowed deeply. The vines may be planted any time from September to April, (we have moved them in full fruit.) We plant six or eight rows of Hovey's Seedling, which is a pistillate to one of the Large Early Scarlet, which is a staminate or hermaphrodite, both bloom and fruit together; the rows two feet apart and the vines some eighteen inches apart in the rows.

Strawberry vines will live planted almost any way, but if fruit be an object the first season, the roots should be put in the ground just as they were taken from it. The vines will make from runners the first season, enough to stock the ground. In the fall, go over the ground with the hoe, and thin out to some ten or twelve inches, leaving the vines to decay where cut up; after this is done, cover the whole ground with decomposing leaves, scrapings of forest earth, fine mud from ditches, and any vegetable matter that will compose soon. Before the plants bloom, top-dress them with ashes, leached or unleached. Keep the whole surface of the ground covered with leaves, which shades and cools the ground, and keeps the fruit clean. As the fruit stalks appear, should the weather prove dry, give them water; as soon as the fruit sets, should the weather prove dry, give them water; as the fruit ripens, should the weather prove dry, give them water. By this treatment, another fruit stalk will have started, before the first is done, and so on through the season. The vines will make few or no runners during the fruiting season. Keep down the grass and weeds with a hoe. We have tried the plough, but it let in too much sunlight. Better keep the grass smothered with leaves. Let those who wish strawberries *five weeks* in the year, trench in two feet of stable manure; but those who like them six or eight months, exclude all manures but Nature, and turn green leaves into nice and luscious fruit.

This can be done. This we do, and our readers that choose can do the same. We doubt not there is plenty of land through the country as poor as ours. When our old friend of the New York *Plough* walked through our beds last March, he exclaimed, "well, well, this is the first strawberry fruit I ever saw without vines!" And it was literally true; the ground was covered with fruit with scarcely yet an appearance of leaf.

For the Southern Planter.

COMMUNICATION TO THE VIRGINIA STATE AGRICULTURAL SOCIETY.

BY EDMUND RUFFIN.

Some of the Results of the Improvements of Land by Calcareous Manures on Public Interests in Virginia, in the Increase of Production, Population, General Wealth, and Revenue to the Treasury.

The statistics of a country, especially in regard to its production, population and wealth, and the comparison of these values at different intervals of time, and under different influences, constitute the most important materials to aid the investigations of the political economist, and the action of the statesman in directing the public policy. Without these aids, no deductions, as to the economy, the profit, or the loss, of the most trivial as well as the most important measures of state, can be known with certainty in advance; and nothing, but the lapse of long time, and consequences so ruinous that their sources cannot be mistaken, will serve to show clearly the errors of action or omission, in the policy of government.

The Legislature of Virginia has done nothing for the direct object of aiding the knowledge of statistics, and thereby giving general light and aid to legislation. But without such intention, there has been prepared, and is scattered through the legislative journals and documents, a great mass of valuable statistics, or materials for statistics, which might be made very far more accessible and useful, if properly digested and published in a concise and clear form. From this mass of materials were principally prepared the various tables furnished from the Auditor's Office to the late State Convention, upon special calls and resolutions of that body. These tables are far from being well digested, or even in good shape for examination. Yet they furnish almost the only accessible information on the general statistics of Virginia. Though not touching agriculture directly, nor designed to touch it at all, still these reports of population, assessments of lands, and taxation, will serve indirectly yet conclusively to prove most important results, and to indicate, to those inquirers who may labor through the examination, the causes of agricultural decline and resuscitation.—Surely the more full investigation and clear proof of these important results, thus commenced without design, would be well worth the attention and furtherance of the legislature of this almost exclusively agricultural country!

The Governor of the Commonwealth, in in his message of January, 1852 to the legislature now in session, adverted to some of these statistical facts in the following words:

"The increased value of the lands lying in the tide-water district, as exhibited by the returns of the recent assessment, vindicates the science [of agriculture] and appeals strongly to you for aid and encouragement in its behalf. In 1819 the lands in this district were valued in the aggregate at the sum of $71,496,997, and in 1838 at $60,704,053 20½, exhibiting a *decrease* in value, during the nineteen years that intervened, to the enormous amount of $10,792,943 79½. And yet those same lands were recently assessed at the sum of $77,964,574 52, showing an *increase* in their value during the last twelve years of $17,260,521 31½.

"This remarkable and gratifying change in the value of these lands cannot be attributed, to any great extent, to benefits resulting from works of internal improvement; for thus far these improvements have been chiefly confined to other sections of the State. And in vain will we look for a solution of this problem, unless we remember that for several years past, the enterprising citizens of this section of the State have been devoting themselves with a commendable zeal to the subject of agricultural improvement; and by a proper application of compost, marl and other manures, and the use of other means which a knowledge of this branch of education has placed at their command, they have redeemed and made productive and valuable, lands heretofore worn out by an improper mode of cultivation, and consequently abandoned by the farmer as worthless and unfit for agricultural purposes."

Then, according to the government assessments, the lands of the whole tide-water district of Virginia, in nineteen years, (from 1819 to 1838,) decreased in general value nearly eleven millions of dollars. In the next twelve years, (from 1838 to 1850,) the lands of the same district were increased in value more than seventeen and a quarter millions of dollars, as shown in the last assessment.

But great as is this late increase, and the more remarkable because taking the place of previous continued and great decline of values of lands—and on every ground deserving legislative inquiry and thorough investigation—these stated amounts of former decline and recent increase of values, are both much short of the true amounts. This position I will endeavor to establish; and further, that all the true clear increase of value, founded, as it justly is, on increased production and fertility, and much more than any apparent amount, is the result of one particular agricultural improvemnet only, viz: the use of calcareous manures. For great as have been the values of many other improved agricultural processes or applications—and great as have certainly been their benefits, all such improvements, if without the addition of marling or liming, have not been sufficient to arrest the before downward progress of agricultural production, much less to recover the lost elevation. The other many and great improvements have been introduced generally, and have been increasing in use for forty years—and more extensively

and beneficially in the middle than in the lower country. Yet the before declining counties have continued to decline, unless they used calcareous earth as manure, or otherwise possessed a soil or sub-soil which, however exhausted by abuse, contained, naturally, lime in some one or other form of combination, and in quantity sufficient to reinstate the wasted fertility. Even in the counties the most improved as yet by marl or lime, there are still very large spaces which have continued to decline in production; and adjacent counties, which have not used marl or lime, are still wholly in the former general state of decline. Therefore, the actual agricultural improvements, of all kinds, have not only produced the increased value of seventeen and a quarter millions, but they have first paid for the heavy losses caused by more general and continued exhaustion of lands, before exhibiting this or any net gain of fertility. And, inasmuch as, where calcareous manures have not been used, either in the tidewater district, or the first and second ranges of counties next above, all other improvements have not served to maintain the former production, surely, where production has been increased, by aid of marl and lime, to these causes alone ought all the actual net increase to be ascribed. This inference and conclusion would now be sustained by the concurrent opinions of all experienced improvers of land in lower Virginia, and, upon the ground of common report, by most other well informed persons. It is further sustained by the statistics of production, assessments, population, and revenue. If, in addition, we had the agricultural statistics of the amount and localities of marling and liming done, and of the usual rates of production before and since, the proofs would be as clear, and the accordance of cause and effect as manifest, as the instruction thereby to be afforded would be important to stimulate further efforts elsewhere for as gainful improvements. These agricultural statistics could be very easily obtained, and without cost to the treasury. The Legislature has been repeatedly urged to render this service to agricultural knowledge—and has either contemptuously disregarded or rejected all these applications for this small and costless boon to agricultural instruction. Without this aid, by far the most important of all, and using only other existing public statistics, and known and unquestionable general facts, I will endeavor to prove that at least as much as all the actual increase of value of lands in the tidewater region, whatever may be the true amount, has been produced by marling and liming—and all the other accompanying benefits, to private and public interests, of course must rest on the same foundation; and further, that the actual improvements so made, are much more considerable and valuable than as estimated in the Governor's message to the Legislature.

In one of the reports to the former Board of Agriculture, communicated to the General Assembly, and published in the documents of 1841–2, the following passage appeared:

"It would be a most important statistical fact if it could be ascertained how much land in Virginia has already been marled. The quantity, however, is very great; and all the land marled has been thereby increased in *net* product, [*i. e.* after paying all expenses of cultivation, &c.] on a general average, fully eight bushels of corn, or oats, or four of wheat, [following corn,]—and *the land increased in intrinsic value fully two hundred per cent.* on its previous value or market price. Where the marling has been judiciously conducted, these rates of increase have been more than doubled. From these data might be calculated something like the already prodigiously increased values and products due solely to marling [and liming], and which will still be increasing from year to year. If not already reached, the result *will* soon be reached, *of new value to the amount of millions of dollars having been thus created.*"

If the suggestion above stated, and which was more formally afterwards recommended by the Board of Agriculture, to collect "the statistics of marling and liming," had been then acted upon by the Legislature, there would have been added (by the force of the information thereby diffused and instruction so aided) a three or four-fold amount to the $17,260 latterly annually paid into the treasury from the increased assessed value of the lands so improved. And if thus enabled to know the actual extent and effect of these still recent and slightly known improvements in each county, there is little doubt that it would be found that the change from a decreasing to an increasing population, of declining to rising values of lands, and of declining to increasing receipts of revenue, as well as the increased products and profits of land, would be all found asnecessary consequences of, and strictly in proportion to, the extent of the judicious use of calcareous manures.

If the above quoted assumption, or prediction, which was uttered in 1842, had then attracted any remark or notice, (which it did not,) it would have been deemed by most persons as the mere illusion of a visionary enthusiast. But the utmost extent of the claim and prediction, then made, did not equal the then actual results—and which, a few years later, were sustained, though indirectly, by the official documents of the governments of Virginia and of the United States. Upon these and other facts presented by these documents, I will now proceed to remark—to enforce what they exhibit, incidentally and accidentally, of agricultural progress—and to expose some palpable short-comings of parts of these reports, and the deductions thence made.

The assessment of lands next preceding that of 1819, was in 1781. Vacant or uncleared land was then so plenty, and the supply so far exceeding the demand, that prices were necessarily low in proportion. Therefore, a comparison of the values of lands as assessed un-

der authority of the act of 1781 with those of any later assessment, would afford no true indication of the changes of productive value, or of the measure of exhaustion or improvement, in the interval of time. But the earliest stated assessed values, of 1781, will serve for fair comparison with each other for the time when they were affixed.

It is also a truth, which I readily admit in advance of any claim, that the assessments of lands in 1819 were put too high generally—the prices of lands being then nominally and apparently enhanced by what was truly but the depreciation of the then redundant and irredeemable paper currency. But it is not less true, that at the next assessment, in 1838, both the money and productive values of all marled lands had then risen much higher than they had been ten years before—which earlier time (about 1828) was the true zero of the general decline of fertility and production, and also of market prices of all lands since improved in the tide-water district. Whoever remembers the general impoverished condition of lands, and their low prices, about 1828, and the anxiety of the numerous desponding or desperate proprietors to sell out and to emigrate to the west, will sustain my position that values were then lower by more than one-fifth part, at least, than in 1838; and would have been put so much lower, if a state assessment had been made in 1828. If I were to claim the extent of reduced value shown in all actual sales made about that time, two-fifths less than the later prices of 1838 would not be too much abatement. But even at one-fifth less than the actual later assessment, which certainly would have been the least estimate, the true lowest value would have been (61—12=) 49 millions of dollars only in 1828; which lowest value was increased to the actually assessed 61 millions by 1838, and to 78 millions by 1850. Therefore, instead of the increase of value being 17¼ millions, in twelve years, it began to increase ten years earlier from a much lower mark, and amounted to (12+17¼=) 29¼ millions in twenty-two years—making a much greater aggregate increase, but at a somewhat smaller rate of average annual increase.

A small part of this growing value had been created by the earlier marlings, from 1816 to 1828. But however important was the benefits on the few farms, the whole amount was too small to equal the continued depreciation on the great majority of lands in the same counties—and of course no evidence of such increased value appeared in the general aggregate returns for each county. Thus it was, that Prince George county, taken together, continued to exhibit a general progressive depreciation, after some dozen farms had been marled, and these doubled in product.

But neither the official statement of increased value of lands, amounting to seventeen and a quarter millions of dollars, beginning from 1838, nor my estimate of twenty-nine and a quarter millions increase, from 1828, will present any approach to the true value derived from marling and liming even then effected. This opinion rests on grounds which will now be stated:

1st. With the actual increased productiveness and higher assessment of lands, on a general average of the tide-water district, there has also been either produced, or retained, an increase of population, (which had been generally decreasing before, and for a long time—) and also gained, or invested, a proportional increase of moveable farming capital, and much greater accumulations of wealth, the fruits of the increased production of the land. Besides all these gains, both to individuals and to the State, there is to the treasury the increase of revenue on not only the actual increase of assessed value of lands, but of all the other subjects of taxation, above referred to, increased in proportion to and because of the improved production of land.

2d. The true and full increased value of lands, then existing, did not appear from the assessment of 1850. It is a truth known to all who have observed, that all state and other assessments or valuations of lands, by official assessors or appraisers, are made with much regard to the last preceding assessment of like kind, and to the general average rates of market prices in the particular locality, for some length of time preceding the then valuation. Therefore, when either intrinsic values, (founded on the rate of production,) or selling prices of lands, or both, are declining, and have recently declined greatly or rapidly, the state assessor, (like each individual proprietor,) will not rate any farm as low as an actual sale of it would show to be the then true market value. And on the other hand, when true intrinsic values are rising, market prices, indicated by actual sales, never keep pace with the advance of true value; and a state assessment then made would be still (more than in general) below market prices, and much more below the true values. Such were the circumstances existing as to the improved lands in 1850; and though their assessments were raised greatly above those of 1838, (making more than seventeen millions increase of valuation,) still it is notoriously true, that the new and advanced valuations of these improved lands are much too low. For the reasons here given, these lands are valued lower, in proportion to true value, than other neighboring and unimproved lands, of which the assessments have remained at the previous rate, or have been put lower. As examples of these different results, I will state the preceding and latest assessments of two contiguous tracts of land, belonging to the same proprietor. One, before being at all improved, and in a then course of long continued exhaustion, was assessed in 1838 at seventeen dollars the acre. This rate was fixed upon because of the former higher value of the tract, and was certainly higher than the land would then have brought at fair sale and price

Before 1850 this land had been mostly marled, and more than doubled in production. The new assessment of that year was twenty-five dollars—full high compared to other lands in general under like circumstances, but in fact as much too low compared to a fair selling price, as the previous lower assessmeut had been too high. The other adjacent tract of poor and much exhausted land, had been assessed at ten dollars in 1819, at five dollars in 1838, and was continued at the same rate in 1850. Yet about the same recent time it was bought, at private sale, for a little less than five dollars the acre—which proves that the assessment was something above the then highest market price, and greatly above the ordinary assessed rates, which are generally much below market prices. These are fair examples of the general facts, and of my position that lands recently increased in true value are always assessed too low, and those decreased in true value, too high, compared to each other, and also to the general rates of the same assessment.

3d. In addition to all these new and great increased values, the results of improvement of lands, (which though certainly existing, do not appear in the public documents as effects of such causes, if appearing at all, and which new benefits, therefore, cannot be clearly and fully traced, as they should be, to marling or liming,) there is the general omission of all the first ten or more years of these first beginning and growing values, previous to the assessment of 1838. I have before shown, as to lands, that the true beginning of increased production and value, of enough amount to be felt in the wealth and finances of the State, was from about 1828, and from a much greater depression of values than existed in 1838, the lowest point shown by any public assessment of lands. Bnt all the other moveable agricnltural capital and general wealth, and subjects of taxation, which were the necessary resnlts of increased production of lands, had also been increasing with, and in proportion to, the growing improvement and value of lands. All this newly created value, in personal or moveable property, which had been commenced still earlier than 1828, and had been growing fast after that time to 1838, was unknown as the result of the true cause; and even now, the amount is not indicated by any thing precise in the public documents.

Upon all these grounds, I maintain that the true amount of new values which had already accrued to the Commonwealth in consequence of the agricultural improvement of the tide-water district—and which was all due to marling and liming—would exceed by a very large amount the highest estimate of values before made, and founded on the increased rate of assessment of lands in 1850.

Further. Not one-twentieth part of all the lands below the falls of the rivers has yet been marled or limed. Therefore, the improvement of this very small proportion (say one-twentieth) has produced all the great increase of values, ascertained and unascertained, and of which the ascertained part, in the general summing up of the last assessed values of lands, is spread over and allowed for the whole tide-water district. It is true that the improvement of some farms by these means, say to double value, operates to increase the appreciation (and perhaps the assessment) of neighboring lands possessing like facilities for being so improved. But such is not usually the case, as to the state assessments. Moreover, there are large spaces near to, or intermingled with, the most extensive marlings, and also entire counties more remote, which either have no such facilities, or have totally neglected their use. In these cases, the assessed or otherwise estimated values have either not increased at all, or have continued to decrease. All these cases, by far the more numerous, serve to keep down the general average assessment, and to detract, in the aggregate amount, from the apparent measure of increased value and actual assessment of the smaller space of improved land.

All these claims for the improved value of the tidewater district may, perhaps, be admitted, and yet it may be denied that the use of calcareous manures was either the only (sufficient) or even the main cause. To meet such objections, I will add to the foregoing general reasons, other reasons and facts more in detail. Even without the deficient and needed statistics of marling and liming, and their particular effects on production, the existing evidence is ample. But it is mostly indirect, and the entirely satisfactory proof of the proposition will be reached by a course of circuitous reasoning which may be tedious.

The older settled counties, including all those which have been most resuscitated in latter times, had all been long declining in production and population. Some of the oldest counties had declined in population from the time of the earliest census, (in 1790,) and perhaps still earlier, when there was no such evidence of the fact as the census reports have since exhibited. From these unquestionable facts of long declining population, continued impoverishment of lands, and general average decline of production, might be safely inferred. But there is abundant and direct evidence of this, though not such as can be conveniently cited and quoted.

All recollection of men now past middle age will go to affirm the former general course of impoverishing culture, and general average decline of production. Every one of the few who wrote in these early times on agriculture spoke of the general impoverishment of lower Virginia, and its then continuing progress, as notorious and unquestionable facts.

To come to more particular authorities—Strickland, an English farmer and a writer of judgment and character, personally examined the agricultural condition and prospects i

this country, and published his opinions in 1801. Probably his unfavorable views were heightened by the strong contrast of our poor lands and their then exhausting and ruinous cultivation, with the good farming and rich lands of England. But, making this allowance, his remarks seemed to be honest and truthful. Among his scattered remarks are these (quoted in "Arator"):

"Land in America affords little pleasure or profit, and appears in a progress of continually affording less."—"Virginia is in a rapid decline."—"Little profit can be found in the present mode of agriculture of this country, and I apprehend it to be a fact that it affords a bare subsistence."—"Virginia is the southern limit of my inquiries, because agriculture had there already arrived to its lowest state of degradation."—"The land-owners in this State are, with a few exceptions, in low circumstances; the inferior rank of them wretched in the extreme."—"Decline has pervaded all the States."*

The first effectual exposer of the exhausted lands and exhausting culture of Virginia, was our great countryman and first agricultural teacher, John Taylor of Caroline. His "Arator," the earliest notable agricultural work produced in Virginia, throughout offers the fullest testimony of that general impoverishment and ruinous progress which I have asserted. It may be said to be throughout one trumpet-tongued exposure of the existence and evils of this general condition; and it was the first warning heeded by our people. But though this work awakened general and proper alarm, and stimulated to great efforts for remedy and relief, these efforts served barely to stay something of the progress of general impoverishment, but could not change it to even the beginning of general resuscitation.

Enough has been said, I presume, to establish the general facts of great and progressive exhaustion of lands, and the failure of any measures used for remedy, sufficient to affect general interests, before the commencement of marling, about 1818, or even its considerable extension, about 1828.

To those not acquainted with the details of our exhausting system it may not be superfluous to explain why the worst effects should have been produced so slowly—and indeed were not so desperate even when Taylor uttered his solemn warnings, as at a later time. The universal former practice was to cut down the forest growth and bring new land under culture every year, to supply the place of the oldest and most exhausted land, then or later turned out of cultivation. So long as good land remained to be cleared, there might be little or no diminution of the annual crops of a farm, or perhaps there might be even an increase of the agricultural products of the State in general, no matter what destruction was made of the land before cultivated. Such was the case for a century or more in the oldest settled counties—and such is still the case in the latest settled counties of lower and middle Virginia. But, in the older counties, when all the good land had been cleared and worn out, and the still remaining wide extent of forest land would not pay for the clearing and exhausting, then the full fruition of the previous system was realized. Then the production of each entire farm (as it reached this position) began to decrease, and the many such particular results to become apparent even in the government statistics, and in the diminished receipts of taxation. The subsequent continued decline of population, and more latterly that also of agricultural productions, are shown in the returns of the census; and the decline of value of lands by the state assessments, whether the correctness of my comments thereupon be admitted or denied.

After beginning to use marl or lime extensively, some of the oldest settled and most exhausted counties, as James City, Prince George and Charles City, began to recover, and have continued to increase in production, in assessed value of lands, in productive population, and in revenue to the treasury. Other neighboring counties, not using these manures, or to but small extent, as Sussex, Southampton and Greensville, in the tide-water region, and Dinwiddie, Amelia and Nottoway, next adjacent, and above the falls, have all continued to decline, in the general, in all these respects. These facts will appear fully and clearly in the statistical tables which will follow, and of which the materials are furnished in different public documents, in the Auditor's Office, and the census reports of population and agricultural production. Nothing can be more striking than the present contrast thus exhibited, between the three counties formerly so exhausted and recently so improved, and the other six. If there exists any sufficient cause for the marked difference of results, except the use of calcareous manures by the now thriving counties, and the omission by the declining, it is unknown and unsuspected.

It is true that sundry other counties, which have marled to considerable extent, do not show near such good results as the three selected for comparison. I am not well or personally acquainted with these cases. Such exceptions, real or apparent, probably could be explained, if all the circumstances were known. In some counties, the census was taken so imperfectly, that a truly growing population is made to appear as decreasing. In other counties, the last assessment of lands was much lower than even the too low geueral standard. In other counties, moral causes, and habits of society, have served to render of but little benefit their facilities for marling. In other counties, gross ignorance of the action of marl, and of agriculture generally, and injudicious practice in marling, in great measure have counteracted the due effects of the

* Strickland's observations were republished in full in the Farmer's Register.

applications actually made. For these reasons, as well as to avoid all uncertain ground—also because of the great labor and difficulty of the investigation to a private individual, while the government statistics of agriculture are deficient in the most important particulars—it was necessary to limit my comparative view to the few counties which suited best for fair comparison, by their similarity in some points, and their difference in others.

The nine counties I have named were selected as all being together in a connected group—and as under circumstances as nearly alike as could be found with the differences of position, &c. required for comparison. No space so large, and also embracing these required differences, can be found more alike in all other respects, and in general. It was necessary, for the very object sought, to take some counties abundantly supplied with marl and others without. Also it was necessary to select counties which had used marl or lime longest and the most extensively. Prince George, James City and Charles City are supposed to occupy this position. On parts of all, either marl or lime has been used longer and over more space, in proportion to their extent, than in any other counties. But even of these, not one-third of the arable, or one-eighth of the whole surface has been yet marled or limed, whether sufficiently or insufficiently, properly or injuriously.

These three counties, all lying along James River, have each a narrow river margin of originally fertile and very valuable land. As on these very strips of river margin were made the earliest settlements in Virginia, they were greatly exhausted long before the first census. Nearly all the very much larger interior portions of these river counties were poor naturally—and all that had been long cleared and cultivated were also made much poorer by exhausting tillage.

The other three counties of the tide-water region, (but neither touching any tide-water,) Sussex, Southampton and Greensville, were naturally as fertile as the preceding three had been, except as to the lands of the latter immediately on James River. The soils of Sussex and Southampton are generally more sandy, and, therefore, less fit for wheat, but better for corn and some other products than the James River counties. Sussex has used very little marl, and most of that but recently—Southampton much less, and Greensville almost none. From forty to thirty years ago, I knew Sussex well. The people of that county were then noted, and deservedly esteemed, as being very generally industrious, provident and frugal; and were as thrifty as the poverty of their land permitted. There were no very rich proprietors—and the poorest were independent upon the fruits of their labor. In regard to industry, good management, and thrift, the people of Sussex were admitted by all to stand much higher than the people of the adjoining county of Prince George. The remarkable change in their relative positions, as now existing, and which will be exhibited presently, can only have been caused by the exteusive use of marl in the one county and the general neglect of it in the other. If any other causes of such effects exist, in this or in other cases, let those who know them state what they are.

Dinwiddie adjoins Sussex and Prince George on one side, and Amelia and Nottoway on the other. These are the nearest three counties above the falls. Marl or lime has been used on a few farms only of Dinwiddie; but not at all in either Amelia or Nottoway—or at least to any notable extent or effect. Dinwiddie was naturally of as good land, and Amelia and Nottoway much better, in the general, than the three marling counties—excepting perhaps the originally fertile strips of river margin of the latter. Probably, the low grounds, or alluvial flats bordering the streams in Amelia and Nottoway were equal in value and extent to the river margins of the lower counties. Moreover these rich alluvial flats were not brought under culture until after the river margins had been under exhaustion for a century or more; and the former even now retain much of their original fertility. Taking the counties throughout, the lands of Amelia and Nottoway were better than those of the three marling counties—and also the former were much less advanced in the general progress to impoverishment, than the latter, when the comparison of them will be begun, and for long after.

In selecting these counties for comparison and contrast, there were other conditions necessary to be observed besides those of contiguity and nearly similar natural circumstances. As was required for comparison, none of these counties have had their boundaries changed since the earliest time embraced. None contain towns, (included in the statements,) or growing villages, or have any other than an agricultural population, or agricultural interests. James City, only, is somewhat affected, and injuriously for my argument, by including part of the old and long stationary village of Williamsburg. Also, none of the marling counties have had any recent aid or new impulse to their prosperity from the existence of any railway or other facilities for transportation, whereas all of the other counties have had important aids of this kind afforded to agricultural interests, and which must have added much to their profits, or improved their condition as to income and wealth. The Petersburg and Roanoke railway, (now nearly twenty years in operation,) passes through parts of Dinwiddie, Sussex, and Greensville, and is of much benefit to the two latter counties especially. Another, the Greensville railway, a branch of the former, and nearly as long in operation, also passes through Greensville county, and still more to its advantage. The Southside railway passes through Dinwiddie and Nottoway. Amelia

has the benefit of the navigation of the upper Appomattox, created by art, and which came into use since the time when my comparative view of agricultural progress will begin.—The Richmond and Danville railway passes through the middle of Amelia, and offers another route to market for Nottoway also. Both the last named railways are new constructions. But they both were either authorized by law, or in rapid progress of construction, before the last assessment of lands. And their expected benefits must have advanced the estimated values of lands in anticipation of the use of the new facilities for transportation. The Seaboard railway passes through Southampton, giving easy access to Norfolk.

The City Point railway is indeed almost wholly in Prince George county. But it is used almost entirely for travel and commerce, and is of such little length, (nine miles only,) that scarcely any crops or agricultural products are conveyed to market on it. Neither does this road, nor the proximity of the town of Petersburg, afford any balance of advantage over the disadvantages caused by both to the agricultural interests of Prince George.

The report of the agricultural productions of any purely agricultural country, continued for many years, with the rates of increase or decrease, would offer a true measure of the prosperity or decline of the residents—unless they were tributary to some other community, or separate interest. The returns of agricultural productions, in the census, of 1840 and 1850, (for the preceding years 1839 and 1849,) are all that exist to be referred to for this important information. These returns were notoriously loose and imperfect. The numerous errors of individual reports, not being made by design, may perhaps serve in some degree to balance each other, and thus to show something like a fair general average of agricultural production for each county, but only for 1840 and 1850. If these reports had included 1830 also, in the ten years following there would have been seen a still earlier increasing production in the older marling counties, rising from a still lower state of impoverishment of the land. But even in the short and later time embraced in the returns, there will be seen, in the following table, very remarkable results, both in regard to the increase and decrease of production, and in full accordance with the alleged causes in the use or neglect of calcareous manures. Unfortunately, the general facts as to these alleged causes are all that I can adduce. If the Legislature had authorized the collection of these particular facts, (asked for formerly by the Board of Agriculture, and again denied very lately to a petitioner in a very far more humble position,) then all the conclusions would be known, and clear, on this subject, which now I can only reach through this long discussion.

The increase or decrease of population, for a particular or short interval of time, is not always a true exponent of either the agricultural, or the public and general prosperity of a country. An idle, improvident, drunken, thievish, or mendicant class, is an injury to any community; and the loss of such members, by emigration, banishment, or death, though so much diminution of general population, would be a positive benefit to the country, and to its industry and production. Thus, the number and increase of the class of free negroes, instead of aiding prosperity, are causes of weakness and loss to any community. Whites, who may be in their habits no better than free negroes, are generally as detrimental, for the time, to the industry and prosperity of the community. So are all surplus, and, therefore, unproductive slaves—while the increase of effective laboring slaves, if replacing lazy, drunken, or otherwise unproductive free men, make a far greater financial and public benefit, than merely maintaining the amount of population. But notwithstanding all exceptional cases, as a general rule, the population of a country being stationary or declining, for a long time, is sufficient evidence that neither production nor any other good thing is improving—or is likely to improve, without new causes of prosperity being introduced and put in operation. Hence, I infer of the counties in which population has long been generally declining, that the land also not only was, but still is in the course of being impoverished, and production being lessened. The numbers, increase and decrease of slaves above twelve years old, (collected from reports of the Auditor's Office,) which will be stated for each of the counties named, for 1830, '40 and '50, will furnish much better indications of the changes of productive labor, than either the total population, or any one separate and entire class thereof. The number of horses and mules, also, where, as with us, these make almost the entire force of teams for tillage-labor, perhaps offer still better indications of the amount and changes of agricultural labor. From the general improvements made in ploughing and harrowing, the increased hauling of manures, and of crops, more horses are required than formerly in proportion to the extent of land cultivated, and to the hands employed. If, then, the amount of team force remains stationary, or, still more, if decreasing, the condition of agriculture must be also declining. It is true that the horses kept merely for pleasure, or show, and still more racing horses, like the free negroes, and other human idlers, are so much detraction from the production and wealth of a country. But the numbers of useless horses probably do not vary greatly in proportion to all others, in these different counties, and so do not much affect the correctness of the indications furnished by the whole number.

All the counties named will now be presented in the following tables, for comparison and contrast in regard to extent of cultivation and amount of production—in values of lands—and in the amounts of revenue.

TABLE OF AGRICULTURAL PRODUCTIONS FOR 1840 AND 1850.

Description.	Counties.	Acres of "improved," or cleared land.	Years.	Grain of all kinds—in bushels.					Peas and beans.	Tobacco, pounds.	Cotton, (ginned) pounds.	Orchard products	Potatoes.	
				Wheat.	Corn.	Oats.	Rye, Buck-wheat, &c.	Total of grain.					Irish.	Sweet.
													Both Kinds.	
Above the falls of the rivers—not marled or limed.	Dinwiddie,		1840	36,083	270,550	133,563		440,196		2,197,109	72,610	$1,015	17,078	
	"	102,517	1850	60,275	304,556	97,373	493	462,701	4,223	1,782,521	1,600	77	12,664	25,248
	Amelia,		1840	50,637	244,785	106,466	92	461,970		1,871,134	6,015	4,848	7,699	
	"	109,109	1850	109,960	250,521	70,074	0	430,555	3,810	1,786,788	6,000	56	6,671	10,261
	Nottoway,		1840	42,145	248,863	70,130	0	361,138		2,212,950	20,682	2,493	8,367	
	"	93,401	1850	71,827	216,991	55,571	172	344,561	4,384	2,109,314	18,400	0	4,927	7,653
Below the falls—not marled or limed but to very small extent.	Sussex,		1840	18,777	404,793	103,916	269	527,755		175,642	477,043	37,520	34,815	
	"	91,408	1850	35,133	356,171	47,963	128	439,261	14,809	56,392	312,000	609	11,132	53,961
	Southampton		1840	9,730	553,895	71,312	3,047	637,984		25,346	851,315	40,345	88,036	
	"	159,668	1850	4,066	564,183	13,903	3,185	585,337	125,218	971	347,600	747	15,061	255,337
	Greensville,		1840	8,860	229,510	92,943	141	331,141		346,100	572,629	2,355	10,655	
	"	74,906	1850	17,619	211,537	16,540	66	245,762	8,837	138,000	286,000	0	3,123	21,796
Below the falls—most extensively marled or limed of all the tide-water counties.	Pr. George,		1840	31,439	176,640	35,221	563	243,863		115,000	23,310	535	6,483	
	"	57,603	1850	81,042	261,510	23,600	581	366,733	1,684	16,550	800	0	7,627	11,881
	Charles City,		1840	36,020	117,846	45,275	42	199,183		0	2,010	7,973	3,520	
	"	36,124	1850	81,229	178,940	26,026	20	286,225	1,164	0	800	16	2,461	3,061
	James City,		1840	17,241	86,500	34,765	0	138,506		8,000	6,307	210	2,904	
	"	21,251	1850	25,476	120,430	22,040	0	167,946	300	0	0	0	2,789	5,730

II.

TABLE OF POPULATION AND LABORING FORCE.

Counties above the falls of the rivers, not marled or limed.

	Classes of Population and Laboring Force.	Census of 1790.	1800.	1810.	1820.	1830.	1840.	1850.	Increase from 1840 to 1850. Aggregate increase.	Increase from 1840 to 1850. Increase per cent.	Decrease from 1840 to 1850. Aggregate.	Decrease from 1840 to 1850. Per cent.
Dinwiddie.	Whites,	*	4,741	4,606	5,373	5,215	4,482	4,277	-	-	205	4½
	Free negroes,		246	476	668	885	630	680	50	7⅞		
	Slaves,		6,866	7,442	7,751	7,506	6,310	6,149	-	-	161	2½
	Total population,		11,853	12,524	13,792	13,579	11,422	11,106	-	-	316	2¾
	Slaves over 12 years of age,		-	-	-	5,557	5,703	3,485	-	-	2,218	38 5-6
	Horses and mules,		-	-	-	2,554	2,593	1,949	-	-	544	21
	* The town of Petersburg was included with Dinwiddie for 1790 only.											
Amelia.	Whites,	†	2,789	3,253	3,407	3,293	3,074	2,790	-		284	9
	Free negroes,		58	155	187	220	223	161	-	-	62	27¾
	Slaves,		6,585	7,116	7,400	7,523	7,023	6,804	-	-	219	3
	Total population,		9,432	10,594	11,101	11,036	10,320	9,755	-	-	565	5½
	Slaves over 12 years,		-	-	-	3,848	3,893	3,720	-	-	173	4½
	Horses and mules,		-	-	-	1,823	1,953	1,829	-	-	124	6⅓
Nottoway.	Whites,	†	3,311	2,730	2,805	2,965	2,490	2,217	-	-	273	10¾
	Free negroes,		107	180	177	223	158	151	-	-	7	4⅓
	Slaves,		5,983	6,368	6,676	6,942	7,071	6,047	-	-	1,024	14½
	Total population,		9,401	9,278	9,658	10,130	9,719	8,415	-	-	1,304	13½
	Slaves over 12 years,		-	-	-	3,565	3,334	3,432	98	2 9-10		
	Horses and mules,		-	-	-	1,637	1,500	1,456	-	-	44	
	† Nottoway and Amelia made one county in 1790, of which the total population amounted to 18,097.											

Counties below the falls not marled or limed but to very slight extent—Greensville not at all.	Sussex.	Whites,	4,771	4,532	4,336	4,155	4,118	3,584	3,084	-	-	500	14
		Free negroes,	391	542	582	684	866	810	738	-	-	72	8 8-9
		Slaves,	5,387	5,988	6,344	7,045	7,736	6,835	5,992	-	-	843	$12\frac{3}{4}$
		Total population,	10,549	11,062	11,362	11,884	12,720	11,229	9,814	-	-	1,415	$12\frac{1}{2}$
		Slaves above 12 years,	-	-	-	-	4,216	3,960	3,470	-	-	490	12 2-5
		Horses and mules,	-	-	-	-	2,061	2,071	1,672	-	-	399	$18\frac{3}{4}$
	Southampton	Whites,	6,312	6,461	5,982	6,127	6,573	6,171	5,940	-	-	231	$3\frac{3}{3}$
		Free negroes,	559	839	1,109	1,306	1,745	1,799	1,827	28	$1\frac{3}{4}$		
		Slaves,	5,993	6,625	6,406	6,737	7,756	6,555	5,755	-	-	800	$12\frac{1}{4}$
		Total population,	12,864	13,925	13,497	14,170	16,074	14,525	13,522	-	-	1,003	7
		Slaves over 12 years,	-	-	-	-	4,157	3,675	3,265	-	-	410	11 1-6
		Horses and mules,	-	-	-	-	2,831	2,640	2,203	-	-	437	$16\frac{1}{2}$
	Greensville.	Whites,	2,530	2,398	2,254	2,056	2,104	1,928	1,725	-	-	203	$10\frac{1}{2}$
		Free negroes,	212	213	omitted	280	332	136	136				
		Slaves,	3,620	4,116	4,599	4,512	4,681	4,302	3,766	-	-	536	$12\frac{1}{4}$
		Total population,	6,362	6,727	6,853	6,848	7,117	6,366	5,627	-	-	739	$11\frac{1}{2}$
		Slaves over 12 years,	-	-	-	-	2,497	2,365	2,131	-	-	231	$9\frac{3}{4}$
		Horses and mules,	-	-	-	-	1,412	1,363	1,082	-	-	281	$20\frac{2}{3}$
Counties the most extensively marled or limed of all in Virginia—Prince George the most and longest.	Pr. George.	Whites,	3,387	2,795	3,101	3,119	3,069	2,692	2,671	-	-	21	$0\frac{3}{4}$
		Free negroes,	267	250	463	588	700	469	516	47	10		
		Slaves,	4,519	4,380	4,486	4,323	4,598	4,114	4,408	394	$9\frac{3}{4}$		
		Total population,	8,183	7,425	8,050	8,030	8,367	7,175	7,595	420	6		
		Slaves over 12 years,	-	-	-	-	2,617	2,390	2,703	313	13 1-10		
		Horses and mules,	-	-	-	-	1,200	1,254	1,372	118	8 2-5		
	Charles City.	Whites,	2,084	1,954	1,776	1,750	1,782	1,671	1,656	-	-	15	1
		Free negroes,	363	398	387	538	761	670	780	110	$16\frac{1}{4}$		
		Slaves,	3,141	3,013	3,023	2,967	2,957	2,433	2,764	331	$13\frac{1}{2}$		
		Total population,	5,588	5,365	5,186	5,255	5,500	4,774	5,200	426	9		
		Slaves over 12 years,	-	-	-	-	1,531	1,386	1,567	181	13		
		Horses and mules,	-	-	-	-	775	814	994	180	22 1-9		
	James City.	Whites,	*1,519	1,374	1,351	1,017	1,283	1,325	1,535	210	$15\frac{3}{4}$		
		Free negroes,	146	168	420	467	572	507	624	117	23		
		Slaves,	2,405	2,389	2,320	1,677	1,983	1,947	1,905	-	-	42	2
		Total population,	4,070	3,931	4,094	3,161	3,838	3,779	4,064	285	$7\frac{2}{3}$		
		Slaves over 12 years,	-	-	-	-	†1,002	1,011	999	-	-	12	1 1-6
		Horses and mules,	-	-	-	-	†384	505	554	49	9 5-6		

* The population of James City, according to every census, includes the part of the village of Williamsburg lying in that county.

† The slaves over 12 years, and also the horses, belong entirely to the county—none of Williamsburg included.

III.

ASSESSED VALUES OF LANDS AND BUILDINGS.

Counties.	Acres of land.	Assessed value per acre (averaged) in				Assessed aggregate value of buildings in	
		1781.	1819.	1838.	1850.	1840.	1850.
Dinwiddie,	322,215	$1 57	$7 15	$3 76	$3 80	$305,332	$310,451
Amelia,	221,215	1 36	7 98	6 92	6 05	297,650	248,775
Nottoway,	197,518	1 45	8 20	6 09	3 61	289,956	296,397
Sussex,	295,330	1 65	5 19	4 08	3 06	263,905	243,004
Southampton,	365,498	1 67	4 75	4 15	2 96	376,559	327,607
Greensville,	184,085	1 56	6 13	4 69	2 82	204,212	117,430
Prince George,	180,100	1 50	6 31	5 57	7 50	209,732	252,877
Charles City,	111,142	1 50	8 90	7 10	7 75	152,035	169,688
James City,	91,683	1 57	4 01	4 74	6 20	88.078	109,690

IV.

INCREASE OR DECREASE OF LAND TAX, AT THE SAME RATE, AND OF AGGREGATE TAXES, AS INCREASED IN SUBJECTS AND RATES, TO 1850.

Counties.	Increase or decrease of tax on lands and buildings, from 1840 to 1850.		Aggregate taxes, payable in 1840.	Aggregate taxes, payable in 1850.	Increase or decrease of taxes from 1840 to 1850.			
					Aggregate		Per cent.	
	Increase.	Decrease.			Inc.	Dec.	Inc.	Dec.
Dinwiddie,	$8		$3,105	$3,596	$580		19	
Amelia,		$206	3,573	3,651	77		2	
Nottoway,		91	2,855	3,236	381		13¼	
Sussex,		273	3,257	3,224		$32		$1
Southampton,		376	3,706	4,993	1,287*		34½*	
Greensville,		339	2,501	2,949		551		22
Prince George,	237		2,426	3,508	1,082		44½	
Charles City,	67		1,521	2,169	647		42½	
James City,	137		1,002	1,335	333		33	

* This astonishing increase of tax paid by Southampton ($1286 91) was nearly embraced in the single item of $1,216 05 tax in 1850 on the collateral succession to a large estate. No other case of this rare tax appears for either of the other counties, and of course this has no relation to comparative existing values of property. Deducting this one payment (as it ought to be in this estimate,) and Southampton will show only the small increase of $70 86 of aggregate taxation.

A careful and thorough examination of the foregoing tables will make manifest the truth of the positions I have assumed. It is only necessary for this proof, to admit as premises the notorious facts that three of the counties have marled or limed extensively, and some of the other six very little, and the others not at all. But as such thorough examination of numbers and figures would be laborious and wearisome to most persons, I will call attention, concisely, to some of the most important evidences in these tables.

TABLE I.—*Agricultural Productions of* 1840 *and* 1850.

The first named *six* (or non-marling) counties contain of cleared land (or "improved" as named in the census reports,) 631,007 acres—and the other *three* (or marling and liming) counties, 114,985 acres—the proportion of space being as 1 of the latter to very nearly 5½ of the former.

Grain (of all kinds taken together) makes the largest product of each of *all* the 9 counties.

Tobacco is a subject of large culture in all the *six*—but not in either of the *three* within the time embraced in the reports—and is the most important culture, except grain, in Dinwiddie, Amelia, and especially in Nottoway. Cotton has been a large culture in Sussex, Southampton and Greensville, and still is so, though much reduced in amount of production.

Peas make a subject of large culture in Southampton—and approaching to large in Sussex and Greensville. But as this crop was not named in the census report for 1840, there is nothing for comparison with the reported products of peas for 1850, so as to show increase or decrease. In the other counties this is a small, but now increasing culture.

Potatoes, of both kinds, are crops of small culture in all the 9 counties, except in Southampton and Sussex, where the culture is much more important—and the extent of both cultures has been increasing in all.

Orchards, for market products, were subjects of large culture and production in Sussex and Southampton, and of importance in all others of the *six* counties—but only in Charles City of the *three*. All these products were reduced almost to nothing by 1850, by abandonment of the culture, and substitution of others. The decrease is very important in diminishing the general products of Sussex and Southampton only.

Dairy products belong to very small culture in all the 9 counties. They were entered in different manner in the reports of 1840 and '50, so as not to be compared; and in both cases apparently so loosely and inaccurately, that nothing can be learned from them. Therefore they are omitted here.

Of the *six* (non-marling) counties, from 1840 to 1850, each has decreased in the total production of grain, except Dinwiddie; and the increase of grain for Dinwiddie is of far less amount than the decrease of tobacco, cotton and orchard products. In total production of crops, all the *six* have decreased.

Of the *three* (marling) counties, each has increased, and largely, in total products, and especially in grain. The only decrease of products shown is of subjects of small culture, abandoned partially or entirely, since 1840, for more profitable objects.

The *six* counties have all decreased, and largely, in the production of tobacco and cotton—one or the other of which was a subject of large culture in all these—but in neither of the *three* (marling) counties.

Gardening for market had place only in Dinwiddie ($5753) and Prince George ($3336,) and was stated for 1850 only, in the census report.

TABLE II.—*Population and Laboring Force.*

Of the 9 counties, 7 had less total population in 1850 than at the earliest separate enumeration, which was in 1800 for Dinwiddie and Nottoway, and in 1790 for the other 5. The only 2 exceptions of increase since 1790, are Amelia and Southampton. Amelia increased from 1800 to 1850 by 323 only. Southampton, from 1790 has decreased in whites and in slaves; but the free negroes have more than tripled, so as to make a small numerical increase in the total population. Each of the *six* (non-marling) counties has also decreased in total population from 1840 to 1850—thus indicating a still progressive decrease.

Of the *three* (marling) counties, each also has declined in total population from 1790 to 1850. But contrary to the other *six*, each of these *three* has gained, and considerably, in the latter time, from 1840 to 1850—indicating a now growing population. This is a certain, but not an immediate nor always a very early consequence of increased agricultural production and general wealth.

There is a difference worth notice in the manner and progress of these different counties arriving at the general result of total population being less in 1850 than at the earliest census, either 50 or 60 years before. The *three* marling counties, on the average, and with some fluctuations, and notwithstanding recent increase, have each decreased from 1790. This would show that they were impoverished even before 1790, and had then reached nearly as low a condition of production as 30 or 40 years later. But the other *six* counties, being more lately settled, were less exhausted and impoverished, and therefore increased in population to a later time. The maximum population of each, as shown by the census reports, (and in Table II,) was either in 1820 or 1830; after which the decline began and has continued.

TABLE III.—*Assessments of Lands and Buildings*

In the earliest stated assessment, (1781) the three counties Prince George, Charles City and James City, even then were valued much lower than Sussex, Southampton and Greensville, taking each three together. This shows that even then the lands of the latter must have been far less exhausted, and much more productive. For, if even then equal in production, there were obvious grounds of preference for the counties on James river, which would have caused them to be rated higher than the other three. Again—Amelia and Nottoway, of unquestionably greater natural fertility, and then but little exhausted, were then rated lower than any one of the lower-lying counties—thus indicating the then comparatively recent settlement of the upper counties, and therefore less appreciation, and for that reason only.

From 1819 to 1838, all the *six* (unmarled) counties decreased in values of lands; and also from 1838 to 1850, except Dinwiddie, of which the last assessment of lands was higher by 5 cents the acre only. From 1840 to '50, the latest assessments of buildings, in these *six* counties the values had decreased, except Nottoway, of which the value of buildings had slightly increased.

The *three* (marling) counties had also de-

creased in value of lands from 1819 to 1838, except James City, of which the assessment was increased, and which was doubtless the result of the then already extended marling. If the assessment had been made from 1820 to 1828, instead of so late as 1838, a much lower rate of value would have been assessed for all these three counties, and, from this lower depression, a much higher advance afterwards to the actual assessment of 1850. As it was, from the actually much advanced values of 1838, there was still a much higher advance of each of these three counties to the assessment of 1850. The value of buildings in all the *three* increased largely from 1840 to 1850.

TABLE IV.—*Increase or Decrease of Public Revenue.*

As proportioned to the assessments, the taxes on lands and buildings, at the same rate, for the *six* counties have all decreased from 1840 to '50, except in Dinwiddie—for which these taxes have increased $8 only for the whole county. Deducting this from the decrease on the other five ($1285) leaves the net decrease of these taxes, for the *six* counties, $1277. The same taxes on the *three* counties have increased in proportion to their assessments, making $441, on these two subjects. Now if the *six* counties had made equal increase of their taxation on lands and buildings in proportion to their greater extent of arable or cleared land, their joint increase would have been ($441×5½=)$2425, instead of the actual decrease of $1277. The difference to the treasury between losing the amount of decrease, and gaining the increase, annually, is equal to these two amounts added together, or $3702, on lands and buildings only, and at the same rate of taxation.

But these two taxes have latterly been increased in rate, and many other subjects added previous to 1850, and of which the products are shown in the aggregate taxes of that year. This actual and aggregate taxation will show a still stronger contrast. In aggregate taxes, the total increase from 1840 to 1850, of Dinwiddie, Amelia and Nottoway amounted to $1038

Sussex, Southampton, (omitting the one tax of $1216 on the rare and single case of the collateral inheritance of a large estate) and Greensville, taken together, decreased in amount of payments of aggregate taxes, by the joint sum of $512—which deduct, 512

Showing a net increase of $526

The increase of aggregate taxes on the *three* marling counties amounted to $2062. If the *six* counties paid equal increase in proportion to their greater extent of cleared lands, their increase would be ($2062×5½=) $11,341 paid of increase of aggregate taxes, or more than 21½ times as much as the actual increase of $526. And this is the balance of gain to the treasury alone, and from these *six* counties only, which would now accrue if these counties had been improved as much as the three marling counties. As Prince George shows more increase of aggregate taxes than Charles City, and much more than James City, if the comparison was made with Prince George only, it would exhibit a still stronger contrast of that county with the six non-marling counties, than when the three marling counties, as above, are averaged and estimated in conjunction.

The suits instituted in the Superior Courts of Law and Chancery, in each of these counties, for the last two years for which full reports were made to the late State Convention, were as follows:

	Year ending Aug. 30, 1847.	*Do.* 1848.
Dinwiddie,	56	97
Amelia,	96	124
Nottoway,	107	117
Sussex,	39	33
Southampton,	73	150
Greensville,	33	41
Prince George,	14	21
Charles City,	15	28
James City & Williamsburg,	89	108

There being one court and clerk's office for James City and all Williamsburg, of which about one-half is in York county, the suits for both are (improperly) included in the above numbers, as reported to the convention.

As general results, these tables of statistics exhibit, in all the counties named, the like long continued and general decline—and also, recently, that, while the extensively marling and liming counties have begun to recover as soon as they used these means for improvement, the other counties have continued to decline to the latest time—and most of them with accelerated downward progress. The accordance of decline in all, for the first long time, and the remarkable difference and contrast of some, in their more recent growing prosperity, cannot be ascribed, with any color of probability, but to one known and sufficiently operating cause—the extensive use of calcareous manures in these prosperous counties and the new productive power thus notoriously created, and the either very general or entire neglect of the use of such means in the other counties. The long continuance and the extent of decline, and which would have been universal but for these means of remedy as yet but partially used, will appear, as here displayed, more impressive and more alarming to the observer, than had been noticed before thus separating and contrasting the counties the most different in latter times, though the most alike in former, in downward career.

These facts and deductions suggest a subject of consideration of the most momentous importance to the public welfare. The lapse and experience of sixty years have shown no change, nor hope for change, in the regular decline of fertility caused by the ordinary exhausting cultivation of much the larger por-

tion of lower Virginia. At last, one sure safeguard against the impending ruin, and, so far, one only, has been adopted; and though used but partially, insufficiently, often injudiciously, and sometimes injuriously, this defence has been found adequate, not only to stay the injury to the soil and its production, but to induce immediate reaction, and rapid improvement, soon reaching and surpassing the highest original state of productiveness, and followed by the certain consequences of proportional increase of general wealth, population, and public revenue. Can any subject be more worthy the consideration of a wise government, or of securing its aid to arrest the continuing evils, and promote the effects of the means for benefit to the best interests of agriculture, and of the commonwealth?

The legislature of Virginia, representing an almost exclusively agricultural people, has never directed the expenditure of a dollar to forward these great benefits to public interests already achieved by means of agricultural improvement; or to invite, by collecting and diffusing information, the hastening of the incalculably greater benefits of like kind to be secured by proper action. The legislature has refused any aid to the obtaining of information for this great object, even when to be at no cost to the treasury. Yet the treasury now receives annually more than $17,000 in the increase of land tax alone (independent of any increase of the rate of that tax,) upon the increased assessed value of the marled and limed farms of lower Virginia. Thus, while denied all substantial aid, and even costless instruction, the farmers who, struggling against all the difficulties of their want of knowledge, have created this new value to their country, are made to pay as a penalty for that service, the annual fine of more than $17,000 to the treasury. By the despotic government of the semi-barbarous people of Russia it has been deemed wise policy to exempt new and important agricultural improvements from all taxation for a long term of years. But the government of Virginia, while refusing all aid to agricultural progress, taxes to full extent all newly created values arising from agricultural improvements, as soon as their existence can be ascertained by assessments. If merely the new supply of such revenue, derived from the newly created values of marled and limed lands alone, were given to aid general agricultural instruction and improvement, it would serve not only to promote both private and public interests beyond estimation, but would also return to the treasury itself all the amount thence derived, with more than ten-fold increase.

The Dahlia was discovered in Mexico, by Humboldt, in 1798, and sent by him to Madrid, where it received its name in honor of the Swedish naturalist, Dahl.

For the Southern Planter.

JOINT WORM.

Mr. Editor,—In a former communication written for your journal, the publication of which I subsequently countermanded, I described the four-winged insect which emerged this spring from the galls produced by the "joint worm" on the sheath of the wheat stalk of last year's growth. In every instance, and I examined more than a hundred, the insect proved to be a hymenopter of the family *Cynipidæ*, or *gall flies*. One section of this family, embracing the genus *Diplolepis*, to which the gall fly of the common oak apple growing on the leaves of the red oak belongs, consists of vegetable feeders living on the tissue of the gall created by their punctures. A second section consists of carniverous parasites which deposit their eggs in the galls raised by the action of the *Diplolepis*, or other insects of similar habits, so that their larvæ may subsist on the latter. To my surprise the new wheat fly had the external characteristics of a genus belonging to the section of carniverous Cynipidæ, and yet as this fly alone was discovered, it seemed extremely improbable that the real author of the mischief was a different insect, and that *in every instance* the true culprit had been destroyed by a parasite. Accordingly, I had no hesitation in ascribing to this fly the habits of a Diplolepis, although it possessed the *artificial* characters of a carniverous *Cynips*. Adopting the nomenclature of Lamarch, who had united into one several of the genera of *Latreille*. I referred this insect to the genus *Cynips*, and applied provisionally the specific name *Vaginæ Tritici*, as indicating its apparent predilection for the sheath of the wheat stalk. A few days later I met with a copy of Dr. T. W. Harris' "Report on Insects injurious to vegetation in Massachusetts," in which is described a disease of barley apparently very similar to that which has been recently so destructive to the wheat. In this case, too, *all* the perfect insects which emerged from the diseased barley were Cynipidæ, which Dr. Harris referred to the genus *Eurytoma*, (Latreille) one of the genera which Lamarch reduced to his *Cynips*, as being distinguished by differences too trivial to justify a generic distinction. It now appears that our new wheat fly is identical with Dr. Harris' Eurytoma of the barley, and accordingly should receive the appellation which he first gave to it, *Eurytoma Hordei*.

The point of greatest interest is, however, yet undetermined. Is this Eurytoma, contrary to the general opinion of entomologists, capable of subsisting on vegetable matter, which must be the case if it be the original and true culprit, or is it a parasite, and if so what insect produces the galls, and is then devoured by the Eurytoma? It being known that several species of Eurytoma destroy the Hessian fly, Dr. Harris thought it probable that the insect which produced the new disease was a new species of *Cecidomyia*, which afterwards fell a prey to the carniverous *Eurytoma*. This opinion is also adopted by Dr. Fitch, of New York, who had somewhat doubtfully identified the "joint worm" as the larva of a *Cecidomyia*. Repeated observations made at short intervals during the spring and down to the present time on the wheat of this year's growth have gone far to confirm my first impressions, that the mischief is produced exclusively by the Cynipidæ, and that no *Cecidomyia*, or other *Dipterous* insect, has had any agency in the matter. I find at least two kinds of worm in the diseased excrescences. One, found in a very large majority of the cells, is yellowish, smooth and very sluggish. The other white, hairy, and very active in its movements. This last is a parasite. In several instances it was found in the same cell with an individual of the first kind, and feeding upon it, but it was found at all times in an exceedingly small proportion of cases, say one in twenty or thirty. In the structure of the head and mouth they resembled one another, and both were identical in this respect with the unequivocal larvæ of the four-winged gall flies of the oak. In view of this fact, taken in connexion with the statements already made, that in *every instance* in which a perfect insect has been observed to emerge from the diseased wheat, it was found to be a four-winged Hymenopter. I must hold, at least until another fly is produced, that entomologists have made a premature generalization in ascribing exclusively carniverous habits to the group of insects to which the Eurytoma belongs.

Dr. Harris, in a recent letter to you, suggests that a portion of the larvæ may undergo transformation during the first summer, unaffected by the parasite, while the other portion, infested with parasites, may remain unchanged till the following spring, and then give issue only to the parasitical Eurytoma. In the progress of my recent observations I have met with three or four instances of complete transformation this summer, but in every case the insect was a *Eurytoma*, of which, in addition to the Eurytoma Hordei, I found two new species, one of which was conspicuously characterized by bright red eyes. In many more instances I found the insect in the pupa stage, and exhibiting that form of a pupa which is characteristic of the Hymenoptera.

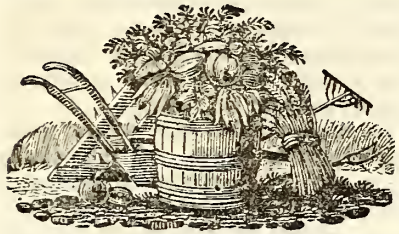
By pursuing these observations a few weeks, or, at most, a few months longer, the question will, doubtless, be finally settled. I had intended to defer the publication of my conjectures until such complete investigation should have tested their value, but for your suggestion that their present publication would serve to direct the attention of other observers to a subject, of much interest to the wheat growers, and thus increase the chances of obtaining a valuable result.

J. L. Cabell.

University of Virginia, July 26, 1852.

A New Mode of Fence Building.—Being desirous to add my mite for the benefit of my brother farmers, I describe my mode of fence building. In the first place I set a good post, seven feet four inches in length, two feet four inches into the ground, leaving five feet above ground. I then drive a stake beside the post, at sufficient distance to admit a rail, then lay in two rails. I now twist a wire firmly around the post and stake, then put in two more rails, then another wire, completing the fence with two additional rails, making six in all. I take the precaution to sharpen my posts as they take their places more readily when thrown by the frost. I have had this fence standing on my farm for four years, and it proves to be cheap and substantial. My neighbors have also tried it, and found it in all respects satisfactory.—*Albany Cult.*

Recipe for Whooping Cough.—Dissolve thirty grains of salts of tartar in a gill of water, add to it ten grains of Cochineal finely powdered, sweeten this with fine sugar. Give an infant a table-spoonful four times a day. To a child two or three years old, two tea-spoonfuls; from four years and upwards a table-spoonful or more may be taken. The relief is said to be immediate and in general within five or six days.



THE SOUTHERN PLANTER.

RICHMOND, SEPTEMBER, 1852.

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Business letters will be directed as heretofore to "The Southern Planter," Richmond, Va.

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SMUT IN WHEAT.

We have learned from various sources that this disease of wheat has done great damage in several portions of the State, in some cases ruining the whole crop, and in others injuring it very seriously. We have been requested to write an article on the subject by a good many of our friends, and a correspondent from Campbell, I. H. W., propounds the following queries, which, as covering the whole ground, we shall make the basis of this article:

1. What is the nature of smut, and its cause?
2. Is there any preventive of it?
3. Can it be propagated from crops that have it to crops that have not, by threshing the latter with the same machine with which the former was threshed?
4. Is it peculiar to particular varieties of wheat, and if so, to which?

Premising that we have no experience in the matter, having never discovered but two heads of smutted wheat in all that we have made, we will answer the above queries without regard to the order of interrogation.

Smut is nothing more or less than a microscopic, parasitical fungus, or mushroom, of the same species with those which grow in the fields and other situations where they are commonly observed. It was for a long time questioned whether this order of plants, of which there are 2,400 species, belonged to the family of vegetables or animals, but it has now been demonstrated to be a vegetable, though of a sort which, like the sponges, links the animal and vegetable races. The species which constitutes the smut in wheat,—perhaps others also,—is composed, to a very considerable extent, of a substance precisely like putrid gluten; and gluten is the characteristic ingredient of wheat, and chemically, though not in form, the same substance with animal gluten, or, as it is more commonly called, albumen. Hence the liability of wheat to be attacked by this fungus, and hence also the dispute as to the appropriate kingdom of the fungus.

Upon shaking or striking with the hand a smutted head of wheat, a quantity of dust will be observed. This dust is composed of the microscopic seed of the fungus, *uredo segetum*, as it is called, and there are millions of them in each head of smut. The same thing

may be observed upon bursting the common mushroom, or puff balls, of our fields; the purplish dust which rises is the seed of the plant.

Numerous experiments have clearly ascertained two modes by which these seed may infect the wheat—by absorption from the soil, in which case the seeds ascend along with water taken up by the roots of the plant—and by infection from seeds of wheat that have by some means got into contact with this powder, which adheres to it. The last is the most frequent cause. In either case the plant is poisoned, not only in the head, but in the straw also, which is reduced in product some eighteen per cent. It is, in fact, an organic disease which attacks and injures the whole plant, though the greatest damage is done to the grain. Of this it does not seriously affect the saline or inorganic constituents, but it prevents the formation of starch, as is known from the facts that none is ever found in smut heads, and that the fecula is never affected by the dust when treated with it independently; and it decomposes the remaining organic or vegetable particles, which consist mainly of gluten. It requires the nicest chemical examination to decide whether it putrifies the gluten, or consumes and appropriates it, since there is but a shade of difference between its substance and putrified gluten.

The countless millions of its seeds existing in the shape of finest dust, wafted about by every breeze, and not easily destroyed by the agency of the seasons, are scattered over the land ready to poison, by absorption, the crops which from some cause may be predisposed to the malady, and having once got hold on the grain, it is rapidly propagated by contagion. That these seed do always exist in the soil is not probable, though the fact of their presence or absence is not ascertained. Those of the rust, which is a plant of the same family, certainly do; but the intermittent and less universal attacks of the smut would seem to warrant the opinion that it is neither so hardy, prolific, or pervasive. What may be the exciting cause of its attack is not known. There are numerous opinions on the subject; but its prevalence in various seasons, over large districts containing every kind of soil, exhibiting great diversities of culture, and presenting many varieties of wheat which it seems to fasten upon indifferently, seems to forbid the ascription of it to the usually assigned causes, and would appear to require more accurate and continuous observation than has heretofore been given to it.

The specific remedy for infected seed wheat is somewhat troublesome, but very simple, and certain in its operation. It consists in steeping the wheat just previous to sowing in certain solutions which destroy the vitality if not the structure of the smut seed. Mr. Bevan, an Englishman, has made several accurate experiments with various steeps. It is not necessary to state those experiments in detail: it is sufficient to mention that specimens of smutted wheat steeped in solutions of common salt, soot, lime saturated, muriatic acid, and sulphuric acid, each produced crops free from smut. Of these, salt, as being cheapest, most common, and most easily handled, is altogether the best. It is used in this way: the wheat is first washed in pure water which is to be poured off along with all the floating grains. Then it should be soaked twelve hours in brine made strong enough to float a hen's egg. It should be then taken out and rolled in slaked lime until the grains becoming coated with it cease to adhere and can be easily scattered by hand. The lime steep is made by mixing one pound of fresh lime with three gallons of boiling water, and in that proportion for any quantity that may be wanted, pouring off the clear liquor and using it immediately. The seed to be rolled in lime as above. In both the above cases the wheat ought to be frequently stirred that the surface of each seed may be well washed.

We have seen in one of our exchanges a statement made by a gentleman in South Carolina of an effective steep made of bluestone. We have written to that gentleman requesting his recipe and his practice, and shall publish it if we get it.

Repeated washings in pure water are also said to be effective, but as the water must be changed at each washing the process is a very troublesome one.

We have heard that some gentlemen in Prince George who have used these solutions not as steeps, but as a mere wash, have had the smut very much curtailed, but have failed to have a good stand of wheat in consequence of the swelling and drying which prevents

the germination of a good many of the grains of wheat. To a certain extent this is to be expected. But we should apprehend less harm of this sort from a thorough soaking than from a superficial wetting, because the grain would dry much sooner in the latter case. It is within the observation of every wheat-grower that if a slight shower occurs during seeding, barely wetting the surface of the ground, but not stopping the work, that the wheat which was dampened by the same rain, or by being immediately enveloped in the moistened surface, vegetates very feebly if a drying sun follows and evaporates the moisture, because the incipient germination has been checked. Would this have happened if the grain had been thoroughly wetted so as not to dry out so easily? We think not. Nor would it, in our opinion, occur in ordinary seasons unless continued dry weather should supervene, such as injures the stand of wheat at all times. But if we are mistaken in this opinion, which ought rather to be called a suggestion, there are still two conditions which may, to a great degree, if not entirely, obviate the risk—ploughing the wheat in pretty deep, say about three inches, so as to place it beyond the influence of ordinary droughts, and adding seed enough to compensate the calculated deficiency, a safe approximation to which may be easily obtained by first steeping a given number of seeds the required time, then sowing them in the way the crop is to be sowed, and counting those that come up. But however all this may be, the smut must be got rid of, and we know no other mode of doing it.

Particular care should be taken after the wheat is removed from the steep not to spread it upon a floor which has been previously occupied by smutted wheat until it has been thoroughly scoured first with pure water, and then with brine as strong as the steep itself, as otherwise it would be liable to infection from the powder which might remain on the floor. The walls ought to be washed in the same way, or, preferably, whitewashed.

As preventives we would advise that wheat should not be sowed on the stubble of a preceding smutted crop, that the crop should not be manured with the straw of a smutted crop, and that the machine should be thoroughly cleansed before threshing, as the dust of the preceding crop may, and probably will, convey the infection.

This is all we can gather on the subject that we deem it necessary to communicate. The processes may seem tedious, but we believe them necessary to cleanse a crop thoroughly, and we think time will be well spent if it accomplish that object, as smut is the vilest pest that can infect the wheat crop. Having no personal experience, we can of course say nothing with absolute certainty. But the confidence with which we would recommend these remedies and preventives, gathered from such books as we have access to, is strengthened by the assurance of a neighbor that his crop was completely purged of smut some few years ago by brining and liming as above. If others shall succeed in consequence of what we have written, as we are very sure they will, we request as a favor that they will communicate the source of their good fortune to that thick headed and prejudiced class, the anti-book farmers, who act as if they thought every truth became a lie as soon as published in an agricultural newspaper.

I. H. W. (whose compliments, by the way, are duly appreciated, only we wish he had backed them by a handsome list of subscribers—we like pudding better than praise,) informs us that one of his neighbors did not mean to thresh his wheat, but would feed the whole of it to his hogs. We would thank him to note the result carefully and communicate it to us. It is by no means certain that it will be a very good food for them. Most of the fungi family are poisonous, and it is known that horses, and even people, fed on spurred rye, or rye infested with ergot, which is another fungus of the same family, have been killed by it. If the wheat was threshed and then brined we should not anticipate any danger; nor do we know that there is any at all. We merely suggest it as a possibility.

Another of our correspondents inquires for a good smut machine. The Rev. Walker Timberlake, to whom we applied on this head, says that Messrs. Wilson & Funk of Winchester, manufacture a machine, which he considers effectual. "It costs one hundred and fifty dollars, makes eight hundred revolutions in a minute; has been running six years, and has never been repaired." He advised a

friend to get one of a much smaller size, costing, he thinks, half as much, and he informed him afterwards that he had no further use for any other machine to clean his wheat.

And this is "all the information we can get on this subject." We hope it may prove satisfactory to our friends.

ANSWERS TO CORRESPONDENTS.

It is very desirable that gentlemen asking information should furnish their names. Sometimes it is unnecessary to *publish* replies, and yet we are forced to do so because we cannot write a private letter from ignorance of the querist's name. Sometimes, too, we desire to communicate further with our unknown friends. Whenever it is necessary to publish the letters that we may get information which we do not happen to possess, we can suppress the name whenever it is desired.

"A James River Farmer" desires to know how guano will operate on very salt reclaimed marsh land—land that has been reclaimed for ten years, and now brings very fine herdsgrass. Whether the land is too wet for grain is not stated, and yet that is a very important condition. If it is, we should think it hardly worth while to sow guano on the grass, as the moisture and vegetable matter in the land seem now sufficient to produce a maximum crop of grass. If it is dry enough for wheat or corn, and rich land, we would think it useless to apply guano, as on very rich land it rarely pays well. The saltness of the land we would not regard at all. It is recommended sometimes to sprinkle salt and water over manure for the purpose of retaining the ammonia, which, it is said, becomes changed thereby from a volatile to a fixed salt—from the carbonate to the muriate of ammonia. We do not know if this is so, but we should apprehend no danger from the presence of salt.

But we beg that our opinion in the above shall not be relied on, but that accurate experiments shall be instituted to test the matter. We may be mistaken; for instance, in the opinion that guano pays badly on rich land. There are facts on the other side that we occasionally hear of, such as this: we learn that Mr. Richard Sampson, of Goochland, applied guano on some of his best low grounds, and thought it a failure. He put on no more for a year or two, until having a small portion left over one fall, he sowed it again on the low grounds and made greatly superior wheat on the land.

I. H. W. of Campbell county, and others, will find their inquiries on smut answered in the leader of this number. They would have been answered in the August number, but we had neither time nor space. They are answered now in good time.

CHINA FOWLS.

Our thanks are due to Mr. Chas. Sampson of West Roxbury, Massachusetts, for the very acceptable present of a pair of these fowls. They came safely to hand per steamer Roanoke. Judging from these, and from some very fine specimens shown us some time ago by our friend, Mr. Butters, (at Nash & Woodhouse's bookstore,) we believe this to be a very superior stock, certainly the largest and finest we have ever seen—and we think poultry-raisers would do well to supply themselves with some of this breed. See Mr. Sampson's advertisement in another page.

P. D. B.

GREAT SALE OF SHORT HORN CATTLE.

We call the attention of our readers and particularly those who are improving their breed of cattle, to the advertisement of Mr. George Vail, in another column. The high reputation of his herd renders any remarks from us in reference to it unnecessary. Catalogues of the sale can be had on application in person, or by letter, at the office of the Southern Planter.

Oat Straw.—A writer in a June number of the Farm Journal, gives his experience of the injury of oat-straw, when fed to milch cows. He states that in the early part of June his cows ate of the oat straw litter, and, although fresh, their milk immediately failed, and was not restored until the cattle were entirely excluded from the straw. This, we believe, accords with the universal opinion among farmers, of the deleterious effects of this straw upon cows in milk; but it is well enough to

mention the fact, in order that, through inattention, others may not suffer from negligently allowing their cattle to feed upon it.— *Germantown Telegraph.*

For the Southern Planter.

GUENON'S THEORY OF THE MILCH COW.

All mankind, and farmers more especially, are prodigiously afraid of the monster, humbug. Nor is this surprising, considering the constant vigilance necessary to guard us against his insinuating machinations in the countless shapes in which he appears, in the moral, political and agricultural world.

Prudence (always commendable) will nevertheless dictate the importance of investigating the claims of what professes to be a new discovery or invention, before the stigma of humbug is fixed upon it. It has been the fate of most of the grand discoveries, to which the world owes its present state of civilization, in their early history, to be pronounced humbugs, and so it will continue to be to the end of time.

A few years since a work was issued from the press, called "A Treatise on Milch Cows, whereby the quantity and quality of milk which any cow will give, may be accurately ascertained by observing natural marks or external indications alone; the length of time she will continue to give milk, &c. By M. Francis Guenon, of Libourne, France, and translated for the Farmers' Library, by N. P. Trist, Esq. late United States Consul at Havana." This work on its first appearance attracted the attention of a few individuals who took the pains to study it; but to the community at large it seemed difficult and inexplicable, and therefore was set down as a humbug. The author of this work has consumed about twenty years in perfecting and systematizing his discovery, which has been subjected to the best tests by the distinguished agricultural societies of France, who have awarded him gold medals, as may be seen by reference to the work. A discovery that will teach us to choose between cows that will yield six gallons of milk and those that give one quart per diem—to distinguish those that give milk during the whole time of pregnancy from such as go dry as soon as impregnated—by external marks, is surely one of the greatest of the age.

But does any one believe it? I must confess that, after two years' investigation and practice, I see very little to shake my faith in the accuracy of the science, and that where I have been at fault in pronouncing upon a cow, it has invariably grown out of my own inattention or ignorance of the subject.

According to Guenon, cows are divided into eight classes, each having a general and distinguishing mark. These are again subdivided into eight grades of each class, with a mark which fixes the rank of the cow in her class. Cows are also divided into three classes, according to size, viz: high, medium and low.

He has given a name to each class, which is altogether arbitrary, but most generally suggested by a resemblance of what he calls "the escutcheon" to the thing whose name it bears.

There occur in all grades of every class what he calls "bastard" cows, who go dry immediately on being impregnated. These have likewise their distinguishing mark. The marks exist on a calf as soon as it is born, and may be defined at two months old, both on male and female. We may, therefore, always know whether to retain any calves for breeders or turn them out for beef.

The book contains plates exhibiting the marks of every grade, of every class, and tables showing the quantity of milk, and the length of time each will give milk after being impregnated.

A considerable degree of practice is necessary to acquire a perfect knowledge of the subject and to retain a distinct recollection of all the marks.

Some persons show a great fondness for, and facility in, learning the marks, and are much astonished at their accuracy. There must be a perfect combination of all the marks, before the character of a cow can be known, and the rates for milk are based on the supposition of perfect health, maturity of age, and abundance of food. Under these circumstances, his standard will often be found too low.

Let the learner take the book and first make himself familiar with the distinguishing mark of each class. He can then learn the marks which fix the grade in each class. He must then learn the bastard marks, and the task is done.

The improved English breeds have a much larger proportion of well marked milkers than the common stock, which is a strong evidence of the truth of the theory.

To persons desirous of conducting the dairy business, is this discovery of paramount importance, for upon the proper selection of cows depends the whole question of profit or loss. The difference between a cow which yields eight hundred gallons and one which yields fifty gallons of milk per annum, is enormous, and yet such a difference exists, and can be pointed out by one familiar with Guenon's Theory. I will conclude by earnestly recommending this work to the *patient study* of all the readers of the Planter, and shall think "I have done the State some service" if I can rescue from oblivion one of the most valuable discoveries of modern times.

The book can be had in Richmond for less than one dollar.

A Subscriber.

For the Southern Planter.

SCIENTIFIC AGRICULTURE.

BY PROFESSOR GILHAM.

NUMBER II.

(Continued from page 228.)

OF THE NUMBER AND DIVERSITY OF BODIES IN PLANTS.

The substances produced by plants in their growth are very numerous, and are remarkable for the great diversity in their properties.—Almost every plant produces some substance peculiar to itself. Thus one tree produces turpentine; another gum; another India rubber; another camphor, &c. Some plants produce flowers that are fragrant; others produce flowers which exhale most offensive odors; some plants yield deadly poisons, while others yield substances which are remarkable for their medicinal virtues; some are cultivated for their leaves; others for their bark; others again for their stems; and others still for their roots. By a careful separation of the different parts of a plant, we find that there is scarce a single one which will not yield some fifteen or twenty different bodies, and many plants produce twice that number. But the substances which make up the great bulk of plants are few in number, and are common to nearly all. Those which give particular properties, such as taste, color, odor, &c. to particular plants, generally form but a small part of the whole mass, and too small to require the expenditure of much of the vital force of the plant in their production.

WOODY FIBRE, STARCH, SUGAR AND GUM.

The white insoluble mass which is left after boiling a piece of the stem of an herb, or a piece of the trunk of a tree, is named *woody fibre*. It has neither taste nor smell, is perfectly insoluble in water, and is nearly identical in composition, whether obtained from the fibres of common flax, hemp or cotton, or from any of the different kinds of trees. It is by far the most abundant product of vegetation. It is composed of the three elementary bodies, *carbon*, *oxygen* and *hydrogen*; or to express its composition more accurately by numbers, it consists of *twelve* atoms of carbon, *eight* of oxygen, and *eight* of hydrogen. Now water is composed of one atom of hydrogen and one atom of oxygen, and since the number of atoms of oxygen and hydrogen are equal in woody fibre, it follows that its composition may be expressed by saying that it is composed of *carbon and the elements of a certain number of atoms of water.*

If woody fibre is burned in the open air the oxygen of the air, and of the fibre itself, enter into combination with the carbon and hydrogen of the fibre, forming carbonic acid with the one, and water with the other. If, however, it is subjected to high heat in a close vessel, or one which will not admit a free access of air, the fibre undergoes what is called *destructive distillation*, and is decomposed; a portion of the hydrogen unites with oxygen, forming water; the other portion unites with carbon forming compounds known as the *carburets* of hydrogen; and that portion of the oxygen of the fibre which does not form water by its union with hydrogen, unites with carbon, forming carbonic oxide, and carbonic acid. But since there is a greater number of atoms of carbon than oxygen or hydrogen in the fibre, it follows that a portion of the carbon will remain in the form of charcoal, after the others have been driven off.

Starch is the next most abundant vegetable product. It possesses great value from its being one of the principal articles of food for man and animals, and from its occurring in large quantities in the grains and roots of cultivated plants. It may be gotten from a variety of sources, only two of which we shall mention in this place.

When the flour of wheat or rye is made into a dough and washed with water, and the milky liquid which passes from it is set aside and allowed to settle, a white powder is gradually deposited in the bottom of the vessel, which is *starch*. When the potato is grated upon an ordinary grater, or on graters arranged for the purpose, and the pulp thus produced is washed as before, the liquid gradually deposits *potato starch*.

Starch is a white granular powder, insoluble in cold water, but readily forming a ropy or pasty liquid, when thrown into boiling water. It is composed of *twelve* atoms of carbon, *ten* of hydrogen, and *ten* of oxygen; or like woody fibre, it may be regarded as *carbon and the elements of water*.

There are two kinds of sugar, *cane sugar* and *grape sugar*. Cane sugar is found in

great abundance in the juice of the sugar cane, the sugar maple, in the stalks of Indian corn, and in the juices of many plants and roots. Grape sugar exists in the juice of the grape, the gooseberry, currant, and many other fruits. Sugar is distinguished by its sweet taste and solubility in water. Grape sugar is not so sweetening in its properties, or so soluble, as cane sugar. The latter consists of *twelve* atoms of carbon, *ten* of oxygen, and *ten* of hydrogen; or its composition, like woody fibre and starch, may be expressed by *carbon and the elements of water.*

Grape sugar is composed of *twelve* atoms of carbon, *twelve* of oxygen, and *twelve* of hydrogen. This shows its composition to be somewhat different from that of cane sugar, but since the equality between the number of atoms of oxygen and hydrogen is kept up, it may likewise be said to be composed of *carbon and the elements of water.*

Gum is another very commonly occurring vegetable product. It exudes from the stems and twigs of trees, and is found in many seeds. When treated with hot water these plants and seeds yield mucillaginous solutions. There are many varieties of gum, but they are all characterized by their dissolving or softening in water, forming very adhesive bodies which may be used as paste. The different varieties of gum are all found to have the same composition, namely, *twelve* atoms of carbon, *ten* of oxygen, and *ten* of hydrogen; therefore, it too may be said to consist of *carbon and the elements of water.*

OF THE MUTUAL TRANSFORMATIONS OF WOODY FIBRE, STARCH, GUM AND SUGAR.

Woody fibre, starch, sugar and gum make up the great bulk of the vegetation of the globe; they are nearly identical in composition, but endowed with widely different properties. This identity of composition renders their mutual transformation even in the hands of the chemist, a comparatively easy matter, but in the processes of vegetation they are constantly going on, and appear to be as necessary to secure the maturity of a plant, as heat, air and light.

If wood be reduced to fine saw-dust, and heated a number of times in an oven, it will become hard and crisp, and may be ground in a mill. The powder or meal so obtained is a light yellow, and has a taste and smell not unlike wheat flour; it ferments when made into dough with yeast, and when baked yields a nutritious bread. In this process the woody fibre, or at least a portion of it, has lost its insolubility, and acquired the properties of starch.

By digesting fine saw-dust, or fragments of old linen (woody fibre,) in sulphuric acid, the fibre will gradually be converted into starch, gum or grape sugar; the particular substance produced depending upon the relative quantities of the fibre and acid used, and the time during which they are in contact.

When flour or potato starch is introduced into an oven and gradually heated to three hundred degrees, it slowly changes, acquires a yellow or brownish tint, and becomes soluble in cold water, because *the starch has been changed into gum.* This gum is now largely manufactured, and used by calico printers as a substitute for gum arabic.

If starch, sulphuric acid and water be taken in certain proportions, the acid and water mixed, heated to the boiling point, and the starch after mixing with a little water, poured into the dilute acid, the starch is first converted into *soluble starch*, or *dextrine*, as it is called, and by longer boiling into grape sugar. After the transformation is complete, the acid may be removed from the solution by the addition of chalk, which throws down the insoluble sulphate of lime. After settling, the clear solution of sugar may be poured off, and the sugar obtained from it by evaporation. This sugar is manufactured largely for the adulteration of cane sugar, and for conversion into spirits.

Sulphuric acid will by similar processes transform gum into grape sugar, and cane into grape sugar.

In vegetation we have like transformations continually taking place, but not always in the above order. Thus the sugar cane, Indian corn, and many other plants contain a large amount of sugar in their juices, just as they are going to flower; but after flowering, the sugar decreases, and we find it replaced by woody fibre, starch, &c. In biennial roots, such as the beet or carrot, there is stored up a certain amount of sugar, with a little starch, both of which rapidly disappear when vegetation is resumed in the spring, in the formation of the leaves, stem and seed. Trees too have stored up during winter supplies of sugar, starch, or gum, products of the preceding year's growth, which are in early spring very rapidly consumed and converted into the woody and cellular fibre of the young leaves.

GLUTEN, VEGETABLE FIBRINE, VEGETABLE ALBUMEN, AND LEGUMIN.

Thus far, we have spoken of such substances only as contain carbon, oxygen, and hydrogen, but there are certain vegetable products which contain nitrogen in addition to the three above mentioned, and which, although small in quantity, are of very great importance.

When wheat flour is made into dough, and the dough washed with water to remove the starch, there remains in the sieve after the washing away of the starch, a soft, adherent, tenacious mass, which has little color, taste, or smell. This is *gluten* of wheat. Other kinds of flour yield it when treated in the same way, but in less quantity. It is this substance which makes the dough from wheat flour so adhesive, and by its tenacity gives the dough the property of rising after yeast has been added.

When gluten is digested in alcohol, an

insoluble white substance is left, which, from its close resemblance to the fibre of lean beef or mutton, has been called vegetable *fibrin.*

From the clear liquid which remains above the starch after standing, a substance may be obtained, which, from its resemblance in composition and properties to white of egg, is called vegetable *albumen.*

Peas and beans contain a substance called *legumin,* which, from its close resemblance to the curd of cheese, is called vegetable *casein.*

Gluten, vegetable fibrine, vegetable albumen, and legumin, appear to be as closely related as sugar, starch, gum, and woody fibre are to each other. They consist of the four elements, carbon, oxygen, hydrogen and nitrogen, united together in the same proportions, and are capable, to a certain extent, of mutual transformations. When exposed to air and moisture, they undergo decomposition; they ferment, emit an offensive odor, and, among other products, produce *ammonia,* from the union of the nitrogen with a portion of the hydrogen of the fermenting body.

When barley which is newly malted and crushed is digested in water for a short time, it dissolves out a substance called *diastase.* This substance does not exist in the grain before malting, therefore *it is formed in the process.* No diastase can be found in wheat, rye, or potatoes, but if they are made to germinate, or sprout, and afterwards treated with water, diastase will be formed, showing that *it is produced during germination.* It is found to contain nitrogen, and must be formed from the gluten of the grain.

Diastase, like sulphuric acid, has the power of converting starch into dextrine, (soluble starch) and afterwards into grape sugar. It is to this property that the value of malt is due. When barley or other grain is malted, the gluten is the first substance to undergo change, forming diastase; the diastase coming in contact with the starch in the grain, renders a portion of it soluble by conversion into dextrine and grape sugar, and when the malt is made into meal and digested in hot water for the manufacture of beer, the whole of the starch is transformed to sugar, which is afterwards fermented. In making whiskey too, a certain portion of malt meal is added to a large quantity of corn or rye meal, and boiling water added; the diastase in the malt effects the conversion of all the starch of the meal into sugar, after which yeast is added, and in fermentation the sugar is transformed to alcohol.

In germination, it is the same as in the making of malt; the gluten under the influence of warmth and moisture, commences change, and forms diastase; this acting upon the starch converts it gradually into sugar, which being soluble is readily carried with the diastase to all parts of the embryo, supplying it with every thing necessary for the formation of cells, woody fibres &c. until its organs are sufficiently matured to permit it to derive its food from other sources.

The other vegetable products are all found to be composed of two or more of the four elementary bodies mentioned above. These substances, namely, oxygen, hydrogen, carbon and nitrogen, are called the *organic elements of plants;* so called because they are the elements concerned in building up, as it were, all organized structures, that is those structures which cannot be produced without the aid of the *vital* or *living* principle.

In the combustion of organic bodies, the organic elements form gaseous compounds, and escape into the atmosphere; it is found, however, that the entire body is not consumed, that there is always left behind a small residue, constituting what is known as the *ash.* The ash of a plant seldom exceeds five per cent. of its whole mass; it is composed of a variety of substances, which are called the *inorganic* constituents of plants—of these we shall speak in our next number; for the present, we will confine ourselves to a consideration of the sources from which the organic elements of plants are derived.

SOURCES OF THE CARBON OF PLANTS.

A statement of a few well known facts will show that the air is the principal source of the carbon of plants.

1. Seeds sown in a soil perfectly destitute of substances containing carbon, will, if well watered, germinate and produce plants which contain several times more carbon than the original seed.

2. Some plants grow and increase in size when suspended in the atmosphere and without being in contact with the soil.

3. Every farmer of any observation knows that the soil of wood land becomes richer every year in carbonaceous matter, from the decay of the annual crop of leaves, and that while this is going on the trees are continuing to increase in size. The same is true in lands that are in grass. The longer the grass stands upon the land the richer does it become in vegetable matter, and when broken up, lands that before were almost destitute of organic matter, often present a rich black mould.

The use of clover, buckwheat, peas, &c. for ploughing in, results from the property these plants possess of drawing much of their carbon from the atmosphere. If they derived their carbon from the soil alone, a crop of either of these plants ploughed under, would only return matter that had originally been contained in the soil, hence the organic matter in it could not increase; but we all know that every green crop ploughed under gives a positive increase to the organic matter of the soil, and that by persisting in ploughing them in, land that is almost destitute of organic matter may be improved in that particular to any desired degree.

4. The formation of peat bogs and swamp muck furnishes perhaps the most striking proof of the atmospheric origin of most of the carbon of plants. A tree falls across a small

stream, and produces a marshy spot, plants spring up, die and fall down; on these, new races spring up; year after year this continues, vegetable matter increases, and in time we have a bed of peat. Plants spring up from year to year in swamps, they grow, die, fall down and are succeeded by others; the vegetable matter increases rapidly, and soon the mud becomes black from the accumulation of carbonaceous matter resulting from decaying vegetation.

All these facts show that plants derive carbon from the air, and that they may be made to grow without deriving any supply from the soil. It does not follow from this, however, that the air is the only source of the carbon of plants. There are a number of facts which tend to show, that while the atmosphere is the principal source, the soil also supplies a portion.

Thus, while plants can be made to grow in a soil perfectly destitute of organic matter, they are not generally perfected in such a soil.

If the crop be carried off a field, the soil will be found in most cases to contain less organic matter than before it began to grow; and if the cropping is continued, without the addition of manures, the organic matter will gradually disappear. The mere ploughing the land without cropping, would by continually exposing the soil to the action of the air, gradually lessen the amount of organic matter in it; but two years' constant stirring the land will not rob it of as much vegetable matter, as one crop of wheat.

All soils are found to be more fertile for containing a certain amount of organic matter; but it does not necessarily follow from this, that the increased fertility is due to the organic matter supplying carbon to plants. For, as we shall see when we come to speak of soils, the presence of organic matter is of great importance to a soil, independently of any carbon it may supply.

Let us now see what compounds of carbon there are in the air, and in the soil, which are sufficiently abundant to supply growing vegetation with the necessary quantities of this element. We have seen that in the air there is but one, and that is carbonic acid; we must, therefore, look to this to supply all the carbonic acid derived from the atmosphere. Carbonic acid it will be remembered is absorbed in small quantity by water, hence the rain in descending will carry down more or less in solution, and by the absorption of water by the roots, a certain amount of the gas will go into circulation of plants. But the amount taken up in this way, must be very small as compared with the quantity required; therefore, we must look to some other means by which it can be supplied to vegetation. It will be remembered that leaves, and particularly their under surfaces, are covered with stomata, or breathing pores. Now, the leaves, through these pores, absorb carbonic acid with great avidity, select it, as it were, from the other gases of the atmosphere, carry it into the interior of the leaf where it is decomposed, the carbon appropriated to the wants of the plant, and an equal volume of pure oxygen returned to the atmosphere. This may be proved very readily by placing a growing branch full of leaves in an inverted glass vessel full of water which is known to contain carbonic acid in solution, and exposing it to sunlight. Very soon little bubbles of gas make their appearance upon the surface of the leaf, they enlarge, run together, and finally collect in the top of the vessel. If, now, after bubbles cease to rise, the gas collected is examined, it will be found to be pure oxygen; and if an examination of the water be made, it will be found to be destitute of carbonic acid.

The per centage of carbonic acid in the atmosphere appears to be too small to supply all the vegetation of the globe with carbon, but a simple calculation will show that there is at all times more of this gas in the air than would be produced by the combustion of all the vegetation now on the earth. But if we look at growing vegetation as one of the agents by which nature keeps up her balance, there can be no difficulty in admitting that the air is abundantly supplied at all times with carbonic acid. In all cases where the decomposition of organic matter takes place, whether by natural decay, combustion, or otherwise, oxygen is consumed from the air, and an equal volume of carbonic acid given off; hence, in the *destruction* of organic matter, we have a constant source of supply of this gas, which, in time, would accumulate to such a degree as to unfit the earth as the abode of animals, but for the fact that growing vegetation by absorbing it, keeps a check upon its increase.

The absorption of carbonic acid takes place during the light of day only; the rapidity with which it takes place depends upon the number of pores, and the extent of surface of the leaves; those plants which grow with great rapidity, either have a great number of leaves, or their leaves are very large. The rapid vegetation which takes place in the short summers of high northern latitudes, results from the days being so much longer, by which the uninterrupted absorption of carbonic acid goes on so many more hours, than in places near the equator.

Plants are said by many experimenters to give off carbonic acid at night and absorb oxygen, while others deny it; one thing is very certain, the carbonic acid given off at night is very small as compared with that absorbed during daylight.

The carbon derived from the soil by plants is also taken into the circulation as carbonic acid, at least the greater part of it; the soil admitting a free access of air, the organic matter undergoes gradual decay, by which there is a constant evolution of carbonic acid; this gas coming in contact with the water in the soil, is absorbed, and by that taken into the roots. In the decay of organic matter in

the soil, there are other soluble compounds of carbon found in small quantity, more or less of which are taken into plants through their roots, but the quantity of carbon received in this way is necessarily small.

SOURCE OF THE OXYGEN AND HYDROGEN OF PLANTS.

There is little difficulty in determining the origin of the oxygen and hydrogen of plants. Water we know, from its solvent powers, is the medium by which food is taken to all parts of the plant, and in that way it is of very great importance to vegetation. But it plays another part of equal importance; it supplies plants with all the oxygen and hydrogen they require. Water is composed of one atom of oxygen and one atom of hydrogen; and woody fibre, starch, sugar and gum, the substances which make up the greater part of the vegetable, consist of carbon and the elements of a certain number of atoms of water. The carbon required is supplied by carbonic acid, and there being a supply of moisture always present, all that is required for the formation of all these substances is, for a new arrangement of the elements of water to take place, and a union of them with the carbon derived from the decomposed carbonic acid. There are some cases in which the changes are more complicated, such as where substances are produced which contain more hydrogen than oxygen, or the reverse case when the oxygen predominates over the hydrogen; but even in these cases, the same principle which enables the plant to decompose carbonic acid, appropriate the carbon, and give off the oxygen, will more readily enable it to decompose water, appropriate either element and give off the other, and for the reason that the elements of water separate from each other so much more readily than those of carbonic acid, affording hydrogen here, oxygen there, to the necessities of the plant.

SOURCES OF THE NITROGEN OF PLANTS.

The existence of a large amount of nitrogen in the atmosphere would naturally lead to the inference that the leaves of plants absorb this gas directly from the air as they do carbonic acid, but this is found not to be the case. Leaves have a very marked power of selection, and it is found that while they absorb carbonic acid with great avidity, very little if any nitrogen finds its way to the plant through them. Neither do they absorb free nitrogen by their roots to any extent, for it is found that substances enter the roots of plants only in a liquid state, or in solution in water, and the solvent power of water on nitrogen is too small to admit of the assumption that any appreciable amount of the gas can enter the plant in this way.

Since free nitrogen does not enter plants by their leaves or roots, it follows that some one or more of its compounds must; of these compounds there are two which appear to be the chief sources of supply—*ammonia* and *nitric acid.* Ammonia is absorbed in large quantity by water, and almost all of its compounds are very soluble, hence there is no difficulty in seeing how abundant supplies of it in solution may be taken up by the roots of plants, provided it exists in sufficient quantity in the soil.

Ammonia and its carbonate, both very volatile, are given off from decaying vegetable matter containing nitrogen, from decaying animal matter, and from fermenting manure. Decaying vegetation gives off little comparatively, while it is evolved in large quantity from decaying animal matter and from fermenting manure, and it is to these two sources that the farmer must always look, to keep up the necessary supplies in his soil.

Nitric acid is found to supply plants with nitrogen as readily as ammonia. It, as well as all of its compounds, is very soluble, and enters the roots of plants with as much ease as ammonia, so, that, in so far as the nutrition of plants is concerned, it appears to serve the purpose just as well as ammonia itself. Ammonia, however, is more generally diffused than nitric acid, and is a constant product of the decay of all organic bodies containing nitrogen, while nitric acid is found only under very favorable circumstances. Therefore, we must look to ammonia as the prime source of the nitrogen of plants.

We thus see that carbonic acid, water and ammonia are the sources of the organic food of plants, and these are the very same substances that are formed in the decay of organic matter; hence, we see, that by a beautiful provision of nature, the destruction of one race of organic beings becomes the source of life to succeeding races.

For the Southern Planter.

THE HESSIAN FLY—THE BLACK FLY AND THE JOINT WORM.

Mr. Editor,—The detail of a few facts, and a brief dissertation upon the above destructive foes to growing wheat, may not be uninteresting to you, or your readers, at this time. In the northern part of Culpeper county, (the location is given to show the gradual progress of the joint worm northward, and to indicate its present position,) the crops have been affected, more or less, by all three, or shall I say, by both of these insects, since the month of March.

The Hessian fly is so old and familiar an acquaintance, that it is not deemed necessary to say much about it; but in its relation to, and contrast with the others, the following points in its history may be appropriately introduced. The fly is described as being about one-tenth of an inch long, black in the head and thorax, and tawny in the hind-body, which

is covered with fine grayish hairs. Its wings are blackish, tinged with yellow, and are fringed with short hairs; they expand one-quarter of an inch, or more. This fly has been seen distinctly depositing its eggs, like minute reddish specks, along the upper surface of the leaves of young wheat. These eggs have been watched until reddish worms have been hatched from them, in from four to fifteen days, which crawl down the leaves and conceal themselves between the sheath and the stalk—remaining there, head downwards, until they go through all their transformations. They neither eat the stalk, nor penetrate within it, but seem to live upon the sap, by suction, and continue to grow for five or six weeks, when they attain their full size of three-twentieths of an inch in length. The skin hardening now and changing color from a white to a chesnut brown, the insects are said to be in the flaxseed state. This fly has its insect enemy, or Ichneumon, which preys upon it while in the condition of a worm. And here, it might be well to define what an Ichneumon or parasite is: It is an insect which lives by preying upon and consuming another insect, in its immature state. There are many of them, and they serve to repress the immoderate increase of our noxious enemies. "They all *oviposit* in living insects, chiefly while in the larva state, sometimes while pupæ, and at others, while in the *egg* state. The eggs thus deposited, soon hatch into grubs, which immediately attack their victim, and in the end insure its destruction."

The preceding, compiled by way of premise to the following, and much more very interesting matter, may be found in Johnson's Farmers Encyclopædia and Kirby & Spence's Entomology.

The wheat in this neighborhood came out of the late severe winter looking badly, in the month of February. By the middle of March it had improved not a little, and promised fairly; but towards April it was observed to have an unfavorable appearance in small portions of some fields, in the half of others, and in the whole of others—at first it seemed to cease growing and to remain stationary, then to retrograde, and finally to disappear, as it were, from the surface of the ground; at the same time were seen tufts or bunches of strong, healthy wheat in the midst of the puny growth around, such as the land might be expected to bear when unaffected; and such as really grew in unaffected portions of the same field. These bunches, accompanied by the gradual disappearance of the wheat around, was the most prominent and striking characteristic of the disease. They were observed by every body, and attributed by every body, almost invariably, to rich spots, caused by droppings of cattle, or cowpens, or more extended manurings—for of such diversity was their sizes and shapes. Another remarkable characteristic was this: the lateral stalks, the tillering, seemed to hug the ground, instead of rising straight up, as in health, and presented a grass-like appearance. One of my neighbors, an extensive wheat-grower, at once pronounced the presence of the "joint worm," from having read an account of it; and I coincided with him, having also read the same account—though, unfortunately, I am unable to lay my hand upon it now. When the diseased condition became more apparent, others assigned different causes for it—some the severity of the winter—some, the want of due preparation of the ground—and some the Hessian fly—and all were incredulous as to the joint worm, supposing it could only be recognized by the bent joints. When the wheat was heading, upon examination—I was about to say close examination, but no great nicety was required,—a small worm, about a quarter of an inch long, white, or slightly marked with greenish lines, could be found in the cavity of the wheat stalk, just above the roots—not in the first joint from the head, but in one of the first from the root; and a lacerated wound in the leaf or leaves, covering the stalk, could also be seen. That this was altogether a different insect from the Hessian fly, was obvious, from the fact that the latter was present at the same time, its worm being found in a quiescent state between the leaf and the stalk, while the former was a stirring, active worm, found within the stalk itself. Its principal ravages seemed to extend throughout April and early May; and it showed itself in different fields at different times, as well as remembered. And let it be remarked, that it seemed to favor or attach itself to the later wheats first, and then to the tenderer of the earlier sorts, viz: it manifested itself first and chiefly in Zimmerman and Poland, then in Early Purple Straw, and lastly in Mediteranean, *if it attacked that at all.* Let it be remarked also, that when people were told they had the joint worm in their wheat, they replied, not so—that only showed itself when it was heading; but that theirs had the "go-back," a term, Mr. Editor, familiar to us for several years.

About the middle of May, while trimming a young orchard, (before breakfast,) I noticed vast multitudes of a peculiar and unusual fly upon the small trees, especially those nearest the wheat field—when the trees were shaken, they fell to the ground, as if indisposed to fly, and from their numbers and color, they reminded me of swarms (in miniature,) of young bees. Not expecting at that time to write about them, they were passed by with less observation than they merited. They may be described, however, familiarly and from memory, as being black flies, about a half an inch long, with whitish, mouldy-looking wings extending to the ends of their bodies—stout in the thorax and head, but slimmer in the abdomen. Imagine a fly between a black ant and a young honey bee in size, and you may recognize these when seen. In a day or two they all disappeared for parts unknown, whether by death or migration, was not observed.

The attention of another neighhor, also a very extensive wheat-grower, was called to the last one noticed. He had never seen such a fly. Now, that this is the fly of the worm that had done such great injury to the wheat, is very probable, from the circumstance that it commenced improving a short time before its appearance, say when the worm had ceased to feed upon it, and continued to improve afterwards. And that it is, is almost, if not absolutely certain, from the fact, that upon hearing the worm had been found changed to a fly, I examined for it, and found a fly, head upwards, not quite so matured, but identical in appearance, just cutting its way through the stalk and leaf. It was so plain, I searched no farther. Let it be remarked here, that from the material improvement in the wheat about this time, most persons remained incredulous as to the presence of the dreaded enemy, and even the gentleman who first announced it, began to waver. But the conclusive evidence was near at hand that the joint worm was in our midst. The wheat began to grow in height and to head, and now was seen, in the latter part of May, head after head bent down, from the disease in the joint. A few joints are bent as much as to forty-five degrees, others, and by far the larger portion, are bent to an angle of ninety degrees, and some few to about one hundred and twenty degrees.

We might pause here, Mr. Editor, to inquire whether this is another stage of the same disease, or a separate and independent malady, caused by a different and distinct fly—that of the joint worm proper. I was of the former opinion until informed by you that you had repeatedly hatched the insects from the galls on the straw, and that accurately measured they were only thirteen-hundredths of an inch long. This would seem to be conclusive; and, yet, it may not be. There is supposed to be a close resemblance between the joint worm and a worm that was very destructive to barley in Massachusetts in 1829 and '30. Dr. Harris hatched out many insects from the maggots in the swellings in the straw, and much to his surprise, they proved to be minute, four-winged Ichneumon flies. He had hoped to have obtained the true culprits, the cause of the disease, but these little insects, while in the larva state, had destroyed them all. Of these insects, the female was thirteen-hundredths of an inch long—the male rather smaller; and may not your fly, of the same length, be a similar Ichneumon, the parasitical fly of the true joint worm? Be this as it may, you must allow me to consider the black fly and the joint worm either as the same disease, or as concomitants, and then I can proceed with the facts—*and* the theory.

This stage of the disease, this symptom, is by most persons dreaded more than all that's gone before; but, to me, it appears a mere incident, a minor injury, as compared to the preceding great destruction. However, this opinion may be exaggerated, from the fact that the Hessian fly was committing its ravages in my fields in conjunction with the worm; and, yet, the highest estimate I have heard of these bent joints is as one to twelve, though in my wheat there is not probably one in fifty; and it was supposed by good judges, that the crop must be cut short at least one-half. Now, what is one-twelfth even, and that too of the remaining standing crop, to one-half, or more, of the original growth of wheat? But these two losses do not include all the probable loss; for the wheat, attacked by the worm and the Hessian fly, was in so green a state at so late a period, that it was seriously threatened by another serious evil—the rust—and this green state was directly attributable to the worm, from its having cut off and destroyed the main, original stalk, and probably the early tillers, and left only tillers, or the later tillers, as the case may be, to come to maturity, except the bunches and patches before spoken of. The season has been so unusually favorable, that very little rust has been seen; but the late green wheat was dried up, while standing, without becoming completely ripe. Another source of most serious loss, is the condition of the leaves and stalks, not yet spoken of, to be mentioned presently.

As to these bent or broken joints, where are they situated, how are they produced, and what is the cause of them? On June 1st, I gathered twenty-nine stalks indiscriminately; and as they were bent in different situations, they were counted out separately. There were nineteen bent at the first joint below the head, seven at the second, and three at the third; one was afterwards seen bent at two joints. The situation is nearly accidental, but the above may be a fair proportion. The bend is produced by a diseased state of the sheath, and not of the stalk. The sheath is thickened, hardened, corrugated and inclined to one side, and the tender young stalk has to bend also, and accommodate itself to its envelope. In almost every instance, the stalk is healthy and uninjured, except that by the pressure of the unyielding sheath it is compressed and hardened, and even has its cavity more or less obliterated. This can be observed by any one, by cutting through the stalk and joint, longitudinally; but, in fact, the stalk was also observed to be bent and injured in a few instances below the diseased joint. This may have been accidental, from the binding of the lower leaf, as you see sometimes in young corn, or the stalk may have been injured by the matured fly when depositing its eggs. If it does deposit them, as will be suggested under the quere, what is the cause of the bent or broken joints? It has been already stated that the worm was found in the stalk, near the root, and that when changed to a fly, it was seen cutting its way out, and numerous, very numerous stalks were afterwards observed lying about the fields, in the midst of the wheat, cut off near the root. Now the bent stalks give no indication of cutting or injury near the

roots; they are simply bent at the first, second or third joint below the head. The seat of the disease is thus changed, not only from the bottom to the top of the stalk, but to different stalks. At the bent joints, in the thickened substance of the sheath, there are a number of nodes or nodules, some three, four or five, of a whitish hue and of different sizes. Upon examining these carefully, either a beautiful nidus for an egg is found; or when more mature, the worm itself, of various sizes, from a very minute object to its full development, (as a worm,) about a quarter of an inch in length; and while yet young it is similar in appearance, and active and stirring as was the original worm near the root. It may be added, that small worms, similar to the others, were at times found between the leaf and the stalk, at the joint, which had probably escaped from the sheath without being observed. Does not all this indicate that after the fly matures, comes out of the stalk and becomes impregnated, it seeks a proper nidus for its eggs and young, and that it alights upon a suitable stalk of wheat, either *near* or *remote*, and inserts its eggs into the tender succulent sheath near a joint, first, second or third, according to its stage of growth, or the condition of the leaf. As confirmatory of this, it may be mentioned that, although nothing of the ravages or the existence of the primary worm was observed in the Mediteranean wheat this spring, yet bent joints were found in that wheat on one side of a farm road, where Poland wheat (which was affected with it) grew upon the other side; and the same was searched for in other places, but not found. It is the enlargement of the sheaths, and the formation of an unnatural secretion, (on *the side* where the eggs are deposited,) to accommodate these eggs and the young worms that causes the angle at the joints.

The account of this disease and its devastating effects is not yet finished. There is a dwarfish, stunted condition of portions of the wheat, not noticed until after the 1st of June. It showed itself to a far greater extent in my crop than did the bend at the joints, but not by any means to so great a degree as in other crops farther south. From them, I would infer that this is the most destructive part of the malady; quite as destructive, perhaps, as the first stage of it in the spring. This is identical in cause and character with the bent joints, viz: the deposit of the eggs *along* the sheath of the last leaf, or the one next to the last. These are deposited *around* the leaf for the distance of two or three inches above the joint, and being so arranged, the leaf continues straight from the equal enlargement upon all sides. Where the joint is bent the stalk in many or most instances goes on to heading, if not to maturing the grain, because of a slighter pressure or stricture upon it; but in the other case, from the pressure all around and for such a distance, the stalk is almost obliterated, and no head is formed at all. However, in this the difference of the injury does not consist, but in the great, the immense disproportion of the stalks affected in either way. By the latter, large patches, or even whole fields may be rendered barren, and in this, Mr. Editor, I presume, consists the great devastation usually attributed to the joint worm, and the great terror caused by it; and when it proceeds to this extent, it is truly not only a destruction of the farmer's crop, but a blasting of the hope that may have revived in his breast, after the first great injury in the spring. Upon examining one of these indurated leaves, you will find whitish, longitudinal swellings for two or three inches, and in attempting to bend it, it will break short off, like a pipe-stem, exhibiting at the fracture cavities broken across, containing each a worm, similar in all respects to those at the joints. Searching farther, the head is found immature and blasted, or at times consumed in part by a worm not unlike the others; and the stalk is found at times small and thread-like; again, wilted; and yet, again, eaten by a worm similar to the others.

Now, in regard to all this secondary crop of worms, *i. e.* in the galls, at the joints and along the leaves, but not those seen consuming the head and the stalk, and between the sheath it was noticed that at first and until half grown, they continued slim and active, like those of the first crop; but after that, they became swollen and maggoty-like, sluggish and torpid. Can it be that in the former state they are the larvæ of the black fly, as yet well and healthy, and that in the latter they are the same, tumid and decaying under the influence of the Ichneumon worm developing within them, and consuming their vitals? If such be the case, these parasitical worms may well be regarded as friends of mankind; and when they are sufficiently numerous to consume and destroy most or all of the larvæ of the black fly, it will account for the non-appearance sometimes of the joint worm in places where it had been the year before.

The future progress, development and habitation of these worms, must be left to others. The writer of this will have no opportunity again, for two years or more, to make observations. Should the facts that have been detailed assist entomologists in their inquiries, and enable farmers to recognize their enemy in its different stages, it will be sufficient for him. And here, perhaps, this communication, from its length, should come to a close; and yet, it may be interesting to inquire as to how long this foe has been among us unrecognized, until attention was directed to it by the intelligent farmers of Albemarle; and also, what precautions may be taken against it.

That it has existed in this region for several, if not for many years, appears more than probable, from the following facts. The same appearances, as seen this year, in April, were observed by my predecessor in a field of Zimmerman wheat two years ago on this farm.

The same bent joints, also, were noticed by him in wheat on the same field, four years ago—and, if I am not mistaken, I heard complaints of broken-jointed wheat between 1822 and 1830, in this county, when the ravages of the fly were also much complained of. Of this, though, I am not certain. I feel convinced though that at that time, although quite a youth, I noticed wheat very similar in appearance to that described as dwarfish, stunted wheat above. Again this spring, people unable to account for its condition, said the wheat had the "go-back"—an expression familiar to us for a long time, as mentioned before. It was remarked to me too, this year, in June, that my wheat had the black fly, in a tone to indicate it was no new disease. It would seem, then, that this is an old enemy, appearing at intervals among us. What remedy have we for it, if any? It appeared to attack, this spring, such wheat as was tender at a late, and even, perhaps, at an early period, i. e. the latter part of March, whether caused by the long and severe winter, or the late character of the wheat itself. If such be the fact generally, the remedy would seem to be plain, viz: to adopt either a very early wheat, or one that, although late, may have a hard, coarse stalk, calculated to resist the puncture or admission of the insect, or its egg; for you will remember a laceration of the leaf was observed over the stalk containing the worm. Can it be that the worms existing at this time, and unaffected by their parasite, will become dormant and continue so during the winter, either in the straw or the earth, and on being matured into flies by the first warm weather in spring, will deposit their eggs in the young wheat, if suitable, or fail to do so, if beyond their reach, and thus allow it to escape? In respect to early sowing we are met by the dangers of the Hessian fly in the fall; and by late sowing we incur the dangers of the joint worm and Hessian fly in the spring, and the rust in the summer—being thus placed between Scylla and Charybdis. A proper medium as to kind of wheat and time of sowing must be obtained, if possible; and the Mediterranean seems to admit of earliest sowing, and to be safest from both the fly and the worm, though generally of moderate yield. Does any one know of a more prolific early wheat, i. e. of early growth in spring, whether white or red, and of a hardy, coarse style of stalk?

The relative injury upon poor, rich, and guanoed land was noticed. The former was unable to rally under even a moderate attack, whereas the two latter, by tillering and a rapid second growth, made a fair, and in some places a considerable yield. Another precaution then would be to sow only on land in good heart, or guanoed, and in good condition, so as not only to give out tillers, when the main stalk is cut off, which poor land cannot do, to any extent, but also to push them rapidly forward between the time of the worm ceasing to feed upon it, and the time the mature fly is ready to deposit her eggs upon it.

The writer of this will probably sow one-half of his crop this fall in Mediterranean, as soon after the first of September as possible, and the other half in Poland wheat, giving to each as large a dose of guano as he may consider he is able.

The facts in this communication may be relied upon as far as a tolerably accurate memory will serve, but the theory, though plausible may be erroneous, and yet it will serve to link the facts together until the truth is discovered.

ANON.

July, 1852.

PAYMENTS TO THE SOUTHERN PLANTER,

From July 23d, to August 23d, 1852.

Hillery Moseley, to June, 1853,	$1 00
Jesse Jarratt, to July, 1853,	1 00
Maj. D. H. Robertson, to Jan. 1853,	1 00
Prof. C. B. Stuart, to July, 1853,	1 00
Freeman Eppes, to January, 1854,	3 00
Dr. M. M. Harrison, to July, 1853,	1 00
J. G. Powell, to July, 1853,	1 00
A. H. Reams, to July, 1853,	1 00
Thomas P. Bland, to July, 1853,	1 00
Dr. H. E. Shore, to July, 1853,	1 00
Thomas Branch, to July, 1853,	1 00
Dr. W. J. Dupuy, to July, 1853,	1 00
Rev. T. W. Sydnor, to January, 1853,	1 00
H. M. Dickinson, to July, 1853,	1 00
John T. Bland, to January, 1854,	1 00
Peter A. Wilkins, to July, 1853,	1 00
J. R. Motley, to July, 1853,	1 00
John B. Odom, to January, 1853,	6 00
John Goode, to January, 1853,	1 00
John A, Herring, to July, 1853,	1 00
S. S. Griffin, to January, 1853,	1 00
J. F. Lilly, to July, 1853,	1 00
A. W. Gray, to July, 1853,	1 00
Henry Thompson, to June, 1853,	1 00
David T. Lanier, to January, 1853,	1 00
James L. Ege, to May, 1853,	1 00
Allen A. Burwell, to July, 1853,	0 77
Cassius Foley, to May, 1853,	1 00
H. E. Weston, to January, 1854,	4 00
Joseph Harris, to July, 1853,	1 00
Dr. K. Nelson, to July, 1853,	1 00
A. M'Daniel, to January, 1854,	3 00
W. F. Hobbs, to July, 1853,	1 00
Dr. T. Jones, to January, 1853,	1 00
Anderson Hughes, to January, 1853,	5 00
William Hughes, to July, 1853,	1 00
J. H. Burgess, to September, 1853,	2 00
D. R. Fielder, to July, 1853,	1 00
Philip Thomas, to July, 1853,	1 00
Albert Kennedy, to July, 1853,	1 00
Dr. Joel Watkins, to January, 1853,	5 00
Dr. E. L. Nelson, to August, 1853,	1 00
Richard Reins, to January, 1854,	5 00
H. Carpenter, to January, 1853,	1 00
T. N. Gee, to January, 1853,	2 00
Col. R. R. Brown, to July, 1853,	1 00

Wm. Catterton, to January, 1853,	$1 00
George M. Terrell, to September, 1852,	1 00
M. L. Anderson, to September, 1853,	1 00
W. H. Jones, to July, 1853,	1 00
Alfred Carpenter, to January, 1853,	1 00
B. T. Brown, to July, 1853,	1 00
G. W. Coleman, to July, 1853,	1 00
N. Burnley, to July, 1853,	1 00
Dr. James B. Rogers, to January, 1850,	2 00
J. H. Lewis, to January, 1852,	1 00
Lewis M'Gehee, to July, 1853,	1 00
J. A. Earley, to September, 1853,	1 00
Dr. G. B. Stevens, to July, 1853,	1 00
P. H. Goodloe, to July, 1852.	1 00
Colin Catterton, to July, 1853,	1 00
R. H. Carr, to July, 1853,	1 00
N. W. Elson, to July, 1853,	1 00
Isaac Medley, to January, 1853,	2 00
W. B. Stanard, to July, 1853,	1 00
D. Horace Hardaway, to July, 1852,	3 00
Edward Johnston, to January, 1855,	5 00
John F. Greenla, to June, 1853,	1 00
N. G. Norfleet, Jr. to July, 1853,	1 00
R. G. Haden, to September, 1853,	1 00
James R. Fleet, to January, 1854,	2 00
John Haw, to January, 1853,	1 00
William H. Sizer, to July, 1853,	1 00
B. Bridgforth, to January, 1853,	1 00
W. R. Mason, to January, 1853,	1 00
R. B. Haxall, to September, 1852,	1 00
W. H. Haxall, to July, 1852,	2 00
W. T. Samuel, to July, 1853,	1 00
James Barbour, to July, 1853,	1 00
Josiah M. Burton, to September, 1852,	4 75

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