THE

SOUTHERN PLANTER,

DEVOTED TO

Agriculture, Horticulture, and the Household Arts.

Agriculture is the nursing mother of the Arts.—Xenophon.
Tillage and Pasturage are the two breasts of the State.—Sully.

J. E. WILLIAMS, M. D., Prof. WILLIAM GILHAM, } Editors. { AUGUST & WILLIAMS, Proprietors.

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The Forces used in Agriculture.

A paper by Mr. J. C. Morton, *read at the Society of Arts, Wednesday, December* 7, 1859. J. Bennett Lawes, Esq., *in the Chair.*

[concluded.]

It is plain, on a very short acquaintance with the subject, that every system which has been, and I will say can be, devised, is liable to abuse. And this, moreover is also true—that each is liable just in proportion to its excellence in the hands of a well-disposed man. The direct payment of a stipulated sum of money for stipulated services to be rendered is, of any plan of wages, the least liable to abuse; but it is, at the same time, that which furnishes the least scope of any for the establishment of friendly relations between masters and men.

Then, on the other hand, that system which gives food and fuel and accommodation is the best of all, when administered with kindness; for the extras are worth to the labourer much more than the sum at which they would be valued to him in money payment; but there can be no doubt that it is more liable to abuse than the simple money payment. The abuse of the money payment, it is plain, does not affect the relation of labourer and employer at all; it lies in the scope afforded by it for the utter ignoring of the man in any other than this relation. The abuse in the case of payments of food, &c., does affect the due reward of labour; for, notwithstanding the agreement on this score, the quality of all these articles cannot be defined so exactly as their quantity. The payment, too, of all this household stuff as wages is a thing which affects householders only, and the young men who are leaving us are those whom we want to keep.

To do so, then, as Mr. Mein, a large employer of agricultural labour tells us, we must just offer wages which will keep them. That is the simple truth.

It is not, however, the whole truth of the matter. It must be admitted that the relation of master and servant is, by force of circumstances, mixed up in agriculture with much besides a mere bargain for the sale of services, with much that is personal; that there is much more scope for the development of kindly personal feeling between the two than there is in the case of any other class, excepting household servants. Of course this personal feeling may show itself in much that is of great money value besides mere wages, and in much that is of higher value than money is capable of measuring. A young man will, notwithstanding lower wages, keep his place for the sake of advantages of greater value to him than the increased sum he might otherwise receive. He may see that his master takes an interest in him personally, showing it in helping forward his education, and by seeking ultimately a better position for him than he can offer for himself, and this is soon observed and thought of. But there is a reverse side to this picture, and just in proportion to the closeness of contact which the terms of service enforce between the two *may be* their recoil asunder as soon as they are once more free.

If there be a plan which would strengthen the bond between the two more than any other, one would imagine it to be the very common one in England of lodging the younger labourers in the farm-house, and giving them partial board as well as cash. But what is the ordinary experience on this point? In the parish in which I reside, Old Michaelmas Day sees a complete sweep of the young men and lads who have lived during the past year in the house of their master. The evening schools, each winter, present a new array of faces—and the masters are, for a while at least, and necessarily, as much strangers to their lads and many of their men as if they had paid their wages through a clerk, and had as little opportunity of personal acquaintance as a manufacturer with his hundreds of mechanics.

It is plain that it is not in the *system*, but in the administration of it, that merit and demerit lie, and that, while sufficient wages (that is, just as much as labourers can get) are given, a personal interest in the labourer, as a neighbor, is what will bind him to his master.

If I had, in a single sentence, to describe the relation of master and servant in the agricultural world, it would be to assert that nowhere is it better and nowhere is it worse. The two are thrown close together, and character is on both sides known, and therein lies the explanation; the two are never—as is unavoidably the case when one man pays 500—they are never indifferent to one another; they love, honour, and respect one another, or they distrust and hate; and while, in the former case, there is a noble scope for exerting a useful influence for their well-being over those who are employed—the latter, in the very closeness which is the condition of agricultural service, has scope enough for bringing forth its fruit.

The combination of sufficient wages, with a greater opportunity for personal good-will than any other trade affords, is what may, and often does, honourably distinguish agricultural labourers and employers amongst the multitude of English occupations.

One further word and I have done. The whole value of the expression to which this good-will leads, arises out of its origin in a personal feeling—it cannot be disputed without altogether losing its character. Anything like the transference of my personal duty and pleasure in such a thing to a public society does, in my opinion, spoil the whole affair.

There are societies, as we all know, long established in England for distinguishing the worthy among agricultural labourers by public testimony to their worth. If that worth had shown itself in public-spirited conduct, nothing could be more appropriate than a public acknowledgment of it. When it is, however, only personal and domestic worth (far more worthy, let us all admit it, than the other), nothing can be more grotesquely out of place.

These societies have, however, been established and are supported by a real, if unwise, philanthropy; and I would not say one word in discouragement of their object, however unwise may be their plan. Benevolent men have truly seen that the relationship of master and servant is but a part of the truth affecting them; and carrying the superiority of the employer over his servant into another field where no superiority exists, they have read the commandment as if it were addressed to the former only, and as if it said of the latter: "Thou shalt be a father unto him." The system of rewards for good conduct, for long servitude, and for morality, is founded on a mistaken idea of this kind. It is a mistaken idea—let me repeat it. Along with the paternal relationship, with its powers and responsibilities, wherever it really exists, there has been implanted the natural love of the father as the safe-guard of the child, and the docility and helplessness of the child as its counterpart. Neither of these conditions apply to the relationship of master and servant. The commandment has been miss-read. It is really addressed to both alike, and it prescribes a perfectly mutual and equal duty in words addressed to each—"Thou shalt love thy neighbour as thyself."

This is the law which supplements the bare relationship of master and servant, and makes the operation of it perfect. But I will not pursue the subject further, only adding as at once the natural corollary of this proposition, and as bringing us back more directly to the subject of this paper, that the more we encourage genuine individual manliness in our labourers, with its efforts after real self-improvement, in intelligence and skill, and its higher sense of individual responsibility, the more likely are we to attach the young men to us, and to obtain labour of the kind of which steam-power is rapidly proving the necessity. This is not to be done, either by taking all the difficulties of his position out of his way, or by offering rewards to him proper only to the qualities and condition of a child.

As affecting the reception of these few words of criticism, allow me to say one

word of myself: They must not be deceived as if they came entirely from an outsider. I have for many years directed and paid the labour, on certainly a small farm, costing, however, about £700 a year in wages paid to the agricultural labourer. I claim to know the style and character of the man by many years' experience; for I have a larger number of personal friendships in his class than in any other class of her Majesty's subjects. I mention all this merely as effecting the weight which might attach to what I have said on this—the last of the forces used in agriculture to which I have to allude. I have more than exhausted the time permitted me, and it only remains for me to indicate the probable results, so far as our subject is concerned, of that progress which we all see in English agriculture.

That the services of the labourer will more and more require the combination of skill with mere force, and that a large number of well-qualified men is being and will be needed, seems plain. That horse-power will be displaced by steam at least two-fifths, I believe; and, as there are now at least 800,000 horses used upon our farms, there is scope enough, for many years to come, for all our agricultural mechanics.

The grand result will, no doubt, be a continual increase of produce and fertility, and that which the Registrar-General puts as fulfilled prophecy into the mouth of the Englishmen of a century ago, may, with equal probability of truth, be uttered now:—

"Our fertile soil sustains 21,000,000 of people in its whole length from the Isle of Wight to the Shetland Islands. We cannot—for the mighty power is not given us—say, let there be on the European shores of the Atlantic Ocean three Great Britains. But the means exist for creating, in less than a hundred years, two more nations, each in number equal to the existing population; and of distributing them over its fields, in cottages, farms, and towns, by the banks of its rivers, and around its immemorial hills: and they will thus be neither separated by longer roads nor wider seas, but continue neighbours, fellow-workers, and countrymen on the old territory; wielding by machines the forces of Nature, that shall serve them with the strength of thousands of horses, on roads and fields and seas—in mines, and manufactories, and ships. Subsistence shall be as abundant as it is now, and luxuries, which are now confined to the few, shall be enjoyed by multitudes, for the wealth of the country—its stock and its produce—shall increase in a faster ratio than the people."

The CHAIRMAN said it was now his duty to invite the meeting to discuss the very able paper they had heard read. It appeared to him that there was very little question that steam-power theoretically was a much more economical power than horse labour, and horse labour, again, more economical than manual labour. But the great problem to be solved in agriculture was, what were the proper proportions in which these three forces should be made use of? There could be little doubt that it would be found eventually that the proportions between those forces found to be most economical, would differ in proportion to the size of the farms, and also the quality of the land. The question whether steam-power would be found most economical upon heavy lands and small farms, or upon

light lands and large farms, was one which opened a large topic for discussion, and upon which he was sure many gentlemen present would be anxious to express their opinions.

Professor JOHN WILSON would rather give a different version to the case. He thought they must look upon the man, upon the horse, and upon the steam-engine, not as sources of power, but as the media through which power could be communicated. The real power existed in the material upon which those three forces were fed, and in this respect he thought he could show them that the whole question was one of pounds, shillings, and pence. They knew very well that a steam-engine could not work unless they gave it coals, and a certain amount of water; a horse could not work well unless it was well fed; and a man could not work unless he was properly nourished, because the force existed in the food which these three engines or machines, as they might be called, consumed. They had heard from Mr. Morton of the manner in which these three machines were fed. They knew it was to the interest of those who employed a steam-engine to have an efficient one, and a low-priced engine was a dangerous tool to play with. They knew how proud a man felt of a handsome team of horses, and how well they were fed and attended to. But did they pay that attention to the agricultural labourer? Was it not the fact that he did not receive the same amount of attention as the other two forces of power mentioned? If, therefore, the man was to be placed in competition with the machine, he ought to receive the same amount of attention as the machine did; otherwise he was placed at a disadvantage, and he thought it should be the policy of the employer to remunerate the labourer in such a manner as would enable him to get the largest amount of work out of him. He spoke, of course, of physical force—not mental. The mental force required another mode of treatment. The steam-engine could work without horses, but it could not work without the application, not only of a small amount of hand labour, but also of skill. They must, therefore, look upon these three applications of power as the media through which the power was communicated; the real generator of power was the substance supplied; and that was the subject of pounds, shillings, and pence—the real question for farmers to consider, for in that their principal interest was involved. He had heard, with some surprise, the statement as to the condition of the agricultural labourers in Wiltshire. With regard to the north it was the fact that a very numerous body of that class of labourers, though not exactly on strike, were almost in that state, having had several meetings amongst themselves to discuss these matters. He hoped the good sense of the employers of labour there would come to the rescue, and lead them to give proper consideration to some strong points which had been brought before them, though he was no advocate for strikes. In all cases where they set men to hard work—such as that on railways, it had been found that a badly fed man could not exert the power which a well fed man did; and he thought no one could reasonably expect that a labourer at 8s. a week was capable

of doing a full amount of work, so as to be fairly placed in comparison with either a well fed horse or a properly supplied steam-engine.

Mr. SMITH (of Woolston) stated the mode in which he had arrived at some of the returns furnished by him to the author of the paper, so as to explain any apparent discrepancies between his own and the other returns. He bore testimony to the great value of Mr. Morton's paper. According to the estimates given by Mr. Morton, in which he entirely concurred, the saving of steam-power over manual and horse labour amounted to nearly 50 per cent.; and upon the total number of horses at present employed in agriculture, there would be a saving of 300,000, or equal £9,000,000 a year, one-half of which would be real gain to the country. If the other half went into the pockets of the labourers in the shape of increased pay, it would be a matter of gratification to him; for he believed the increased production of the soil under steam cultivation would still enable the farmers to secure their profits.

Mr. S. SIDNEY thought that the time had scarcely arrived for working out the Chairman's suggestion, and ascertaining the comparative amounts of hand-labour, horse-labour, and steam-labour that could most profitably be employed on a farm of given quality and acreage. Steam cultivation had, within the last two or three years, been brought to the stage of an economical success; but until Mr. Fowler, Mr. Smith, and others, had fully supplied all the customers who were clamourous for steam cultivators, until it was as easy to obtain a steam cultivator as a set of barn machinery, the calculation suggested by Mr. Lawes could not be made over a sufficiently wide area to give it any practical value. The high importance of Mr. Morton's paper lay in the fact that he had availed himself of his peculiar advantages, as editor of an established agricultural newspaper, to collect precise facts, showing the present state of British agriculture, and specially in reference to the employment of manual-power, horse-power, and steam-power. Thirty years ago the ratepayers of the kingdom were labouring under perpetual fear lest unemployed unskilled labour should devour in poor rates the whole substance of the land, and under the influence of this terror various expedients were proposed, by men eminent for rank, talent, and literary ability, to increase the amount of manual labour. The horse was to be dismissed, as working too much and too cheaply, and we were to retrograde to the spade. This was one of the theories of Robert Southey—cottage farms and spade cultivation —and it was supposed that there was a sort of magical influence in the spade, which would, in some mysterious manner, multiply without measure the fertility of the soil. A great name in political economy, Mr. John Stuart Mill, who, however, had failed totally whenever he approached practical questions of trade, colonization, and agriculture, had suggested pauper colonies in Ireland, where a number of five-acre farms were to be cultivated with borrowed capital, spades, and hoes. These terrors and these fallacies had past away. Mr. Morton had shown, by facts and figures, what every one one familiar with the agricultural

condition of the country knew by common report. Instead of being deluged with labour there was a positive drought. Wages were rising, and farmers were consulting and contriving how to attract and retain the class who, thirty years ago, were treated by the poor law and its administrators as if they were some noxious vermin, whose increase was to be obstructed by every possible means. Mr. Morton had shown by figures, which were rather under than over the mark, that while the system of mechanical and intensive cultivation increased the demand for manual labour in those departments where machinery could not be employed had increased also; that wherever a horse could do a man's work, it was more rapid, more effectual, and consequently cheaper; and that wherever steam-power could be applied, it was even cheaper compared with horse-labour than horse-labour was when compared with that of man. It must be observed that economy in agricultural operations meant more produce. The exertions of agricultural engineers had destroyed the fallacy of the spade (most valuable in its place) as a means of raising the sustenance of the nation. He (Mr. Sidney) had made a few calculations, for the purpose of giving some idea of how much was gained by the improvements which had brought mechanical ability of a high order, and the science of the chemist, to assist in the cultivation of English farms of average size and fertility. Mr. Smith's farm at Woolston, in Buckinghamshire, consisted of 110 acres of arable and 70 acres of grass, of good quality. The labour appeared to be performed by seven men and four boys, equal to nine men, the number usually taken to represent in England 45 souls. These men lived, he undertook to say, better than the peasant cultivators of France and Germany. Were this farm divided into six-acre farms, it would probably support double the number of peasant proprietors; it would keep no sheep, a goat or two, no ox-beef, but an occasional supply of the flesh of a worn-out milch cow. There would be, as surplus, a little wheat, rye, and perhaps, flax. The arable would be fallow every third year. But with hand-power, horse and steam-power, he (Mr. Sidney) would undertake to say that the Woolston farm, being never in naked fallow, produced 6 quarters to the acre, but say 5 quarters on 27 acres, or 135 quarters of wheat, 135 quarters of barley, and with clover and other green crops, roots and beans, at least seven thousand pounds of mutton from 100 sheep, two thousand pounds of pork, from say 10 pigs, and an increase on cattle, purchased or reared, of five thousand pounds of beef; in all, fourteen thousand pounds of meat, besides feeding the family of the farmer himself. These calculations, very much under the mark, would show, not only that full-sized farms were necessary to support agricultural progress, but that it was on large farms, as distinguished from five-acre farms, that the nation must be fed. Mr. Morton's paper had conclusively shown that this progress had been obtained with positive benefits to the labouring classes, who had not been sacrificed, as was once feared, to machinery. He (Mr. Sidney) thought that the distressed classes now were the farmers, hard driven for labour, with high wages and low prices. He believed their only safety and resource lay in adopting steam cultivation, and tempting

labourers to stay and increase by improved cottage accommodation. The wages question settled itself, and was beyond the power of laws.

Mr. EDWIN CHADWICK, C. B., had rather expected that the discussion would have turned upon the points which the Chairman had suggested, namely, upon the comparative value of mechanical forces; but he was glad to find that it had been directed to the social and economical effects either already obtained or promised by the introduction of machinery into agriculture. It was most important to discuss the effects of machinery upon the great mass who had to use it—the labourers. In the statistics given by Mr. Morton of the rise of wages, he (Mr. Chadwick) submitted that one large and important fact was omitted. Mr. Morton had stated the progress of wages in different counties, but he had not mentioned another progress, viz., the progress of the efficiency of the labourer; because, according to his own inquiries, the efficiency of the labourer had borne its relation to the improved forces introduced. The farmer in Dorsetshire only paid 8s., and the farmer in Lancashire and some of the northern districts paid 16s. a-week, and the latter got his work done cheaper at the higher wages than it could be done at the lower. Moreover, there was yet room for further improvement by the advance of wages to the operative class. Some time ago there was a notion of getting up a Land Improvement Company, the object of which was to improve particular districts, and to put the land into better condition, by employing a better class of labourers. Those who were engaged in that project were good judges of labour, and they proposed, as the cheapest plan, to employ, not the agricultural labourer, of the district, where the law of settlement and low wages prevail, but navvies whose wages were 3s. per day. Truly efficient labour, he submitted, could only be obtained by the advance of wages. The increased development of labour which the improved circumstances of the country would produce, would effect this object. The extensive emigration that annually took place, and the demand for labour in manufactures would raise wages; and he expected and hoped that it would bring this country into the condition of the American labour market, and give an immense stimulus to the introduction of machinery. With respect to what had already been done, he would take the opportunity of congratulating his friend, Mr. Wren Hoskyns, that in the introduction of steam for ploughing, which he had so long laboured for, the corner in the shape of profit over manual labour had been turned. He might mention, by way of contrast, looking to the state of things abroad, that in many parts of the south of France the constant price of ploughing by oxen was at the present time five francs a day for the men and the oxen to do the work, whilst the amount of work done was a quarter of an acre per day. That was paying at the rate of 20 francs per acre, but it was a mere scratching of the surface of the soil some three or four inches deep, whereas steam-ploughing did the work much better at about one-third or one-fourth that price; in other words, the light land which the farmer in France paid 20 francs an acre for ploughing in that way, could be done by the steam-ploughs now in use at 6s. per acre, and instead of being ploughed

three or four inches deep, it would be ploughed seven inches deep. The economical, as well as the social part of the question was, he thought, well resolved by a labouring man on one occasion when he (Mr. Chadwick) went to see Mr. Smith's plough at work on the farm of the Prince Consort. Upon his asking the man how those steam-ploughs answered, the reply was that they answered exceedingly well, as he (the labourer) got half-a-crown a day wages. He (Mr. Chadwick) was extremely desirous to see the use of steam culture extended, because he was sure wherever the steam implement went two shillings or half-a-crown wages per day would go with it. But in contemplating the extended introduction of machinery, one important point must be considered, viz., the state of education of the class of agricultural labourers upon whom the management of these new steam implements would devolve. In the larger use of that same power in the manufacturing districts, it was the frequent remark of Mr. Fairbairn upon coroners' inquests, when accidents occurred by the bursting of steam boilers, that for the proper management of the steam-engine a higher degree of education was required than had yet been applied to the labouring classes. If that were so in places where they were paying 20s. or 25s. a-week wages for the management of an engine, what must be the case in the agricultural districts, where the wages are so much lower? It was only by the exercise of intelligence and watchfulness that they could reach the highest order of economy. That had been peculiarly displayed in the case of the Cornish engine, in the use of which men were put upon piece-work, which was not the case in the north. There had been great improvements in the steam-engine in Manchester, but in Cornwall they did as much work with 2½lbs. of coal as was done in Manchester with 10lbs. It was found that farmers were frequently dissatisfied because their engines did not realize all the promises of the manufacturers of them. The answer to that was, that the fault was not with the engine, but with themselves, in not employing more intelligent men to superintend it, and in order to do that they must pay better wages. But unfortunately, in the present state of education in the agricultural districts, if higher wages were offered, the men were not to be found to do the work with the greatest amount of economy; and in order to attain this end, their education must be improved. It was true that prodigious advances in that direction had been made. On going into one of the district schools that day, where a steam-engine was used to prepare the food, he found that boys were placed under the men for the purpose of being educated in working those engines. He thought this was largely an educational question. Besides the employment of machinery, which was so valuable, he thought the small farmers should not attempt a too great use of steam-power, and that there were many useful lessons to be learnt from America, where labour was dear, and also from the continent, where coal was scarce. He would conclude by expressing his high opinion of the remarkably able paper which had been read.

Mr. Wren Hoskyns said, if he had wanted evidence what the general advancement of agriculture in this country had been able to effect, it could not be

more satisfactorily furnished than had been done in the eloquent and philosophical paper they had heard that evening. He was struck with the tone of the paper; because, although the subject was a physical one, yet it went also into the metaphysical portion of the question, and all those who read it, whether connected with agriculture or not, could not but consider it as a most useful production, showing that agriculture had made other strides than in matters connected merely with mechanical improvement. With regard to the remarks of the Chairman as to the desirability of establishing something like a specific relation between the forces now employed in agriculture, he (Mr. Hoskyns) had come to the same conclusion as Mr. Sidney, viz., that they had not yet sufficient data for the discussion of that question, because he could not submit to the idea that they had as yet attained to the development of the steam-engine in the cultivation of the soil, which they were destined to witness. Far be it from him to derogate from such splendid specimens of well-applied labour and employment of capital with a courage and determination not surpassed in any department where human ingenuity had been applied, as had already been afforded by the use of the steam-engine in agriculture; but, for specific reasons connected with agriculture itself, he could not believe that the point at which they had now arrived afforded a true test of comparison between the steam-engine and horse and manual labour.. One reason why the problem was more difficult, was that the varieties of soil were so much greater than many people were aware of. The difference between the cultivation of light soil and stiff waxy clay was as great as possible, and any conclusion at present arrived at could only be of a very general character. For when they said a steam-engine would plough a shilling per acre cheaper by the ordinary method, it could only apply to some general average of the soil. But when they saw what horse labour could do upon light soils, where they could cultivate every day in the year, because the labour was less severe, and compared that with soil which did not allow of access to it, except for a month in spring and a couple of months in autumn, the comparison between horse labour and the steam-engine was most difficult. It had been stated by Mr. Meehi that a horse required sixteen hours of rest for eight hours of work. That was understating the case, because a horse required eight months of idleness for four months of work, on a soil which would not admit of the tread of his foot except when sufficiently dry for profitable cultivation to take place. He could not conclude without a word upon the condition of the agricultural labourer, as spoken of by Prof. Wilson. There was, no doubt, much truth in what the Professor had said. A fair estimation of what the labourer was able to do was not possible, because his powers were not entirely brought out—either in a physical or moral point of view. If they had more skilled and intelligent labour, they would have better results from the elements composing it, and especial y from that best element of all—the will. He did not know a better foundation for this than a juster distribution of the labourer over the soil, and increased facilities for restoring the due proportion of cottages for the residence of the labourers

near their work. Owing to the imperfect laws which had reduced the means of living near their work, it was a fact that labourers did half a soldier's day's work in going to and from the farm. He hoped that residences would be provided for the labourers, in a way that would make them a better investment of capital than than they were at present. For some reason or other, which it was difficult to fathom, cottage accommodation could not be provided so as to make it profitable. One of the best inducements to provide this accommodation would be the power of doing so without loss to the landlord.

Mr. JAMES HOWARD (of Bedford) said he subscribed fully to the opinion that the general employment of steam-power in agriculture would tend to increase the employment of labourers. Within his own knowledge, it had in some degree extended the growth of root crops. He could refer to a case in which 35 acres of roots were grown upon land which had never before been so cropped; and if they grew larger root crops, they increased the crops of corn, and increased also the employment of labour. Looking at the increase of population in this country since the extension of steam-power in our manufactories, he was surprised to find that it took upwards of 200 years previously to the introduction of the steam-engine to gain an increase in the population of 2,000,000; whilst since its introduction the population had increased 12,000,000. He thought there were no more effectual means of raising the intelligence of the farm labourer than a more general introduction of steam-power. A farmer who paid a man merely to swing a flail could not afford to pay for intelligence—it was nothing more than the exercise of brute force; but to a man who paid £500 for a steam-engine, a shilling per day additional would be a trifle in the wages of the men employed to direct that machinery.

Mr. Alderman MECHI said he felt it nothing less than a duty to pay his tribute of thankfulness and admiration to Mr. Morton for his able paper. He entirely agreed with the tenor of it. He was quite sure that in his calculations of the economy of horse-power over human labour, and of steam over horse-labour, Mr Morton had not over-stated the case. He (Mr. Mechi) had employed a steam-engine on his farm for the last ten or eleven years, though it was regarded by his neighbours as an act of folly to use a steam-engine upon a farm of 170 acres. His experience during that period had convinced him that the employment of steam-power had not diminished the demand for labour, but had rather increased it, whilst it produced a most beneficial effect upon the profits of the farmer and the intelligence of the labourer. They were all creatures of prejudice; but he had yet to learn that agricultural prejudices were stronger than those of other people, and he hoped that the showing of Mr. Morton that £50 out of £100 could be saved by the substitution of steam-power for horse-labour would tend very largely to remove all prejudice upon that point. With regard to the scarcity of labour, no doubt the cause had been correctly stated by Mr. Chadwick. When they looked at the vast increase that annually took place in the exports and imports of this country, they must see that the mere keeping the accounts, and the

handling of the goods about, must absorb an enormous amount of labour. Looking at his own immediate locality, he found that men had been abstracted from agriculture to be employed in the manufacture of implements for foreign exports. He also found that the knowledge that better wages could be obtained in our colonial possessions induced many to emigrate, who had derived considerable advantage from emigration. Still he thought a good master had not much trouble in getting good labourers. He had employed the same men for many years, and they had become intelligent by the improvements carried out upon the farm. Those men still remained with him, and he had no difficulty in getting-in his harvest at a moderate rate of wages whilst others complained on that score. He agreed with what had been said, that something more ought to be done than the mere payment of wages and the using men as machines which could be laid aside at any time. There was the relation between the employer and the employed to be considered. With a proper regard for that feeling, and by a more general introduction of piecework, which was, after all, the cheapest, he experienced no difficulty in getting and retaining men of great physical and improving mental capacities. With regard to the economy of horse-labour and steam, they must look at it not only in a pecuniary point of view with respect to the direct saving effected, but also to the amount of land that was set free for the production of human food by that substitution, namely, by feeding those 300,000 horses with coal instead of with corn and hay. He calculated that, at the lowest estimate, there would be in the United Kingdom 2,300,000 acres of land set free for feeding human beings instead of animals. That alone was a great desideratum in these times, when population was pressing so hardly upon production. With regard to the various applications of steam-power in the operation of a farm, looking to the improvements they might expect to be made, he saw no reason why, by improved arrangements, in addition to the turnips, &c., being cut up, the food should not be delivered by the means of machinery, and why steam should not be made to do nearly everything upon a farm which was now done by manual labour.

Mr. THOMAS SCOTT said it was a gratifying fact which they had heard, that the great pioneers of steam culture—the inventors—had more orders upon their hands than they were able to keep pace with. The whole subject of this evening's discussion had been in fact reduced to the great agricultural question of the day—steam cultivation; and when Mr. Hoskyns said it was judicious to wait a little longer, he (Mr. Scott) would only say that three or four years ago he felt for those great self-sacrificing inventors, but he was happy to add that no such feeling was now called forth. Having noticed the results of steam culture upon the crops, he found that they were such as justified any man in adopting the present machinery, even admitting it to be still far from perfect. A few days ago he entered into an examination of the cost of the operation by Fowler's steam plough, extracted from the carefully kept books of a farm, and he found it to be 4s. 4d. per acre as the actual cost, to which must be made a fair addition for repairs and allowance for wear and tear. If that were the fact, the cost of steam ploughing was very much less

than that of the common ploughing, and the produce of the land was greater. It was therefore manifestly to the interest of the cultivators of the soil to abandon the present system, which entailed a daily loss, and to avail themselves of steam machinery, now that the opportunity was afforded to them of doing so.

A vote of thanks to Mr. Morton concluded the proceedings.

Horses—Directions to Purchasers.

Of course every man wishes for a sound horse, without defect in the wind, limb or sight. The various imperfections which occur in each of these are here enumerated.

THE EYES.—When the animal about to be purchased is at the stable door, before he is brought out, examine his eyes; the light coming upon them in that situation, will enable you to discover any defect that may exist. Remember that both eyes must be in an equal degree of light; and, regarding this, observe that there is no difference in the eyes, for if they be not alike, one must be diseased. If both eyes be clear, and hazel round the pupil, and the pupil itself be blue, and free from any white specks—if it contract in the light and dilate when in the shade, you may conclude the eyes are good. If the eyes be blue round the pupil, or the pupil itself be in the least degree affected with external specks, or deep-seated pearly whiteness, termed cataract; if it do not diminish, or enlarge, as the light is more or less upon it, in all these cases, it is a defective eye. All weeping, cloudy, dull-looking eyes are unsound; and if there be the least appearance, in any, of disease in this very important organ, reject the animal. Imperfect vision is often the primary cause of shying.

THE AGE.—Next examine the mouth to ascertain the age. Yearlings and two-year-olds are alike in mouth, and must be judged by general appearance. At three years old, the horse has four *horse-teeth*, two above and two below, in front of the mouth, which supply the place of the sucking teeth. At four, he has eight horse-teeth, four above and four below, the corner being only sucking teeth. At five years old, these are gone, and the *mouth is up*, at least, with the exception of the *inside* of the backmost, which, especially in mares, sometimes do not rise until the sixth year; that is, all the teeth are horse-teeth, and the tusk is up on each side of the mouth. A dark mark, or hollow, is generally observable in all the teeth of the bottom jaw at five years old; and the tusks are concave in their inner surface. At six, the two middle teeth have quite lost their mark, and the tusk is higher up, and longer, and not so concave. At seven, the next two teeth have lost it, and the corner teeth only have the mark left in them. At eight, it has grown out of these, and no mark is left at all. The tusks also become longer, and instead of being concave in their inner surface, become convex; the horse is then termed aged. There is, however, a great deal of difference in the mouths; some have lost their mark in all except the corner teeth, even as early as five years old; others have their front teeth in the top jaw projecting over the bottom teeth at the same age. You may form some idea

of the age from the appearance of the mouth in general, when the marks are no longer visible. If the corner teeth do not appear long and running forward, as it were, to the front of the mouth; if they retain their square shape, and shut well together; if the tusks are blunt, and have least concavity in their inner surface, you may conclude that the horse is not very old, particularly, if his head be not gray, and not very hollow above the eyes; though this latter shape sometimes exists in young horses. A concave tusk is the most certain criterion of youth; and as mares have no tusk at all, they must be judged with reference to what I have said about the corner teeth, except in some cases of what are called "shell teeth," from their resemblance to the plate-cakes of shells, and horses with these preserve the appearance of youth till ten or twelve years old. It is here necessary to mention, that the difficulty of acquiring accurate knowledge of the age of horses by their teeth is very much increased by the tricks that are practised.

It is generally allowed that no horse is fit for work until at least five years old; and it is a common custom with great breeders in the north of England, and with many dealers, to pull out the sucking teeth when the animal is rising to four years old; the mouth is *forced* by these means, for the horse-teeth succeeding soon after the operation, the animal appears to be a five-year old. To detect such deception, regard must be paid to the tusk. Every horse upon attaining the full age of five, has the tusk completely up on each side of the mouth; but in forced five-year old mouths, the tusk is only just making its way through the gums. There frequently exists also in the latter an irregularity in the front teeth, as well as backwardness in the growth of the tusk. Forced mouths vary in their appearance according to the time of performing the operation; and the habit of observing horses' mouths, will alone enable you to ascertain where any artifice has been practised.

THE JUGULAR VEIN.—Mark that both jugular veins are perfect, and that a free circulation through them exists; as there are horses, which, from having been unskilfully blooded, and from subsequent inflammation, have *lost the vein*, a defect of some consequence.

THE POSITION.—When a horse is brought out, allow him to be placed with his fore-legs up hill; because if his joints be at all *bent over*, or his legs shaken, you will best discover it in such a position. When the animal is placed with his fore-legs in a gutter or down hill; or whenever the person showing him, is continually pulling at the bit to make him shift his legs, that he may stand advantageously, be assured that his joints are impaired, and that he cannot stand firmly.

KNEES.—As the horse stands, examine his knees, and ascertain that no marks exist in front of them. The marks are generally the symptoms of having *been down*, and even were they occasioned by other means than falling, the blemish is the same, and almost equally detracts from his value. Next look inside of the leg just under the knee, and if scars be visible, or the hair stick up, you may conclude that he cuts in his speedy or fast places. Mark well that a similar scar

does not exist at the ankle, or hair appear brushed; for such marks are solely produced by the act of cutting, which, as before observed, is generally a natural and therefore incurable defect in action.

THE LEGS.—Take notice that the legs be not tottering, and inclined forward, either at the knee or at the ankle; and that the ankle joints be large in front. The back sinews, also, should not appear bowed out behind, nor feel thick; the symptoms of their having sustained some injury. The legs should be flat, and not round; neither should they be soft and puffy, but *wiry* and hard. Both legs should be alike, for if one be larger than the other, it is an injured leg. Never buy a horse for a sound one with a big leg, even though he be *warranted*. You need not mind a splent, or a bony excrescence on the shank, unless it be so situated as to interfere with the suspensory ligament, or project so much as to hit the other leg in going. *Ring-bones*, or enlargements on the pasterns and coronet, are easily perceived from a difference in the two legs; as it rarely occurs, even when both legs are affected, that they are affected equally. Incipient ring-bones will sometimes produce lameness, even before they are very observable.

THE FEET.—Be particularly attentive to the feet; for, according to the old saying, *no foot, no horse*. First of all, observe that one foot should not be less than the other; and that they should not be indented, or hollow round the crust. The crust itself should not be brittle, and broken where the nails have been driven; nor should there exist in it any circular cracks, nor longitudinal fissures from the coronet downward, which last are termed *sand-cracks*. The heels should not be drawn together, and contracted; nor should the frog be small and ragged, nor discharge of fœtid matter, which is a disease called *thrush*. The horn at the heels should be as high as the frog; for if lower, the heels will be liable to *corns;* and the sole should neither be flat nor convex. It is obvious no horse can continue sound with those imperfections in the feet; and it frequently happens that horses with very finely formed feet, are very lame from a hidden cause within the hoof. Some veterinary surgeons consider such description of foot lameness hereditary. Lameness in the feet (often erroneously taken for, and called lameness in the shoulder) frequently proceeds from a slight strain in the back tendon, which, on inflammation falling down to the sensible sole, produces *navicular* disease, only curable by an operation, and which, fortunately, is a simple one, in really scientific hands, seldom failing to give relief. If the legs and feet be *smooth*, you may imagine that all is right in the fore part of the horse.

THE HOCKS.—Next examine the hocks; observe that, as you stand on either side of them, there be no projection at the back of the joint, called a *curb;* and as you stand behind them, that the inside of the joint down below be free from little knots, or bony excrescences, which are called *bone-spavins;* and on looking at them in a slanting direction, that there be no tumor above, or *blood spavin*. Look down between the horse's fore-legs for these defects, as it frequently happens that they are better seen from that view. An enlargement of the cap of the hock does not often cause lameness, though it is a blemish; but enlargements

on each side of it, which upon pressure fluctuate from the inside of the joint to the outside, are termed *thorough-pins*, which are in fact *wind-galls*, and often cause very obstinate lameness.

THE HIPS.—Look that both hips be of the same height, as horses are met with having the defect termed *down of a hip*.

SHOWING.—Having thus examined the horse as he stands, let him be run down slowly on a rough, or stony declivity, at the end of a halter, without any support to his head, or any whip near him. If he go boldly, with his knees bent, and his foot flat and firm to the ground, without dropping his head, you may conclude that he is sound before; and if, on running him up hill, he go with his hocks regularly together, and not dragging the toe, nor drooping from the hip, you may buy him as free from lameness. If he go *pattering* on the toe, and *feeting*, let him not be bought for a sound one.

HOW A HORSE SHOULD BE SHOWN.—Always have the horse you are about to purchase shown quietly; because, when he is agitated, a slight lameness may escape your observation; and always see him ridden, that you may judge how he *wears* himself, and how he uses his legs and feet; for many horses are pleasant to ride, that are unpleasant to look at when ridden; and dealers never fail to put you immediately on their backs, when their riding is pleasanter in the feel than in the appearance. Besides when you see him ridden, whatever pace the horse is continually kept in, that pace is the best; and whatever he is hurried out of, he cannot do at all, or be well assured that no opportunity would be lost of exhibiting it.

LAMENESS—HOW DISCOVERED.—Take notice, that in examining a horse for lameness, you may often detect it by only looking at his ears; for all horses that are lame before, drop their heads when they throw their weight on to the sound leg; and those that are lame behind, throw their heads up when the sound leg comes to the ground.

FENCING.—Whenever a horse stands in the stable fencing, that is, with a foot out under the manger, it is a sign that something exists uneasy to him, and may give you just reason to suspect unsoundness.

STRING-HALT.—*String-halt*, or a singularly high motion, or twitching up of the hind legs, is too glaring to escape observation; it does not constitute unsoundness, though it lessons a horse's value. Bone-spavins not unfrequently occasion a similar method of going. But there are no horses with this affection thoroughly bad.

WIND.—With regard to wind, some horses naturally possess greater freedom of breathing than others; for instance, a horse with large, open nostrils, a wide gullet, a short neck, and a deep wide chest, has generally superior wind to one with the contrary shape. There are two kinds of disease injurious to the wind; one is an affection of the wind-pipe, which creates *whistling* and *roaring;* the other, an affection of the lungs, which produces *broken-wind.*

The usual way to discover the first of these imperfections, is to go up to the

animal in the stall, and taking fast hold of his head, flourish a stick about him suddenly, or strike him. If he groan he is a *roarer*. But this method will not detect a mere *whistler;* the surest way, therefore, is to gallop the horse with a bridle tightly curbed, and at the same time agitate him as much as possible. If he make a wheezing noise, or blow with the same kind of sound as is produced by blowing upon a knife placed before one's mouth, he is not sound in his wind. The state of the wind is sometimes ascertained, and with great accuracy, by the sound of the cough; and in the following manner: Grasp the wind-pipe at the throat tightly, and then immediately let go the hold; the horse is sure to cough. If he cough *bullily*, that is, if the cough sounds like the lowing of a bull, the disease I just mentioned is in existence. But this cannot be often done with the same horse, or it would produce the very disease in question, and is, indeed, a method so delicate and difficult as not to be tried without express permission of the owner, nor with it, if you possess any claim to humanity. If he cough short and hacking, the lungs are affected, and he is broken-winded; but if the cough be long and shrill, the wind is good. Be careful to leave hold of the wind-pipe the moment you have compressed it; for if you hold it long, the horse will cough shrill even if he have imperfect wind.

Always gallop a horse as well as make him cough; a horse with the roaring or the short cough should be immediately rejected.

By making a horse cough, another advantage arises, viz: that you may discover if he be affected with a cold; in which case, upon compressing the wind-pipe, he will cough repeatedly.

Injurious Habits.—*Crib-biting* is a bad habit to which many horses are addicted. It consists in taking hold of the manger, and at the same time drawing in the breath with a gulping noise. The effect of it is loss of flesh and condition in the animal, and sometimes injury of the wind. It is cured by a little salt, when it proceeds, nine cases out of ten, from acid in the stomach.

Wind-sucking is nearly the same, only without taking hold of the manger. It is caused by the animal's desire to cool his interior, and a little salt in his oats, by removing the cause, often allows the habit to drop.

As these habits are not always discoverable during the short time you are in a dealer's stable, it is advisable to have the horse you are about to purchase warranted free from these defects, in addition to the warranty of soundness, as the latter does not provide against them.

It is also prudent to have the horse warranted free from restiveness; though you may discover this by riding him several times past his own stable door; if he be restive, he will manifest his self-will by endeavoring to turn in, and in rearing if you attempt to prevent him.

Injuries of the Back.—Injuries of the back, which are not unfrequent, are discovered by *backing* the animal; and if he perform the retrograde motion with the least degree of difficulty, he has experienced some serious dorsal injury.

There are other imperfections which need not be mentioned, as none but the lowest description of persons would keep for sale horses possessing them.

Horse Tamer.

Cheese.

We have seen the question going the rounds of agricultural papers—"What causes the strong, unpleasant flavor of American cheese?"

In the English market, great fault is found with American cheese, on account of an acrid or sharp, bitter taste that is often found in it. This subject deserves great consideration, as the credit of American cheese in the European market depends upon its solution. We could give our views on this question in a few words; but we think more than statement of our opinion may be useful on the subject.

We have often reiterated our remarks on this subject, that the quality of butter and cheese depends much on the character of the soil and herbage on which cows are pastured. Cows kept on low, wet ground, which produces coarse, *sour* herbage, will not give rich, sweet milk. The milk, and consequently the butter and cheese made from it, will partake of the nature and flavor of the herbage. For good butter and cheese, an old, dry pasture is best, and the shorter the herbage, provided there is enough of it, the better.

The first great difficulty, then, in American cheese is, the cows run on new, wild land, and in the dry season resort to the low, wet lands for their food, and the milk partakes of the sour qualities of the herbage. This flavors the cheese, and destroys the sweet, pleasant flavor of that which is made from milk secreted from sweet herbage. The remedy is, by underdraining, lime and good tillage, to convert these low lands into dry pasture. Kill out the wild grass, and substitute the blue grass, red top, sweet vernal, and other sweet and tame grasses.

The other difficulty is, in manufacturing the cheese. This is often done by *guessing*, without any fixed standard. We may thus often find a great diversity in the quality of the cheese made by the same person, from the milk. This is owing to a want of system in adapting the quantity of salt and rennet to the milk, the proper temperature of the milk, and the preparation of the rennet.

In every part of cheese-making, there should be a system. The milk should be weighed, and one hundred and twelve pounds of cheese may be counted on for every one hundred gallons of milk, by weight. If the milk has been skimmed for butter, the butter-milk should be put into the milk for cheese, as the particles of butter will greatly add to its richness.

The rennets should be procured at least one year before they are used; turned inside out, and salted, and then packed down with a layer of salt between them, then covered with salt and shut from the air. Before they are used, they should be taken out, and fine salt sprinkled on them, and then stretched on sticks to dry. If used earlier, the cheese heaves and is full of holes.

The milk should be at a temperature of about 80 degrees, when the rennet is

applied, and enough, and no more rennet put in than will bring the milk to a curd in one hour. If the curd is produced more rapidly, there will be less of it, and it will be tougher. The quantity of salt should be one pound of Turk's Island salt to forty pounds of curd.

The *strength* of the rennet cannot be tested, accurately, except by experiment. Six rennets in two gallons of water or brine, is about the usual proportion, and the quantity of the liquid necessary to coagulate the milk in one hour, can be tested by experiment.

The whey should be allowed to separate itself from the curd. If forced out, it will be of a whitish color, showing that the richness of the cheese is pressed out into the whey. If the whey is allowed to separate itself, it will be of a greenish color.

The great difficulty, then, aside from the quality of the herbage from which the milk is secreted, is a want of system in adapting the quantity of the rennet and salt to the milk; too much haste in "making the curd come soon," and in separating the whey from the curd by pressure, and in using rennets too soon after they are cured.

To make the rind hard, and thus prevent its cracking, the English, as soon as a cheese is taken from the press, put it in strong brine for three or four hours.

If these suggestions are attended to, we believe American cheese will rank with the best made in England. We hope our views will call out experienced dairymen.—*Ohio Farmer.*

"Southern Independence."

The ridiculous farce of forever *talking* about, and never *doing* anything to develope our own Southern resources, is well satirized in the following:

A Southern planter, who has been indulging in disunion notions, took an inventory of his household and plantation stock in trade, and the following is the result, as communicated to the N. Y. *Journal of Commerce:*

"I have been a planter for a good many years, and I was considerably startled at the result of an investigation in my own family. On examination of my expenditures, one year with another, I find that nearly three-fourths of my income has either directly or indirectly, found its way into the hands of Northern men; and I believe this to be true of a majority of the producing classes here.

"I am aroused in the morning by the bell of a clock hailing from Connecticut. Leaving a bed which, with all its paraphernalia, is of Northern origin, I thrust my feet into a pair of Massachusetts shoes, and, as I join my family at the table, everything that meets my eye, except the faces so dear to me, is all, all Northern.

"My coffee, which has paid toll to a Northern importer, been parched over an Albany stove, ground in a mill from Meriden, Conn., poured from a Yankee urn into a Yankee cup, sweetened with sugar refined in New York, stirred with a spoon of like origin—used to be drank without one emotion other than pleasing.

"To church or to school a Northern bell invites us. In our devotions or our dances a Northern organ or a Northern fiddle lends its inspiring strains.

"Whether we ride or walk, sit or sleep, we do all, my Northern friends, through your kind assistance.

"I take a look at my sour visage in a Northern mirror, stamp my foot on a Northern carpet, and rush out of a house which was constructed with Northern tools, fitted with Northern doors, sash, blinds glass, &c., painted with Northern paint, furnished and adorned throughout, from cellar to attic, with the work of northern hands. I mount a Northern saddle and I ride over a farm which is cultivated with Northern implements, by negroes clad in cloth made in Massachusetts, from materials furnished anywhere from Vermont to Ohio.

"My cotton, prepared for market by a Northern gin and press, enveloped in bagging which has paid tribute to a Boston Indiaman, is hauled by a Northern engine to the sea port, whence it is shipped in a Northern vessel to its ultimate point of destination, paying, in its transport, commission, brokerage, insurance, exchanges, and a host of charges."

It is a great pity (says the Georgia *Constitutionalist*) that Southern planters, and merchants of the South, have not been "startled" by these facts at an earlier day. They have harangued continually against the aggressions of the North, and yet instead of building up Southern mechanical and industrial enterprises, which would render this section truly independent and flourishing, they have given their patronage and their money to build up the institutions and fortunes of that section which they hate and abuse. If this policy of patronage to home industry had been adopted years ago, there would be no causes for disunion threats at this day—or, if there was a cause, the South would be in a position not only to assert, but to maintain her independence. Our institutions of learning would be more numerous, and the course of education more thorough. Our manufacturing establishments would be numerically increased, and their products at least equal to those of other sections.

Our population in the cities and towns would be largely increased, because of the inducements to mechanics and operatives—who would, in turn, be so many more inducements to an increase of mercantile men and mercantile employments. We should have not only these, but we should have, too, armories, and foundries, and workshops for the manufacture of many things for which we are now compelled to send abroad.

But our "Southern planter" was "startled" at the discovery that he had been sending abroad for things which his own section could have furnished him, and thus have enabled him to patronise and foster branches of industry that must and will benefit and even enrich the South.

Thus he arises from a Northern made bed, when Platt's factory, in this city, could have furnished him one equal to it, made in the South, and of Southern lumber. Some one of the Southern factories could have furnished him with the material for a mattress, and he could have had it stuffed with the great "staple

of the South." The same factories could have furnished his sheeting; and his pantaloon stuffs might have been purchased from the Ivy Mills of Georgia, made up by Southern tailors; while he could have encased his feet in shoes made by Southern shoemakers in any of our Southern cities, towns and villages, from Southern tanned leather.

Our "Southern planter" having thus arisen from his Southern made bed, and arrayed in his Southern made clothes, might have greeted his family around a Southern made table—upon which might have been spread his neat tea set, manufactured at the Kaolin factory, near Augusta; and his coffee he could have procured from New Orleans importers, and his sugar from New Orleans refineries; while he could have had all of his breakfast cooked upon one of the stoves made in this city.

When the hour for school or for church came, one of Alexander's Columbia, South Carolina, bells could have made the announcement for him, while Brenner, of Augusta, or Baker, of Charleston, could have furnished his church with its organ. His doors, window sashes, and blinds, could have been made in the South. In a word, more than two-thirds of that money which he sent to the North might have remained in his own section, enriched his own people, and helped to place them and him in a position of the most complete commercial, manufactural and political independence. But, unfortunately for the South, our people prefer to vent their spleen and their patronage upon other portions of the confederacy.—*Southern Cultivator.*

From the Plantation.

At Home.

I write in one of the most retired rooms of the rambling old house in which I was born, and in which I have spent most of the years of my life. Of late, I have been a restless wanderer, but here I am, once more, sitting in the quaint old chair, connected by my earliest recollections with my grandfather—for this was long, almost the only seat he would occupy. The board on which I write, is the one on which his Bible used to rest. Beneath it is the little box which contained what seemed, to my childish imagination, a world of treasures and curiosities. My feet are on the foot-board on which I used to sit, and look up into grandfather's face, and listen to his tales and jests. It is a strange old chair —large, and apparently cumbersome—but so surrounded with various convenient appendages, so many places for books and papers, little tools, pipes and all an old man's notions, that it seems a habitation within itself. Oh! the memories that throng around this old chair. Let me recall the past. Turn back, oh, my soul! and review the scenes of childhood, of boyhood, of youth, and opening manhood. What a retrospect!

"I dreamed of many a perished hope,
Of many a spoken word,
That, lost amid the wreck of time,
Will ne'er again be heard.
Oh, how the ghosts of buried joys
Start up and haunt our gaze,
When o'er the tomb of love and hope,
We dream of other days!"

Who can look back over his past life—its happy hours, its hopes, its aspirations, its ardent ambitions, its pleasurable excitements, and remain unmoved, while contrasting it with the present—its unhappiness, its *ennui*, its disappointments, its gloom, its despondency?

"Ah, give me back the joyous hours.
When I, myself, was ripening too.
* * * * *
Give me the freedom of that hour,
The tear of joy, the pleasing pain;
Of hate and love the thrilling power;
Oh, give me back my youth again!"

Let it pass. I look around, and, on the walls, behold the same old ceiling, with its peculiar beaded strips, put up many, many years ago, according to the strange fancy of my eccentric grandfather. There is the same wide, old fireplace, with its massive andirons, and its quietly-glowing fire. The same cranky old tongs and the venerable fire-shovel maintain their position against the jambs. My mother sets her face against innovation, and she is right. This particular room she insists shall remain unaltered, and it stands, a memento—a living part—of a past age. On the mantelpiece, the old clock stands, with its constant tick echoing loudly in the silence of the room. Before the glowing hearth lies the white cat, favorite of my mother, with her calm, lazy purr, indicative of the most perfect contentment.

In that corner stands the table on which my father once kept a few books and journals, so that he could read without going to the solitude of the library. The wind whistles by, and rattles the panes of a window which opened long before I came into existence. By the window, close to the cozy fireplace, day after day, for nearly half a century, my father used to sit, at certain hours, reading some favorite French author, or looking over the newspaper. The same old panes of glass which gave him light, still kept their place in the mouldy wooden frame.

Opposite me, by this very window, sits my mother—relict of my departed sire—sole surviving link which connects me with a past generation. I gaze upon her placid, pallid brow, as she sits in the stillness and quiet of this, the Sabbath day, reading *the* Book—the Word of Life—the inspired volume which now constitutes her chief solace and delight.

Now she removes the glasses from her eyes, shuts the sacred tome, and turning to the window, gazes out. The wind is howling dismally, and as it sweeps by,

brings down the leaves in showers from the huge old oaks with which she has become so familiar, and which appear to be almost human in the companionship which they afford her. She looks out, abstracted, and unconscious even of the presence of me, her youngest born. Whither do her thoughts turn? Is she communing with the past? Do thronging memories come, bringing with them old faces, old scenes, old hours of happiness? Or is she looking forward and upward, with vision brightened and perception made clear by the words of Holy Writ which she has just been perusing, to a blissful reunion with all those whom she has loved on earth?

Sure I am of one thing: that though she may occasionally look back through the dim vista of past years, her bitterest pangs are long since over, and her gentle mourning is now almost sweet, as she thinks of the happy home to which she is tending, and repeats to herself:

"Eye hath not seen it, my gentle boy!
Ear hath not heard its deep songs of joy;
Dreams cannot picture a world so fair—
Sorrow and death may not enter there;
Time doth not breathe on its fadeless bloom,
For beyond the clouds and beyond the tomb,
It is there, it is there, my child."

H. W.

Hints on the Care of Horses in Winter.

I. During the winter months, those horses which are used for labor should be well shod. Unless, however, they are to be driven in such places as render them very liable to slip, the corks should not be *very* sharp. When a horse is newly shod, be a little careful when you drive him, especially if he feels well, or he may cork himself. Like men, it takes a few days for them to become accustomed to handling their feet with new shoes.

II. See that the stables in which horses stand are strong, and so arranged that they cannot kick each other. In cold weather, if they are well fed and do not work much, they kick and paw, or bite their mangers for exercise. It is not viciousness that makes them do it, but frequently a want of exercise. Often a valuable horse is badly injured just for want of proper arrangement of the stalls. A little expense to-day often saves a good deal to-morrow.

III. See that the floors are strong, and that the horse-barn is well banked up, to prevent the cold air from passing under the building and making the floor constantly cold. Every means ought to be taken to have the floor as warm as possible. A horse that has worked all day and has his legs wet, often takes a cold because his legs are kept so during the night by a cold floor. Warm feet for horses is as important as for men.

IV. A horse's bed is of some importance. We know a good many farmers who allow them to stand and lie on the hard floor all winter. They may get

used to it, but what can be got used to, is not always the best. A good bed of straw, or some similar material, kept clean by frequent changing, should be furnished to all horses. They will frequently paw it from under them, but this is for amusement, and not because they do not wish for a bed. When this is the case, great pains should be taken to prevent it.

V. Always clean out the droppings of your horses, both morning and evening. They ought always to be so far removed from the stable that the air will not be poisoned by the emanations from them, or the sills and siding of the barn will be rotted by coming in contact with them. We have always thought the practice of throwing the manure into a heap by the side of the barn door slovenly, wasteful and detrimental to the health of the horse. With a broom, sweep out all dust that accumulates daily.

VI. A horse should be groomed every morning when stabled. A good grooming is worth *as much as half a peck of oats.* Every barn should be supplied with a good curry-comb, card, comb for mane and tail, brush and stiff broom, for this purpose. It keeps the circulation in the surface vigorous, keeps the skin clean and in a good condition to withstand both heat and cold, and makes the horse look very much better. An ungroomed horse is like an unwashed boy, or a person who never attends to his toilet.

VII. It is a question with some, whether a horse should be blanketed in the winter. If the stable is a good one, and sufficiently warm, we should not use the blanket, except when the horse is out of doors, or has been subjected to severe labor or exposure. If it is used when they do not need it, it will do them little good when they do need it.

VIII. In a cold day of winter, when a horse's bits are full of frost, always *warm them thoroughly before placing them in the mouth.* Not to do this is very cruel. Touch your tongue or even a wet finger to a very cold piece of iron, and you can appreciate the importance of this hint. It may be a little trouble to do it, but it should be done. The frost may be taken out conveniently by placing the bits in water.

IX. If you have no labor to perform with your horse, see that he has *plenty of exercise daily.* This is necessary to the health of the animal, as well as to his and your comfort.

X. Do not allow him to drink very large quantities of ice-cold water at once. Moderately warm water is best for animals, but a large quantity of very cold water is always injurious. Especially is this the case when they do not have moderate exercise immediately after drinking, or when the horse is warm or much wearied by hard labor.

XI. A horse's food can never be exactly measured to him. Sometimes he needs more than at other times. Give him as much as he needs, and exercise judgment in regard to the matter. At all times give as much good, bright hay as your horse can eat. If the weather is very cold, the horse needs heat-producing material, and corn is as good grain as you can give. Grind it and feed

wet and mixed with a little cut hay or bright straw. When it is warm, oats is the best of grain for horses, and for laboring horses nothing is superior to them. Oats is to the horse what steak is to the laboring man; it furnishes the material for muscle.

XII. Young colts should not be stabled in winter, but protected from cold storms and winds by sheds, or be kept in unexposed situations. They need to be kept where they can move about as much as they desire. It gives them better constitutions and better locomotive power. Give them a little grain daily, and domesticate them by treating them kindly and handling them frequently.

XIII. Brood mares, unless they are worked, should be allowed to run out, except when the weather is severe. Give them plenty of hay and a moderate allowance of oats. A few roots occasionally are good, but never feed frozen roots, or those *very* cold, to them or any animal. It is like putting so much ice in the stomach.—*Ohio Farmer.*

Southern Patronage to Southern Imports and Domestic Industry.

CONCLUDED.

We again repeat that the lack of *home* patronage to domestic industry is apparent in every department of Southern life. Nothing exemplifies it stronger, than the neglect of our own nurserymen, engaged in raising fruit-trees, roses, and ornamental shrubbery for sale. That class of men have had a long and hard struggle for existence, and are just now beginning to get a foothold. Notwithstanding, it is a well-known fact, among intelligent fruit-growers, that there is a disease likely to exterminate the peach-tree at the North, and that, in the course of time, must lead to its destruction here, if we continue to send there for our trees. Scarcely a vessel arrives in our Southern ports, during the fall, winter, and spring months, that is not partly freighted with bundles of fruit-trees from the North; and you may see them at every railroad depot and express office at the South, from November to March.

We have the finest climate and soil in the world, for the propagation and growth of that delicious fruit—the peach. And there is no reason why we cannot be supplied with any number of trees by our own nurserymen. We have the native seed to plant, for grafting and budding, which ought to secure us against the destructive diseases with which the Northern trees are infected. Our native peach-trees, if properly taken care of, will live and bear fruit for half a century, while those imported from the North may not be expected to last longer than twelve or fifteen years. We have an example before us, of healthy, thrifty trees of native growth, which were bearing twenty-three years ago—while we have orchards of Northern-grown trees ten and twelve years old, that are dying out, and which we are obliged to prune down every year to half a crop, in order to keep them alive.

Aside from the patriotism that should prompt Southern men to purchase from

each other, a knowledge of the above facts prove it to be "penny-wise and pound-foolish," to attempt such economy in the establishment of an orchard, as the saving of three to five cents a tree. Fine grafted and budded trees are sold at all the Southern nurseries at twelve and fifteen cents, some as high as twenty cents. But where they are sold by the quantity, *fifteen cents* should be the outside price, and some now sell at twelve cents.

Yet thousands of orders go to New-Jersey, where they are bought for eight cents, and by the time they are delivered at Columbia or Augusta, they will have cost twelve cents. It should be known to every one, that large nursery establishments are springing up all over the South, and they require nothing more than a reasonable patronage from our own people, to render that branch of industry thrifty and prosperous. We will take the liberty of naming a few establishments, from which we have purchased trees, and know to be reliable and able to furnish all kinds and varieties of choice fruit-trees, either to supply amateur fruit-growers with extra choice small collections, or in quantities to plant orchards.

Those of whom we have *practical* acquaintance, are Messrs. Wm. Summer, of Pomaria, Newberry District, S. C.; Peters, Harden & Co., Atlanta, Ga.; P. J. Berckmans & Co., Augusta, Ga.; Thomas J. Fentress, Greensboro', N. C.; Westbrook & Mendenhall, Greensboro', N. C. There are, no doubt, others as reliable as those named, and it only needs the patronage of those now planting orchards, to rear up nurseries all over the South, which will not only fully supply us, but will eventually turn the current of trade from South to North. We predict the time when we will see the Jersey peach millionaires digging up their sickly orchards, to be replanted with Southern trees, thus carrying out the advice of the lamented Downing on this subject.

He recommended this as the only means of curing the disease known as the *yellows*, which has already nearly destroyed the peach orchards of New-Jersey and Delaware; and has within a few years cut off an immense source of income to peach-growers, railroads, and steamboats, the extent of which, would seem marvellous to relate in detail. We have a published statement before us of one grower, who realized in a few years over a million of dollars, principally on peaches. He, besides chartering a steamboat for the season, paid upward of twenty thousand dollars railroad freight, to carry his crop to market. Many realize gross incomes amounting to twenty, thirty, and even fifty thousand dollars, for a single peach crop; paying enormous transportation expenses, say, some five thousand, some eight thousand, and others ten and twelve thousand dollars, railroad freight during the fruit season.

If we were to pursue the subject, naming in detail all the neglected articles and occupations in our Southern country that might be adduced, a much larger space would be required than is allotted to these articles.

We trust that we have shown to the conviction of our readers, that much injustice has been done to the enterprising individuals who have embarked in *man-*

ufacturing at the South. And by such injustice a wound has been inflicted on the whole country, which no ordinary skill can heal.

But shall we stop at this point—may we not proceed to show that our *importers* have been also unjustly dealt with? A public sentiment has been allowed to grow up against them, and in favor of Northern men of that class, and by that means our strength has not only been impaired, but we have interwoven our pecuniary and commercial affairs in the meshes of Northern commerce to our own detriment, and thereby have added vigor and strength to Northern political power.

The political sentiment of the South is decidedly and universally against the North, but the more powerful pecuniary and commercial sentiment has shown itself to be with the North and opposed to the South, and if continued will lead to our ruin, both economically and politically. It is so thoroughly interwoven in the body politic, that it may be seen in the every-day acts of our people, from the lowest grade of society to the highest. If additional evidence is necessary, to prove the positions above assumed, what better proof do we want than the fact that an humble, unpretending country or village merchant, who has not the means of going beyond Charleston, to lay in his stock of merchandise, should consider it necessary to obliterate every mark on a box, which would betray the fact that his stock of goods was purchased in Charleston, and not in New-York. It has, for years past, been a common thing for country merchants to request that their packages should be so marked as to leave no clue to their having been bought in Charleston. Does not every one know that a widespread public sentiment has long existed all over the South, which has caused a preference to be given to articles purchased at the North? It was quite a plume in the cap of a trader, to be able to say he was just from New-York, and had purchased his supplies there. So highly has that advantage been esteemed, by all classes of men, that the idea of enabling a merchant to go to New-York, to lay in his stock, would enlist the kindly friendship of rich endorsers, and if anything could induce a board of bank directors to make any extraordinary effort to *accommodate*, it would most surely be in the *good cause* of enabling a neighbouring merchant to transfer his custom from Charleston to New York. That such a course is wrong all must see and admit; yet matters have been suffered to run so long in that direction, that a commercial and political power has been created at the North, which now threatens to annihilate us.

Why should a Southern country or village merchant go to New York to purchase his supplies? Almost every country merchant who visits Charleston has a through ticket to New York in his pocket. Some buy a few boxes of goods in Charleston; others will be drifted on North by meeting with the slightest impediments in the way of trade in Charleston. And many, from a desire to mix in the great whirlpool of fashion, sight-seeing, &c., pay their $30 passage money to and from New York, and cannot resist the temptation of doing something more than is embraced in the stale idea of buying a stock of goods in South

Carolina. While others, under the delusion that they can buy cheaper in New York, go there year after year to get cheated every time and never find it out.

To those acquainted with the nature and complicated operations of commerce, it is plain enough to be seen that Charleston can undersell New York, even if the goods be first landed there, and pay a duty to the New York custom-house. Goods are either imported by large dealers, or sent out by foreigners to agents, to sell by the case or large quantity. These importing houses, or agents, are bound to the jobbing trade not to break packages, or sell in such small quantities as to interfere with their customers. Any importer, or foreign agent, who violates this rule, must expect to lose the custom of the jobbing trade, not only of New York, but of Charleston, Chicago, Cincinnati, St. Louis, Louisville, Nashville, and other jobbing cities and towns scattered over our vast country. Now, we wish our readers to understand the groundwork: That imported goods first come into hands that are bound by the strongest ties to the wholesale dealer, more commonly termed jobbing merchant, who purchases by the package and retails out to merchants, a class of smaller dealers, located in towns, villages, and country places; this class of men sell immediately to the customer. The jobber, in turn, is bound to this latter class of merchants not to interfere with their customers, by selling small quantities.

We will now try to illustrate the subject by following a Southern merchant to New York, where he may desire to purchase an assorted stock of goods amounting from ten to thirty or fifty thousand dollars; even the last named sum will not procure him admission into an importing or agent's stock. If he insists on buying from such houses, the price will be fixed at much higher rates than the jobbing merchant pays, and the custom of not breaking packages will almost invariably rule him out; and he is, of necessity, thrown into the hands of the jobbing merchants of New York, the keenest and most adroit dealers known in the world—men who live by their wits, and who cannot sustain themselves except by exorbitant profits. Just for a moment look at things as they really are. A jobbing merchant in New York, paying from fifteen to thirty thousand dollars a year for store rent; clerk hire, from one to six thousand dollars a year; having two or three partners in the concern, each living in palaces at the most princely expenditure—compare this picture with the same class of merchants in Charleston, where the most commodious and best-located stores rent from fifteen hundred to two thousand dollars, and where clerks are now begging for situations; willing to pay their own board, work, and receive no pay for the first year or two, while the most expert receives for their services but from five hundred to two thousand dollars a year. Can you not see that the Charleston jobber is able to sell cheaper than the New Yorker?

Merchants of the city, town, village, and country! consider, and say whether you have not been treading unprofitable paths, which, if persevered in, will ultimately lead your country to ruin. Your notions of mercantile thrift are warped by errors as glaring as those by which abolition fanaticism is urged on at the

North. The Charleston wholesale merchants, as a class, have as good credit as any in the world. They purchase largely, and procure their stocks at the lowest rates.

The trade of New York is of a different class altogether; one half and probably three fourths of them live from hand to mouth, under exorbitant and extraordinary expenses; they buy to-day and sell to-morrow, are in many instances reckless of character, and pay higher prices for their goods than good reliable merchants do. If they cheat a man this year who lives fifteen hundred miles off, and lose his custom, what do they care?—the next year brings two in his place. So great are the profits made by merchants in New York, that every six or eight years of fair sailing, and undisturbed commercial prosperity, transforms a large number of those men of straw—jobbing merchants—into millionaires. But when a monetary crisis overtakes them, they are swept off into bankruptcy by hundreds.

New York is the last place to which an experienced, impractical merchant should venture to purchase a stock of goods, and there is no reason whatever why Charleston, New Orleans, Mobile, Savannah, and Augusta, should not become points of distribution, and be relied on entirely for supplies. Charleston can become so without waiting to establish lines of steamers to Europe. If she can obtain her fair proportion of the jobbing and distributing trade, she will soon number 200,000 in population, and the lines of steamers will follow, and so will the ability to build railroad outlets.

The mere importing business cannot make a city. If New York were to lose the jobbing trade, which rightfully belongs to Southern cities, she would immediately retrograde in population, or remain for a long time stationary. If her commerce was confined to importing houses and foreign agencies, that city would settle down to be the Liverpool of the United States, instead of the "London of America."

In order to render Charleston a great centre of distribution, and a fortress of political power, all that is requisite is the assurance of receiving in future all the trade that naturally belongs to her, with the hearty co-operation and patronage of Southern merchants; with this she would be prepared to make a doubled or quadrupled trade.

The present merchants would most willingly enlarge their trade fourfold, and the prospect of increased business would induce others to embark, and the money power would follow in the train. That portion of the money capital that belongs South, and which has centred in New York to buy up Southern merchants' paper with, would, as a matter of course, be transferred to Charleston, and an extended jobbing trade would bring with it large direct imports, of the heavier articles not sent to agents in this country, such as iron, salt, coffee, and many European articles made only to supply orders.

We are rejoiced to see the work of reformation already commenced, and we trust that such assurances of permanent increase of patronage to Charleston

merchants will be given, that their usual fall stock may be doubled. And although it is said that some of the hotel keepers feed their guests on turkeys and chickens fattened in abolition Ohio, and brought to Charleston by the way of New York, the change in the mercantile currents, which are so devoutly desired, will, no doubt, bring us back to poultry of our own raising, with which our back country abounds.

But, how is this change to be effected? It can be done only through the people—the great body of consumers. They should meet in primary assemblies, and put the mark of reprobation and proscription on every merchant who will not obey the call to abstain from a traffic that leads to our impoverishment and political ruin. Each individual who buys a coat, a silk dress, a piece of muslin, or any article from a home dealer—and gives his orders to a Southern mechanic and nurseryman, instead of sending it to the North—lends his or her aid in cutting off some of the springs. And the whole South, collectively acting together, will dry up many considerable branches, if not the great stream which carries away millions of our treasure, and is fast drifting us commercially and politically into the vortex of Northern power. To be politically independent of the free States, we must render ourselves commercially so, for commerce holds the sceptre that rules the world. The despots who have for ages swayed their power over nations of Europe, have been compelled to give way to it, and all nations bow to the unbounded power of commerce—which has whitened every sea with its sails, and driven by the wings of steam power, is now traversing every country known to civilized man. Her power will subdue and overrun the Chinese empire, and will ultimately civilize and Christianize benighted Africa, as well as every other inhabited portion of the globe. One of the greatest despotisms on earth has been forced into a strife for pre-eminence in manufacture and commerce.

The wise men who have the power of control in Russia, have very considerately come to the conclusion, that by agriculture alone, their country cannot keep pace with the growing power of manufacturing and commercial nations; hence the immense efforts of that nation to introduce manufactures, railroads, and all the appliances necessary to an extended commerce with the world.

In all civilized nations, the political power has yielded to the sceptre of commerce; and no nation in modern times has become commercial without the aid of manufactures; and so surely as we follow up the system which is advocated by many, as the true policy of the South of remaining an exclusively agricultural people, neglecting all other industrial occupations, and buying from others the commonest necessaries of life, and wearing out and exhausting our soil as fast as we can, so surely will we become vassals to some power. If we release ourselves from one, we must immediately fall into the hands of another.

To be independent, we must be our own merchants. Let us, then, set about a reformation that shall disenthral us from the tyranny of the North. Let us

resolve to patronize no merchant who will refuse his aid toward building up a distributing city at the South. Let us encourage the extension of manufactures, and by all means encourage and give our patronage to every article the product of Southern domestic industry.

For the Southern Planter.

LOUDOUN COUNTY, Va., December 26th, 1860.

Respected Friends—Permit me to inquire, through the Planter, what has become of Professor Campbell, of the Washington College. In reply to my criticism on his views on "Vegetable Physiology," in the April number of the Planter, he professes to be "a learner—a mere gleaner in the great field of scientific research;" and voluntarily says, "Willingly, therefore, would I sit at the feet of Mr. Taylor, or any one prepared to give me instruction," &c. Having thus placed himself under my instruction, and as I gave a few lessons for him to look over at his leisure, in my reply to his essay, I, as teacher, am anxious to know how my pupil is coming on in his studies. Is he earnestly endeavoring to solve the problems presented, or is he behaving truant and taking no notice of his lessons. Being so highly honored with so illustrious a pupil, I cannot think of giving him up. If he has found any difficulty in those problems presented, and will point them out, I will readily endeavor to assist him in his difficulties; it is the duty of teachers to give all proper instruction to pupils.

Will the editors be so kind as to inquire, whether the Professor is studying the facts presented by me in opposition to his theory, for he freely offered, that if I would bring forward facts well authenticated, and by a legitimate process of reasoning, based upon these facts, could show him that he was entertaining erroneous views, or advocating unsound theories in any department of science, instead of quarrelling with me, he would tender me his sincere thanks, and class me among his real benefactors. I shall hold him to this position. I consider that I gave him facts, in support of my views, that set his theory aside, and unless he can show that these facts are not true, or are not applicable, he must, if consistent, acknowledge their correctness. It will not do for him to say he has not time to attend to it, he had time to reply to my first essay, and an earnest seeker after scientific truth, will only seek the more earnestly after truth when he meets with a fact, or idea, that crosses what he considered the line of that truth.

I wait for a reply.

YARDLEY TAYLOR.

YORKSHIRE PUDDING.—Mix five spoonfuls of flour with a quart of milk and four eggs well beaten; butter a shallow pan, and bake under the meat; when quite brown, turn the other side upwards, and brown that. It should be made in a square pan, and cut into pieces to come to table. It is a good plan to set it over a chafing-dish at first, and stir it some minutes.

On the Sources of the Nitrogen of Vegetation;

With Special Reference to the Question whether Plants Assimilate free or uncombined Nitrogen—By John Bennet Lawes, Esq., F.R.S., F.C.S.; Joseph Henry Gilbert, Ph.D., F.R.S., F.C.S.; and Evan Pugh, Ph.D., F.C.S.

[*From the Proceedings of the Royal Society of London for June* 21, 1860.]

After referring to the earlier history of the subject, and especially to the conclusion of De Saussure, that plants derive their nitrogen from the nitrogenous compounds of the soil and the small amount of ammonia which he found to exist in the atmosphere, the Authors preface the discussion of their own experiments on the sources of the nitrogen of plants, by a consideration of the most prominent facts established by their own investigations concerning the amount of nitrogen yielded by different crops over a given area of land, and of the relation of these to certain measured, or known sources of it.

On growing the same crop year after year on the same land, without any supply of nitrogen by manure, it was found that wheat, over a period of 14 years, had given rather more than 40 lbs.—barley, over a period of 6 years, somewhat less —meadow-hay, over a period of 3 years, nearly 40 lbs.—and beans, over 11 years, rather more than 50 lbs. of nitrogen, per acre, per annum. Clover, another Leguminous crop, grown in 3 out of 4 consecutive years, had given an average of 120 lbs. Turnips, over 8 consecutive years, had yielded about 45 lbs.

The Graminaceous crops had not, during the periods referred to, shown signs of diminution of produce. The yield of the Leguminous crops had fallen considerably. Turnips, again, appeared greatly to have exhausted the immediately available nitrogen in the soil. The amount of nitrogen harvested in the Leguminous and Root-crops was considerably increased by the use of "mineral manures," whilst that in the Graminaceous crops was so in a very limited degree.

Direct experiments further showed that pretty nearly the same amount of nitrogen was taken from a given area of land in *wheat* in 8 years, whether 8 crops were grown consecutively, 4 in alternation with fallow, or 4 in alternation with beans.

Taking the results of 6 separate courses of rotation, Boussingault obtained an average of between one-third and one-half more nitrogen in the produce than had been supplied in manure. His largest yields of nitrogen were in the Leguminous crops; and the cereal crops were larger when they next succeeded the removal of the highly nitrogenous Leguminous crops. In their own experiments upon an actual course of rotation, without manure, the Authors had obtained, over 8 years, an average annual yield of 57.7 lbs. of nitrogen per acre; about twice as much as was obtained in either wheat or barley, when these crops were, respectively, grown year after year on the same land. The greatest yield of nitrogen had been in a clover crop, grown once during the 8 years; and the wheat crops grown after this clover in the first course of 4 years, and after beans

in the second course, were about double those obtained when wheat succeeded wheat.

Thus, Cereal crops, grown year after year on the same land, had given an average of about 40 lbs. of nitrogen, per acre, per annum; and Leguminous crops much more. Nevertheless the Cereal crop was nearly doubled when preceded by a Leguminous one. It was also about doubled when preceded by fallow. Lastly, an entirely unmanured rotation had yielded nearly twice as much nitrogen as the continuously grown Cereals.

Leguminous crops were, however, little benefited, indeed frequently injured, by the use of the ordinary direct nitrogenous manures. Cereal crops, on the other hand, though their yield of nitrogen was comparatively small, were very much increased by direct nitrogenous manures, as well as when they succeeded a highly nitrogenous Leguminous crop, or fallow. But when nitrogenous manures had been employed for the increased growth of the Cereals, the nitrogen in the immediate increase of produce had amounted to little more than 40 per cent. of that supplied, and that in the increase of the second year after the application, to little more than one-tenth of the remainder. Estimated in the same way, there had been in the case of the meadow grasses scarcely any larger proportion of the supplied nitrogen recovered. In the Leguminous crops the proportion so recovered appeared to be even less; whilst in the root-crops it was probably somewhat greater. Several possible explanations of this real or apparent loss of the nitrogen supplied by manure are enumerated.

The question arises—what are the sources of all the nitrogen of our crops beyond that which is directly supplied to the soil by artificial means? The following actual or possible sources may be enumerated:—the nitrogen in certain constituent minerals of the soil; the combined nitrogen annually coming down in the direct aqueous depositions from the atmosphere; the accumulation of combined nitrogen from the atmosphere by the soil in other ways; the formation of ammonia in the soil from free nitrogen and nascent hydrogen; the formation of nitric acid from free nitrogen; the direct absorption of combined nitrogen from the atmosphere by plants themselves; the assimilation of free nitrogen by plants.

A consideration of these several sources of the nitrogen of the vegetation which covers the earth's surface showed that those of them which have as yet been quantitatively estimated are inadequate to account for the amount of nitrogen obtained in the annual produce of a given area of land beyond that which may be attributed to supplies by previous manuring. Those, on the other hand, which have not yet been even approximately estimated as to quantity—if indeed fully established qualitatively—offer many practical difficulties in the way of such an investigation as would afford results applicable in any such estimates as are here supposed. It appeared important, therefore, to endeavour to settle the question whether or not that vast storehouse of nitrogen, the atmosphere, affords to growing plants any measurable amount of its *free* nitrogen. Moreover, this question had of late years been submitted to very extended and laborious experimental

researches by M. Boussingault, and M. Ville, and also to more limited investigation by MM. Mène, Roy, Cloez, De Luca, Harting, Petzholdt and others, from the results of which diametrically opposite conclusions had been arrived at. Before entering on the discussion of the own experimental evidence, the Authors give a review of these results and inference; more especially those of M. Boussingault who questions, and those of M. Georges Ville who affirms the assimilation of *free* nitrogen in the process of vegetation. So Dr. Voelcker for Clover.

The general method of experiment instituted by Boussingault, which has been followed, with more or less modification, in most subsequent researches, and by the Authors in the present inquiry, was—to set seeds or young plants, the amount of nitrogen in which was estimated by the analysis of carefully chosen similar specimens; to employ soils and water containing either no combined nitrogen, or only known quantities of it; to allow the access either of free air (the plants being protected from rain and dust)—of a current of air freed by washing from all *combined* nitrogen—or of a limited quantity of air, too small to be of any avail so far as any compounds of nitrogen contained in it were concerned; and finally, to determine the amount of combined nitrogen in the plants produced and in the soil, pot, &c., and so to provide the means of estimating the gain or loss of nitrogen during the course of the experiment.

The plan adopted by the Authors in discussing their own experimental results, was—

To consider the conditions to be fulfilled in order to effect the solution of the main question, and to endeavour to eliminate all sources of error in the investigation.

To examine a number of collateral questions bearing upon the points at issue, and to endeavour so far to solve them, as to reduce the general solution to that of a single question to be answered by the results of a final set of experiments.

To give the results of the final experiments, and to discuss their bearings upon the question which it is proposed to solve by them.

Accordingly, the following points are considered:—

1. The preparation of the soil, or matrix, for the reception of the plants and of the nutriment to be supplied to them.

2. The preparation of the nutriment, embracing that of mineral constituents, of certain solutions, and of water.

3. The conditions of atmosphere to be supplied to the plants, and the means of securing them; the apparatus to be employed, &c.

4. The changes undergone by nitrogenous organic matter during decomposition, affecting the quantity of combined nitrogen present, in circumstances more or less analogous to those in which the experimental plants are grown.

5. The action of agents, as ozone; and the influence of other circumstances which may affect the quantity of combined nitrogen present in connexion with the plants, independently of the direct action of the growing process.

In most of the experiments a rather clayey soil, ignited with free access of air, well-washed with distilled water, and re-ignited, was used as the matrix or soil. In a few cases washed and ignited pumice-stone was used.

The mineral constituents were supplied in the form of the ash of plants, of the description to be grown if practicable, and if not, of some closely allied kind.

The distilled water used for the final rinsing of all the important parts of the apparatus, and for the supply of water to the plants, was prepared by boiling off one-third from ordinary water, collecting the second-third as distillate, and redistilling this, previously acidulated with phosphoric acid.

Most of the pots used were specially made, of porous ware, with a great many holes at the bottom and round the sides near to the bottom. These were placed in glazed stone-ware pans with inward-turned rims to lessen evaporation.

Before use, the red-hot matrix and the freshly ignited ash were mixed in the red-hot pot, and the whole allowed to cool over sulphuric acid. The soil was then moistened with distilled water, and after the lapse of a day or so the seeds or plants were put in.

Very carefully picked bulks of seed were chosen; specimens of the average weight were taken for the experiment, and in similar specimens the nitrogen was determined.

The atmosphere supplied to the plants was washed free from ammonia by passing through sulphuric acid, and then over pumice-stone saturated with sulphuric acid. It then passed through a solution of carbonate of soda before entering the apparatus enclosing the plant, and it passed out again through sulphuric acid.

Carbonic acid, evolved from marble by measured quantities of hydrochloric acid, was passed daily into the apparatus, after passing, with the air, through the sulphuric acid and the carbonate of soda solution.

The enclosing apparatus consisted of a large glass shade, resting in a groove filled with mercury, in a slate or glazed earthenware stand, upon which the pan, with the pot of soil, &c., was placed. Tubes passed under the shade, for the ingress and the egress of air, for the supply of water to the plants, and, in some cases, for the withdrawal of the water which condensed within the shade. In other cases, the condensed water was removed by means of a special arrangement.

One advantage of the apparatus adopted was, that the washed air was forced, instead of being aspirated, through the enclosing vessel. The pressure upon it was thus not only very small, and the danger from breakage, therefore, also small, but it was exerted upon the inside instead of the outside of the shade; hence, any leakage would be from the inside outwards, so that there was no danger of unwashed air gaining access to the plants.

The conditions of atmosphere were proved to be adapted for healthy growth, by growing plants under exactly the same circumstances, but in a garden soil. The conditions of the artificial soil were shown to be suitable for the purpose, by

the fact that plants grown in such soil, and in the artificial conditions of atmosphere, developed luxuriantly, if only manured with substances supplying combined nitrogen.

Passing to the subjects of collateral inquiry, the first question considered was, whether plants growing under the conditions stated would be likely to acquire nitrogen from the air through the medium of ozone, either within or around the plant, or in the soil; that body oxidating free nitrogen, and thus rendering it assimilable by the plants.

Several series of experiments were made upon the gases contained in plants or evolved from them, under different circumstances of light, shade, supply of carbonic acid, &c. When sought for, ozone was in no case detected. The results of the inquiry in other respects, bearing upon the points at issue, may be briefly summed up as follows:

1. Carbonic acid within growing vegetable cells and intercellular passages suffers decomposition very rapidly on the penetration of the sun's rays, oxygen being evolved.

2. Living vegetable cells, in the dark, or not penetrated by the direct rays of the sun, consume oxygen very rapidly, carbonic acid being formed.

3. Hence, the proportion of oxygen must vary greatly according to the position of the cell, and to the external conditions of life, and it will oscillate under the influence of the reducing force of carbon-matter (forming carbonic acid) on the one hand, and of that of the sun's rays (liberating oxygen) on the other. Both actions may go on simultaneously according to the depth of the cell; and the once outer cells may gradually pass from the state in which the sunlight is the greater reducing agent to that in which the carbon-matter becomes the greater.

4. The great reducing power operating in those parts of the plant where ozone is most likely, if at all, to be evolved, seems unfavourable to the oxidation of nitrogen; that is under circumstances in which carbon-matter is not oxidized, but on the contrary, carbonic acid reduced. And where beyond the influence of the direct rays of the sun, the cells seem to supply an abundance of more easily oxidized carbon-matter, available for oxidation should free oxygen or ozone be present. On the assumption that nitrates are available as a direct source of nitrogen to plants, if it were admitted that nitrogen is oxidated within the plant, it must be supposed (as in the case of carbon) that there are conditions under which the oxygen compound of nitrogen may be reduced within the organism. and that there are others in which the reverse action, namely, the oxidation of nitrogen, can take place.

5. So great is the reducing power of certain carbon-compounds of vegetable matter, that when the growing process has ceased, and all the free oxygen in the cells has been consumed, water is for a time decomposed, carbonic acid formed, and hydrogen evolved.

The suggestion arises, whether ozone may not be formed under the influence of the powerful reducing action of the carbon-compounds of the cell on the oxygen eliminated from carbonic acid by sunlight, rather than under the direct action of the sunlight itself—in a manner analogous to that in which it is ordinarily obtained under the influence of the active reducing agency of phosphorus? But, even if it were so, it may be questioned whether the ozone would not be at once destroyed when in contact with the carbon-compounds present. It is more probable, however, that the ozone said to be observed in the vicinity of vegetation, is due to the action of the oxygen of the air upon minute quantities of volatile carbo-hydrogens emitted by plants.

Supposing ozone to be present, it might, however, be supposed to act in a more indirect manner as a source of combined and assimilable nitrogen in the Authors' experiments, namely—by oxidating the nitrogen dissolved in the condensed water of the apparatus—by forming nitrates in contact with the moist, porous, and alkaline soil—or by oxidating the free nitrogen in the cells of the older roots, or that evolved in their decomposition.

Experiments were accordingly made to ascertain the influence of ozone upon organic matter, and on certain porous and alkaline bodies, under various circumstances. A current of ozonous air was passed over the substances for some time daily, for several months, including the whole of the warm weather of the summer; but in only one case out of eleven was any trace of nitric acid detected, namely, that of garden soil; and this was proved to contain nitrates before being submitted to the action of ozone.

It is not, indeed, hence inferred that nitric acid could under no circumstances be formed through the influence of ozone on certain nitrogenous compounds, on nascent nitrogen, on gaseous nitrogen in contact with porous and alkaline substances, or even in the atmosphere. But, considering the negative result with large quantities of ozonous air, acting upon organic matter, soil, &c., in a wide range of circumstances, and for so long a period, it is believed that no error will be introduced into the main investigation by the cause referred to.

Numerous experiments were made to determine whether free nitrogen was evolved during the decomposition of nitrogenous organic compounds.

In the first series of six experiments, wheat, barley, and bean-meal were respectively mixed with ignited pumice, and ignited soil, and submitted for some months to decomposition in a current of air, in such manner that any ammonia evolved could be collected and estimated. The result was, that in five out of the six cases, there was a greater or less evolution of free nitrogen—amounting, in two of the cases, to more than 12 per cent of the original nitrogen of the substance.

The second series consisted of nine experiments; wheat, barley, and beans being again employed, and, as before, either ignited soil or pumice used as the matrix. In some cases the seeds were submitted to experiment whole, and allowed to grow, and the vegetable matter produced permitted to die down and

decompose. In other cases, the ground seeds, or "meals," were employed. The conditions of moisture were also varied. The experiments were continued through several months, when from 60 to 70 per cent of the carbon had disappeared.

In eight out of the nine experiments, a loss of nitrogen, evolved in the free state, was indicated. In most cases, the loss amounted to about one-seventh or one eighth, but in one instance to 40 per cent of the original nitrogen. In all these experiments the decomposition of the organic substance was very complete, and the amount of carbon lost was comparatively uniform.

It thus appeared that, under rare circumstances, there might be no loss of nitrogen in the decomposition of nitrogenous organic matter; but that, under a wide range of circumstances, the loss was very considerable—a point, it may be observed, of practical importance in the management of the manures of the farm and the stable.

Numerous direct experiments showed, that when nitrogenous organic matter was submitted to decomposition in water, over mercury, in the absence of free oxygen, there was no free nitrogen evolved. In fact, the evolution in question appeared to be the result of an oxidating process.

Direct experiments also showed, that seeds may be submitted to germination and growth, and that nearly the whole of the nitrogen may be found in the vegetable matter produced.

It is observed that, in the cases referred to in which so large an evolution of free nitrogen took place, the organic substances were submitted to decomposition for several months, during which time they lost two-thirds of their carbon. In the experiments on the question of assimilation, however, but a very small proportion of the total organic matter is submitted to decomposing actions apart from those associated with growth, and this for a comparatively short period of time, at the termination of which the organic form is retained, and therefore but very little carbon is lost. It would appear, then, that in experiments on assimilation no fear need be entertained of any serious error arising from the evolution of free nitrogen in the decomposition of the nitrogenous organic matter necessarily involved, so long as it is subjected by the ordinary process of germination, and exhaustion to supply materials for growth. On the other hand the facts adduced afford a probable explanation of any small loss of nitrogen which may occur when seeds have not grown, or when leaves, or other dead matters, have suffered partial decomposition. They also point out an objection to the application of nitrogenous organic manure in such experiments.

Although there can be no doubt of the evolution of hydrogen during the decomposition of organic matter under certain conditions, and although it has long been admitted that nascent hydrogen may, under certain circumstances, combine with gaseous nitrogen and form ammonia—nevertheless, from considerations stated at length in the paper, the Authors infer that there need be little apprehension of error in the results of their experiments, arising from an unaccounted

supply of ammonia, formed under the influence of nascent hydrogen given off in the decomposition of the organic matter involved.

Turning to their direct experiments on the question of the assimilation of free nitrogen, the Authors first consider whether such assimilation would be most likely to take place when the plant had no other supply of combined nitrogen than that contained in the seed sown, or when supplied with a limited amount of combined nitrogen, or with an excess of combined nitrogen? And again—whether at an early stage of growth, at the most active stage, or when the plant was approaching maturity? Combinations of these several circumstances might give a number of special conditions, in perhaps only one of which assimilation of free nitrogen might take place, in case it could in any.

It is hardly to be supposed that free nitrogen would be assimilated if an excess of combined nitrogen were at the disposal of the plant. It is obvious, however, that a wide range of conditions would be experimentally provided, if in some instances plants were supplied with no more combined nitrogen than that contained in the seed, in others brought to a given stage of growth by means of limited extraneous supplies of combined nitrogen, and in others supplied with combined nitrogen in a more liberal measure. It has been sought to provide these conditions in the experiments under consideration.

In the selection of plants, it was sought to take such as would be adapted to the artificial conditions of temperature, moisture, &c., involved in the experiment, and also such as were of importance in an agricultural point of view—to have representatives, moreover, of the two great Natural Families, the Graminaceæ and the Leguminosæ, which seem to differ so widely in their relations to the combined nitrogen supplied within the soil—and finally, to have some of the same descriptions as those experimented upon by M. Boussingault, and M. G. Ville, with such discordant results.

Thirteen experiments were made (4 in 1857 and 9 in 1858,) in which the plants were supplied with no other combined nitrogen than that contained in the original seed. In 12 of the cases prepared soil was the matrix, and in the remaining one prepared pumice.

Of 9 experiments with Graminaceous plants, 1 with wheat and 2 with barley were made in 1857. In one of the experiments with barley there was a gain of 0·0016, and in the other of 0.0026 gramme of nitrogen. In only two cases of the experiments with cereals in 1858, was there any gain of nitrogen indicated; and in both it amounted to only a small fraction of a milligramme. Indeed, in no one of the cases, in either 1857 or 1858, was there more nitrogen in the *plants themselves*, than in the seed sown. A gain was indicated only when the nitrogen in the soil and pot—which together weighed about 1500 grammes—was brought into the calculation. Moreover, the gain only exceeded 1 milligramme in the case of the experiments of 1857, when slate, instead of glazed earthenware stands were used as the lute vessels; and there was some reason to believe that

the gain indicated was due to this circumstance. In none of the other cases was the gain more than would be expected from error in analysis.

The result was then, that in no one case of these experiments was there any such gain of nitrogen as could lead to the supposition that *free* nitrogen had been assimilated. The plants had, however, vegetated for several months, had in most cases more than trebled the carbon of the seed, and had obviously been limited in their growth for want of a supply of available nitrogen in some form. During this long period they were surrounded by an atmosphere containing free nitrogen; and their cells were penetrated by fluid saturated with that element. It may be further mentioned, that many of the plants formed glumes and paleæ for seed.

It is to be observed that the results of these experiments with cereals go to confirm those of M. Boussingault.

The Leguminous plants experimented upon did not grow so healthily under the artificial conditions as did the cereals. Still, in all three of the cases of these plants in which no combined nitrogen was provided beyond that contained in the original seed, the carbon in the vegetable matter produced was much greater than that in the seed—in one instance more than 3 times greater. In no case, however, was there any indication of assimilation of free nitrogen, any more than there had been by the Graminaceous plants grown under similar circumstances.

One experiment was made with buckwheat, supplied with no other combined nitrogen than that contained in the seed. The result gave no indication of assimilation of free nitrogen.

In regard to the whole of the experiments in which the plants were supplied with no combined nitrogen beyond that contained in the seed, it may be observed that, from the constancy of the amount of combined nitrogen present in relation to that supplied, throughout the experiments, it may be inferred, as well that there was no evolution of free nitrogen by the growing plant, as that there was no assimilation of it; but it cannot hence be concluded that there would be no such evolution if an excess of combined nitrogen were supplied.

The results of a number of experiments, in which the plants were supplied with more or less of combined nitrogen, in the form of ammonia-salts, or of nitrates, are recorded. Ten were with Cereals; 4 in 1857, and 6 in 1858. Three were with Leguminous plants; and there were also some with plants of other descriptions—all in 1858.

In the case of the cereals more particularly, the growth was very greatly increased by the extraneous supply of combined nitrogen; in fact, the amount of vegetable matter produced was 8, 12, and even 30 times greater than in parallel cases without such supply. The amount of nitrogen appropriated was also, in all cases many times greater, and in one case more than 30 times as great, when a supply of combined nitrogen was provided. The evidence is therefore sufficiently clear that all the conditions provided, apart from those which depended upon a supply of combined nitrogen, were adapted for vigorous growth; and that

the limitation of growth where no combined nitrogen was supplied was due to the want of such supply.

In 2 out of the 4 experiments with cereals in 1857, there was a slight gain of nitrogen beyond that which should occur from error in analysis; but in no one of the 6 in 1858, when glazed earthenware instead of slate stands were used, was there any such gain. It is concluded, therefore, that there was no assimilation of free nitrogen. In some cases the supply of combined nitrogen was not given until the plants showed signs of decline; when, on each addition, increased vigour was rapidly manifested. In others the supply was given earlier and was more liberal.

As in the case of the Leguminous plants grown without extraneous supply of combined nitrogen, those grown with it progressed much less healthily than the Graminaceous plants. But the results under these conditions, so far as they go, did not indicate any assimilation of free nitrogen.

The results of experiments with plants of other descriptions, in which an extraneous supply of combined nitrogen was provided, also failed to show an assimilation of free nitrogen.

Thus, 19 experiments with Graminaceous plants, 9 without and 10 with an extraneous supply of combined nitrogen—6 with Leguminous plants, 3 without and 3 with an extraneous supply of combined nitrogen, and also some with other plants, have been made. In none of the experiments, with plants so widely different as the Graminaceous and the Leguminous, and with a wide range of conditions of growth, was there evidence of an assimilation of free nitrogen.

The conclusions from the whole inquiry may be briefly summed up as follows:

The yield of nitrogen in the vegetation over a given area, within a given time, especially in the case of Leguminous crops, is not satisfactorily explained by reference to the hitherto quantitatively determined supplies of *combined* nitrogen.

The results and conclusions hitherto recorded by different experimenters on the question whether plants assimilate *free* or *un*combined nitrogen, are very conflicting.

The conditions provided in the experiments of the Authors on this question were found to be quite consistent with the healthy development of various Graminaceous Plants, but not so much so for that of the Leguminous Plants experimented upon.

It is not probable that, under the circumstances of the experiments on assimilation, there would be any supply to the plants of an unaccounted quantity of combined nitrogen, due to the influence either of ozone, or of nascent hydrogen.

It is not probable that there would be a loss of any of the combined nitrogen involved in an experiment on assimilation, due to the evolution of free nitrogen in the decomposition of organic matter, except in certain cases, when it might be presupposed.

It is not probable that there would be any loss due to the evolution of free nitrogen from the nitrogenous constituents of the plants during growth.

In numerous experiments with Graminaceous plants, under a wide range of conditions of growth, in no case was there any evidence of an assimilation of free nitrogen.

In experiments with Leguminous plants the growth was less satisfactory, and the range of conditions was, therefore, more limited. But the results with these plants, so far as they go, do not indicate any assimilation of free nitrogen. It is desirable that the evidence of further experiments with such plants, under conditions of more healthy growth, should be obtained.

Results obtained with some other plants, are in the same sense as those with Graminaceous and Leguminous ones, in regard to the question of the assimilation of free nitrogen.

In view of the evidence afforded of the non-assimilation of *free* nitrogen by plants, it is very desirable that the several actual or possible sources whence they may derive *combined* nitrogen should be more fully investigated, both qualitatively and quantitatively.

If it be established that plants do not assimilate free or uncombined nitrogen, the source of the large amount of combined nitrogen known to exist on the surface of the globe, and in the atmosphere, still awaits a satisfactory explanation.

For the Southern Planter.

The Supposed Calcareous Character of Certain Rocks and Soils in Florida Practically Tested.

BEECHWOOD, *Prince George Co.*, Va., Jan. 19th, 1861.

MESSRS. EDITORS—Having been called to Florida recently, I had designed to use the opportunity thus afforded to see something of the country, and to investigate some curious and obscure questions in relation to the soils. Several causes for disappointed effort, or delay, among which were an unusual prevalence of rainy weather, and my own indisposition, produced by exposure on my journey, allowed me but a few days for my designed examinations and inquiries. These particular examinations were confined to a few plantations, in one neighborhood, in Marion county. More slight and general views were added on my journeys from Fernandina to Marion, and thence to Tallahassee. Though I am inclined to believe that the very remarkable facts which I observed in a limited locality are general through a large portion of Florida, I will not assume so broad a position on so limited an amount of actual observations. But I will assume as true and general, for the neighborhood in which my personal observations were made, the particular and peculiar qualities of soil which I observed. That area embraced the pine-land estate of Gen. Wm. Owens (and his residence,) the Fort Duane plantation, belonging to him and his brother Col. S. Owens, and the intermediate pine forest land, all stretching some 12 miles. The Fort Duane land is very extensively known, owing to its having been settled, as a sugar plantation, by Gen. Clinch, before the Seminole war, and to the place being occupied as a

military post during that war. This plantation also is strongly illustrative, in its character, of the peculiarities of soils and rock of which I shall speak. Thus, by reference to the Fort Duane lands, so well known to many, the importance of my observations may be made more impressive. And many may be ready to admit that if qualities of soil, so entirely different from what were universally supposed, are true as to the Fort Duane lands, and their vicinity, they may well be true as to all of Florida, where the like apparent qualities of rocks and soils extend.

This was my first sight of Florida—and I had never before had an opportunity to examine even a hand specimen of its soil or rock. But as far back a 25 years, the descriptions published of the soils and products had presented to me puzzling or incredible propositions, which I had never before been able to examine and scrutinize by actual experiment. The opportunity, now incidentally afforded by the main pursuit of other and now more important political objects, limited as it was, was used for this purpose; and though having but little leisure or inclination, at this exciting time of political revolution, for other studies or discussions, I will constrain myself to write some hasty statements of my observations, before they may fade from my frail memory.

The general description of the lands of Florida, as given by all visitors and residents, and without exception, so far as I have known, has been that the land was generally underlaid with "rotten limestone," on a very hard marl, which rock often cropped out at the surface, and was seen in detached masses on almost all the lands, in greater or less abundance. The quantity of this rock was greater on the rich hammock lands, but it was not wanting on the poorer pine lands. No resident, or planter, had doubted that these rocks were generally calcareous, or that the soils were necessarily generally and also abundantly supplied with lime. Indeed, certain bad results of cotton culture on some of the richest lands, and their failure to produce good cotton, were ascribed to the excessive quantity of lime in these soils.

From all the numerous and intelligent witnesses, testifying to the like general facts, and concurring in the same inferences and conclusions, I myself could never have doubted their correctness, except that they contradicted (for all the great extent of the pine lands,) my theoretical views of the antagonism of calcareous soil and healthy and natural pine growth. Because of the contradiction of the universally believed facts to my theoretical doctrine, I could not admit the alleged facts. And when, at last, I was enabled to test their accuracy, in places where they were deemed most certain and undeniable, I found them, without a single exception, so far as observed, to be mistaken, and fallacious.

In my first drive by day-light, and otherwise than on a railway, from Micanopy to Gen. Owens' residence, I was soon furnished with enough apparent proofs of the correctness of the general opinions. The scattered surface rocks, to my eye, seemed like the hard calcareous rock of Marengo, Ala., or of Charleston District, S. C., and fully as calcareous as these, which contain from 70 to 90 per cent. of

carbonate of lime. I saw such rock on pine-land as well as hammock. I saved specimens for accurate testing by the touch of acid—but with little expectation of finding any contradiction to what appearances indicated to the eye.

In this hasty sketch I cannot state particular cases—and it would be useless, inasmuch as the general results were found to be all alike. It is enough to say, that in trying, by the touch of muriatic acid, numerous specimens of soils, both of pine land and hammock, and of the surface or buried gravel, or of the surface stone, and on soils supposed by the intelligent owners to be most certainly and strongly calcareous, I did not find any *carbonate* of lime, in either soil or gravel, or rock—nor was lime in any other form indicated to be present in any of the surface stones, or in any near the surface, except in the numerous depressions, or "lime-sinks," in which the lower lying stone was always found to be calcareous, whether very pure, or impure as more usual. Yet, the stones at or near the general surface, not only in their color, soft texture, and general form, seemed to be calcareous, but many of them are full of the impressions, (or casts,) of shells, and some even of the harder shells (*pecten* and *ostræa*,) remaining in form. These strange results were sufficient to re-establish my here controverted doctrine that pine trees would not naturally grow and thrive on a calcareous soil—or, at least, that there is no evidence to disprove that doctrine presented in the growth of the pine forests of Florida. Also, my testings and observations, limited as they were in extent of surface, were enough to prove, for these lands at least, that the universal opinion of the abundance (or excess) of lime in these soils is entrely mistaken. I infer that no soil which I examined has too much lime, and that all the pine lands would be much benefitted by having more lime added. And this essential ingredient of good soil, though absent at and near the surface, is to be found at some moderate depth, where indicated by "sink-holes," on sundry different parts of almost every plantation in Marion county, if not of most lands of the whole state. I brought away some specimens of the rocks, which obviously had been calcareous at some former time, but are no longer so, which will be sent with this writing, for inspection, to the office of the Southern Planter.

It is proper for me to state that Dr. Robert Archer, then a Surgeon in the U. S. Army, and stationed at Fort King, in Florida, in 1833, made observations similar to mine, in regard to that locality, and which were induced by the like causes, and led to the same conclusions. I noticed, with great and personal interest, this statement of Dr. Archer's, when he favored me and the public by the communication containing it, and which I then published in the Farmers' Register, (vol. iv., p. 185, for 1836*). But the facts stated, important as they

* Extract of Dr. Archer's letter, above referred to:

"The country about Fort King is called a lime-stone country. The pine lands, which constitute four-fifths of this region, to all appearances, are very little more than barren sands, producing scarcely any undergrowth but rank [coarse] grass, and interspersed, in every direction, with what has been called rotten lime-stone, containing the impression

were, probably attracted no notice of any of the cultivators or proprietors of Florida lands, who were so deeply interested in the question. And the general, if not universal calcareous character of the soils and rocks of Florida has continued, since as before, to be the universally accepted opinion of the residents and cultivators of the country.

I believe that the surface and higher-lying under beds of the peninsula of Florida were, at some remote ancient era, calcareous, both the rocks and soils, as they are now erroneously believed to be. The low-lying rock, probably extending under the whole of the Peninsula, is still of lime-stone. As of all lime-stone formations, this great under-bed is penetrated by innumerable hollow passages and caverns, many of which are channels of rapid and bold streams, or even considerable rivers, and all of which are full of water, if not being actual open communications between the numerous lakes and large ponds. By some great and long-continued operation of Nature, which I do not pretend to explain, it seems that the carbonate of lime has been removed from the soils, and the carbonate and probably all other forms of lime from the rocks, and for some or many feet of depth from the surface.

That such a change may take place is even more evident from other facts which I have observed elsewhere. In St. Matthew's Parish, and elsewhere in Orangeburgh District, S. C., I had long ago seen numerous and unquestionable evidences that soils and rocks, and especially numerous shells, had lost their former calcareous ingredients, and received instead, and in precisely the same form, as to the shells, silicious in place of the lost calcareous parts. There are there found beds of silicious rock or earth, which manifestly were once beds of shell marl. The shells (of the *eocene* era,) are perfectly preserved, and where imbedded in sand (as at Legare's mill,) are separate and distinct, and in many cases are as perfect in form, even to the most delicate and sharp edges, and the minutest prickle, as if the living animal were still enclosed. Yet these perfect and beautiful shells are entirely silicified, and contain not the least remains of lime.

There are other peculiar and remarkable characteristics of Florida which well deserve notice, and which perhaps I may speak of at some other time, when more leisure and convenience may permit. EDMUND RUFFIN.

LIME.—Lime will descend down as far as the earth is pulverized, and it should, therefore, be placed on the top of the ground.

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of various marine shells. Pursuing still the inquiry how such immense forests of pine should grow in a soil evidently calcareous, I concluded to analyze it, and, to my surprise, found that it did not contain one particle of carbonate of lime. This appeared the more extraordinary, as the rotten lime-stone was all around me in large masses, as well as disintegrated. I then undertook to ascertain what proportion of the carbonate was contained in this rotten lime-stone; and to my still greater surprise, could not detect the existence of the smallest quantity."—p. 186.

Man cannot Act upon Nature,

Or appropriate her forces to his own use, without having an ultimate acquaintance with her laws.

An equal appreciation of all branches of mathematical, physical and natural sciences, is a special requirement of the present age, in which the material wealth and the growing prosperity of nations are principally based upon a more enlightened employment of the products and forces of nature. The most superficial glance at the present condition of Europe shows that a diminution, or even a total annihilation of national prosperity, must be the award of those States who shrink with slothful indifference from the great struggle of rival nations in the career of the industrial arts. It is with nations as with nature, which, according to a happy expression of Göcthe, "knows no pause in progress and development, and attaches her curse on all inaction." The propagation of an earnest and sound knowledge of science can therefore alone avert the dangers of which I have spoken. Man cannot act upon nature, or appropriate her forces to his own use, without comprehending their full extent, and having an intimate acquaintance with the laws of the physical world. Bacon has said that, in human societies, knowledge is power. Both must rise and sink together. But the knowledge that results from the free action of thought, is at once the delight and the indestructible prerogative of man; and, in forming part of the wealth of mankind, it not unfrequently serves as a substitute for the natural riches, which are but sparingly scattered over the earth. Those States which take no active part in the general industrial movement, in the choice and preparation of natural substances, or in the application of mechanics and chemistry, and among whom this activity is not appreciated by all classes of society, will infallibly see their prosperity diminish in proportion as neighboring countries become strengthened and invigorated under the genial influence of arts and sciences.

As in nobler spheres of thought and sentiment, in philosophy, poetry, and the fine arts, the object at which we aim ought to be an inward one—an ennoblement of the intellect—so ought we likewise, in our pursuit of science, to strive after a knowledge of the laws and the principles of unity that pervade the vital forces of the universe; and it is by such a course that the physical studies may be made subservient to the progress of industry, which is a conquest of mind over matter. By a happy connection of causes and effects, we often see the useful linked to the beautiful and the exalted. The improvement of agriculture in the hands of freemen, and on properties of a moderate extent—the flourishing state of the mechanical arts freed from the trammels of municipal restrictions—the increased impetus imparted to commerce by the multiplied means of contact of nations with each other—are all brilliant results of the intellectual progress of mankind, and of the amelioration of political institutions, in which this progress is reflected. The picture presented by modern history ought to convince those who are tardy in awakening to the truth of the lesson it teaches.

Nor let it be feared, that the marked predilection for the study of Nature, and

for industrial progress, which is characteristic of the present age, should necessarily have a tendency to retard the noble exertions of the intellect in the domains of philosophy, classical history, and antiquity; or to deprive the arts by which life is embellished of the vivifying breath of imagination. Where all the germs of civilization are developed beneath the ægis of free institutions and wise legislation, there is no cause for apprehending that any one branch of knowledge should be cultivated to the prejudice of others. All afford the State, precious fruits, whether they yield nourishment to man and constitute his physical wealth, or whether, more permanent in their nature, they transmit in the works of mind the glory of nations to remotest posterity. The Spartans, notwithstanding their Doric austerity, prayed the gods to grant them "the beautiful with the good."—*Humboldt's Cosmos.*

Curiosities of the Patent Office.

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

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

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

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

From Dr. Dale's examiner's report, we gather some idea of the value of patents. A man who had made a slight improvement in straw-cutters, took a model of his machine through the Western States, and after a tour of eight months, returned with forty thousand dollars. Another man had a machine to thresh and clean grain, which in fifteen months he sold for sixty thousand dollars. These are no ordinary cases—while such inventions as the telegraph, the planing machine, and India rubber patents are worth millions each.

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

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

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

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

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

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

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

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

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

Young America Wonders.

Wonders why mamma keeps Bridget at home from church to work all day, and says it is wicked for me to build my rabbit house on Sunday?

Wonder why our minister bought that pretty cane with the yellow lion's head on the top, and then asked me for my cent to put in the missionary box? Don't I want a jewsharp just as much as he wants a cane?

Wonder what makes pa tell such nice stories to visitors about hiding the master's rattan when he went to school, and about his running away from the schoolmistress when she was going to whip him, and then shut me up all day in a dark room because I tried, just once, to be as smart as he was?

Wonder why mamma tells pa he is cross when he comes home at night and says his tea is weak, and ties a handkerchief over my mouth so that I can neither speak nor breathe because I happen to say she is cross?

Wonder what made pa say that wicked word when Bessy upset the ink all over his papers, and then slapped my ears because I said the same thing when my kite-string broke?

Oh, dear! there are lots of things that I want to know! How I wish I was a man!

Alderney or Jersey Cattle.

A correspondent of the New England *Farmer*, speaking of Mr. Fay's sale of Alderneys, remarks:

A few years ago this breed was introduced into Exeter, N. H., and many half-blooded heifers have been bred from a full blood bull on all sorts of cows. The universal opinion, I think, in that neighborhood, is, that this is the best cross that has ever been tried by the farmers there.

The half-bloods seem to take the hard and more compact form of the dam, with the milking qualities of the breed of the sire. It is remarked that the heifers came in very early, often before they are two years old, that their milk yields far more butter than that of common stock, and that the quantity is also large. I know of none more than four years old in that region, so that the experiment is not yet fully tried. The general characteristics of the breed are, that they are small, somewhat delicate, yielding a fair quantity of milk daily, keeping in milk nearly or quite all the year, surpassing all other breeds in their butter-making qualities. They are not the milkman's cow, because they do not give water enough with their milk, and do not weigh heavy when turned off for beef. Their butter is yellow as gold, and many English dairies keep one Jersey cow to about four others, to give rich color and flavor to their dairy products. So much for the full blood. What the grades may do for us is a question of importance.

I will close with a tolerably good story, of my own experience. I had a calf from an ordinary red cow, by a Jersey bull, dropped April 9th, 1857. She had her first calf, which she picked up in the pasture from a half-bred Jersey bull, April 1st, 1859. She gave a fair quantity of milk through the season, which was not measured or used separately from that of the other cows. She was dry about five weeks, and dropped her second calf about May 31st, 1860. In June, during one week, she made about ten pounds of butter, and we estimated that she made nearly that quantity weekly; then she was sold at auction with my other goods and chattles, on the 28th of July last, when she and her calf brought $61.15. I sold her first calf, at about six months old, for $16. My impression is that it will pay to raise half-blood Jerseys, if this is a fair specimen."

Poverty Not so Great a Curse.

If there is anything in the world that a young man should be more thankful for than another, it is the poverty which necessitates his starting in life under very great disadvantages. Poverty is one of the best tests of human quality in existence. A triumph over it is like graduating with honor from West Point. It demonstrates stuff and stamina. It is a certificate of worthy labor, creditably performed. A young man who cannot stand the test, is not worth anything. He can never rise above a drudge or a pauper. A young man who cannot feel

his will harden, as the yoke of poverty presses upon him, and his pluck rise with every difficulty poverty throws in his way, may as well retire into some corner and hide himself. Poverty saves a thousand times more men than it ruins; for it only ruins those who are not particularly worth saving, while it saves multitudes of those whom wealth would have ruined. If any young man who reads this, is so unfortunate as to be rich, I give him my pity. I pity you, my rich young friend, because you are in danger. You lack one stimulus to effort and excellence, which your poor companion possesses. You will be very apt, if you have a soft spot in your head, to think yourself above him, and that sort of thing makes you mean, and injures you. With full pockets and full stomach, and fine linen and broadcloth on your back, your heart and soul plethoric, in the race of your life you will find yourself surpassed by all the poor boys around you, before you know it.

No, my boy, if you are poor, thank God and take courage; for He intends to give you a chance to make something of yourself. If you had plenty of money, ten chances to one it would spoil you for all useful purposes. Do you lack education? Have you been cut short in the text book? Remember that education, like some other things, does not consist in the multitude of things a man possesses. What can you do? That is the question that settles the business for you. Do you know your business? Do you know men, and how to deal with them? Has your mind, by any means whatsoever, received that discipline which gives to its action power and faculty? If so, then you are more of a man, and a thousand times better educated than the fellow who graduates from college, with his brains full of stuff that he cannot apply to the practical business of life—stuff, the acquisition of which has been in no sense a disciplinary process as far as he is concerned. There are very few men in this world less than thirty years of age, unmarried, who can afford to be rich. One of the greatest benefits to be reaped from great financial disasters, is the saving a large crop of young men.—*Timothy Titcomb.*

A True Woman.

When a man of sense comes to marry, it is a companion he wants, not an artist. It is not merely a creature who can paint and play, sing and dance; it is a being who can comfort and counsel him—one who can reason and reflect, and feel and judge, and discourse and discriminate—one who can assist him in his affairs, lighten his sorrows, purify his joys, strengthen his principles and educate his children. Such is the woman who is fit for a mother and the mistress of a family. A woman of the former description may occasionally figure in the drawing-room and attract the attention of the company; but she is entirely unfit for a helpmate to a man, or to train up a child in the way he should go.—*Maine Farmer.*

The best way to humble a proud man is to take no notice of him.

The Trust Providentially Committed to the South in Relation to the Institution of Slavery.

[On the occasion of a public thanksgiving appointed by the Chief Magistrate of Louisiana, for the 29th of November last, the Rev. B. M. Palmer, D. D., delivered a sermon to the people of his pastoral charge on the existing crisis in our public affairs, from which we make the following extract in relation to the obligations of the South, to conserve the trust providentially committed to them, "and to perpetuate the institution of Slavery as now existing," &c. As his views are striking, able, and somewhat original, we have thought it would prove acceptable and instructive to our readers who are slaveholders, and who, of course, are anxious to know the nature of the obligations they are under in their relations to this institution that we should lay that part of the sermon before them.]—Ed.

Extract.—It is my purpose,—not as your organ, compromiting you, whose opinions are for the most part unknown to me, but on my sole responsibility,—to speak upon the one question of the day; and to state the duty which, as I believe, patriotism and religion alike require of us all. I shall aim to speak with a moderation of tone and feeling almost judicial, well befitting the sanctities of the place and the solemnities of the judgment day.

In determining our duty in this emergency, it is necessary that we should first ascertain the nature of the trust providentially committed to us. A nation often has a character as well defined and intense as that of the individual. This depends, of course, upon a variety of causes operating through a long period of time. It is due largely to the original traits which distinguish the stock from which it springs, and to the providential training which has formed its education. But, however derived, this individuality of character alone makes any people truly historic, competent to work out its specific mission, and to become a factor in the world's progress. The particular trust assigned to such a people becomes the pledge of Divine protection, and their fidelity to it determines the fate by which it is finally overtaken. What that trust is must be ascertained from the necessities of their position, the institutions which are the outgrowth of their principles and the conflicts through which they preserve their identity and independence. If, then, the South is such a people, what, at this juncture, is their providential trust? I answer, that it is to *conserve and to perpetuate the institution of domestic slavery as now existing.* It is not necessary here to inquire whether this is precisely the best relation in which the hewer of wood and drawer of water can stand to his employer; although this proposition may perhaps be successfully sustained by those who choose to defend it. Still less are we required, dogmatically, to affirm that it will subsist through all time. Baffled as our wisdom may now be, in finding a solution of this intricate social problem, it would nevertheless be the height of arrogance to predict what changes may or may not occur in the distant future. In the grand march of events, Providence may work out a solution undiscoverable by us. What modification of soil and climate may hereafter be produced, what consequent changes in the products on

which we depend, what political revolutions may occur among the races which are now enacting the great drama of history; all such inquiries are totally irrelevant, because no prophetic vision can pierce the darkness of the future. If this question should ever arise, the generation to whom it is remitted will doubtless have the wisdom to meet it, and Providence will furnish the lights in which it is to be resolved. All that we claim for them and for ourselves is liberty to work out this problem, guided by nature and God, without obtrusive interference from abroad. These great questions of providence and history must have free scope for their solution; and the race whose fortunes are distinctly implicated in the same is alone authorized, as it is alone competent to determine them. It is just this impertinence of human legislation, setting bounds to what God only can regulate, that the South is called this day to resent and resist. The country is convulsed simply because "the throne of iniquity frameth mischief by a law." Without, therefore, determining the question of duty for future generations I simply say, that for us, as now situated, the duty is plain of conserving and transmitting the system of slavery, with the freest scope for its natural development and extension. Let us, my brethren, look our duty in the face. With this institution assigned to our keeping, what reply shall we make to those who say that its days are numbered? My own conviction is, that we should at once lift ourselves, intelligently, to the highest moral ground and proclaim to all the world that we hold this trust from God, and in its occupancy we are prepared to stand or fall as God may appoint. If the critical moment has arrived at which the great issue is joined, let us say that, in the sight of all perils, we will stand by our trust: and God be with the right!

The argument which enforces the solemnity of this providential trust is simple and condensed. It is bound upon us, then, by the *principle of self-preservation*, that "first law" which is continually asserting its supremacy over others. Need I pause to show how this system of servitude underlies and supports our material interests? That our wealth consists in our lands and in the serfs who till them? That from the nature of our products they can only be cultivated by labor which must be controlled in order to be certain? That any other than a tropical race must faint and wither beneath a tropical sun? Need I pause to show how this system is interwoven with our entire social fabric? That these slaves form parts of our households, even as our children; and that, too, through a relationship recognized and sanctioned in the Scriptures of God even as the other? Must I pause to show how it has fashioned our modes of life, and determined all our habits of thought and feeling, and moulded the very type of our civilization? How, then, can the hand of violence be laid upon it without involving our existence? The so-called free States of this country are working out the social problem under conditions peculiar to themselves. These conditions are sufficiently hard, and their success is too uncertain, to excite in us the least jealousy of their lot. With a teeming population, which the soil cannot support—with their wealth depending upon arts, created by artificial wants—with an eternal friction

between the grades of their society—with their labor and their capital grinding against each other like the upper and nether mill-stones—with labor cheapened and displaced by new mechanical inventions, bursting more asunder the bonds of brotherhood; amid these intricate perils we have ever given them our sympathy and our prayers, and have never sought to weaken the foundations of their social order. God grant them complete success in the solution of all their perplexities! We, too, have our responsibilities and our trials; but they are all bound up in this one institution, which has been the object of such unrighteous assault through five and twenty years. If we are true to ourselves, we shall, at this critical juncture, stand by it and work out our destiny.

This duty is bound upon us again *as the constituted guardians of the slaves themselves.* Our lot is not more implicated in theirs, than is their lot in ours; in our mutual relations we survive or perish together. The worst foes of the black race are those who have intermeddled on their behalf. We know better than others that every attribute of their character fits them for dependence and servitude. By nature the most affectionate and loyal of all races beneath the sun, they are also the most helpless; and no calamity can befall them greater than the loss of that protection they enjoy under this patriarchal system. Indeed the experiment has been grandly tried of precipitating them upon freedom which they know not how to enjoy; and the dismal results are before us in statistics that astonish the world. With the fairest portions of the earth in their possession, and with the advantage of a long discipline as cultivators of the soil, their constitutional indolence has converted the most beautiful islands of the sea into a howling waste. It is not too much to say that if the South should, at this moment, surrender every slave, the wisdom of the entire world, united in solemn council, could not solve the question of their disposal. Their transportion to Africa, even if it were feasible, would be but the most refined cruelty; they must perish with starvation before they could have time to relapse into their primitive barbarism. Their presence here, in the presence of the vigorous Saxon race, would be but the signal for their rapid extermination before they had time to waste away through listlessness, filth and vice. Freedom would be their doom; and equally from both they call upon us, their providential guardians, to be protected. I know this argument will be scoffed abroad as the hypocritical cover thrown over our own cupidity and selfishness; but every Southern master knows its truth and feels its power. My servant, whether born in my house or bought with my money, stands to me in the relation of a child. Though providentially owing me service, which, providentially, I am bound to exact, he is, nevertheless, my brother and my friend; and I am to him a guardian and a father. He leans upon me for protection, for counsel, and for blessing; and so long as the relation continues no power, but the power of Almighty God, shall come between him and me. Were there no argument but this, it binds upon us the providential duty of preserving the relation that we may save him from a doom worse than death.

It is a duty which we owe, further, *to the civilized world.* It is a remarkable

fact that, during these thirty years of unceasing warfare against slavery, and while a lying spirit has inflamed the world against us, that world has grown more and more dependent upon it for sustenance and wealth. Every tyro knows that all branches of industry fall back upon the soil. We must come, every one of us, to the bosom of this great mother for nourishment. In the happy partnership which has grown up in providence between the tribes of this confederacy, our industry has been concentrated upon agriculture. To the North we have cheerfully resigned all the profits arising from manufacture and commerce. Those profits they have, for the most part, fairly earned, and we have never begrudged them. We have sent them our sugar and bought it back when refined; we have sent them our cotton and bought it back when spun into thread or woven into cloth. Almost every article we use, from the shoe-latchet to the most elaborate article of luxury, they have made and we have bought; and both sections have thriven by the partnership as no people ever thrived before since the first shining of the sun. So literally true are the words of the text, addressed by Obadiah to Edom, "All the men of our confederacy, the men that were at peace with us, have eaten our bread at the very time they have deceived and laid a wound under us." Even beyond this, the enriching commerce which has built the splendid cities and marble palaces of England as well as of America, has been largely established upon the products of our soil; and the blooms upon Southern fields, gathered by black hands, have fed the spindles and looms of Manchester and Birmingham not less than of Lawrence and Lowell. Strike now a blow at this system of labor and the world itself totters at the stroke. Shall we permit that blow to fall? Do we not owe it to civilized man to stand in the breach and stay the uplifted arm? If the blind Samson lays hold of the pillars which support the arch of the world's industry, how many more will be buried beneath its ruins than the lords of the Philistines? "Who knoweth whether we are not come to the kingdom for such a time as this?"

EASY AND SAFE METHOD OF REMOVING GREASE SPOTS FROM WOOLEN.—Fuller's earth, or tobacco pipe-clay, being first wet, on an oil spot, absorbs the oil as the water evaporates, and leaves the animal or vegetable fibres of the cloth clean, on being beaten or brushed well. When the spot is caused by tallow or wax, it is necessary to treat the part cautiously by an iron on the fire, while the cloth is drying. In some kinds of goods, bran or raw starch may be used to advantage.

HORACE MANN says: "To put your children on a short allowance of fresh air, is as foolish as it would have been for Noah, during the deluge, to put his family on a short allowance of water. Since God has poured out an hemisphere fifty miles deep, it is enough to make a miser weep to see children stinted in breath."

For the Southern Planter.

Guano and Fertilizers on Corn, &c.

MESSRS. EDITORS:—While travelling through the State during the past year, I have gained the following information in relation to the use of Guano and Fertilizers on corn, &c.:

An intelligent gentleman, in Spotsylvania county, told me that a spoon full of guano to the hill, on their lands, gave corn a quick start and enabled them to make good corn on land that would not pay for cultivation without it. While passing through that section I halted to ask a stranger about the roads, &c., and asked how such land, as then surrounded us, produced. Oh, says he, we could not make bread in this country if it were not for guano. I was shown corn that had been treated with a small quantity to the hill, which promised well, it then being about three feet in height. One of the largest users of guano, of different sorts, in all Eastern Virginia that I met with, (and I met with some persons who used from ten to eighty and ninety odd tons per year,) told me guano paid as well, if not better, on corn than on any other crop, and that, for the future, he should grow large crops of corn with guano, and aim at very small crops of wheat. I met with persons who had used No. 1 Peruvian Guano and Fowle & Co.'s Phosphated Guano, with satisfactory results, on wheat and tobacco. In the Valley of Virginia I spent a night with an intelligent gentleman, who told me he had used a good phosphate of lime at the rate of 175 lbs. per acre, as nearly as he could come at it, in the hill and broadcast, and that he had the corn carefully measured, and the increase over the corn without phosphate was three barrels (15 bushels) per acre—and the broad-casted portion measured rather the most. A gentleman in Frederick county used No. 1 Peruvian Guano and Fowle & Co.'s Phosphated Guano of equal quantities on his corn last spring, he was equally satisfied with the effect from each, and ordered five tons of Fowle & Co.'s Phosphated Guano for his wheat crop last fall, being $8 or $10 the cheapest. I saw a field of corn myself that had had about half a gill of Fowle & Co.'s Phosphated Guano applied to the hill after it was eight or ten inches above the ground. It was sprinkled on and around the hill for a foot,—it killed fully half the blades, there being little or no rain for five weeks; but in the fall, the rows so treated were easily distinguished, being better in every respect. I saw oats to which the same had been applied at the rate of 75 pounds per acre, as nearly as it could be come at; the effect was very marked over that on each side of it. I met with persons who thought it wonderful, how bones enough could be had to manufacture so much phosphate of lime. They fell upon the plan of soaking and washing a pan full to satisfy themselves, as well as they could, what proportion would dissolve in the soil. The result was, that they found a fair proportion of it would not dissolve in water, and they were at a loss what to call that part, and finally concluded it was nice sand, designed to glaze well the stalks of corn and wheat. I witnessed an experiment myself of the sort about three years since, and what we could not dissolve in water we concluded was stone-coal—

charcoal and possibly stone-coal ashes, we could not exactly tell. Notwithstanding these experiments, a large proportion of the phosphates produced good results last season—J. J. & F. Turners, especially. I advise every farmer to test any manure he may purchase to his own satisfaction, with water, and if he finds *sand* or *stone-coal* in it, not to use it.

A few years since a friend of mine and myself used largely of a phosphate that did us no more good than if it had been all sand, while others near by made fine crops with an article with the same stamp on it. I believe the lot I got was stone-coal ashes, dashed with charcoal and sand, and then powdered with guano. I saw a crop of wheat, in June last, that had been drilled in on sandy land. There was a good road through the field dividing it into two parts; the owner requested me to view it, remarking that one side had 60 lbs. of No. 1 Peruvian Guano put in with the wheat, and the other had 60 lbs. of Fowle & Co.'s Phosphated Guano to the acre. I thought the field would average 18 or 20 bushels per acre. He asked me to say which was the best. The wheat was then ripening. I told him the part with Fowle & Co.'s guano I thought was the best; he replied, I am of the same opinion.

If this statement, in your opinion, will do you, the farmers, or the manufacturers of fertilizers any good, you are at liberty to publish it, with my name attached. I. I. HITE.

P. S.—I neglected to state that I met with an experienced farmer from Louisa county, who contended guano had proven an injury to his land, but said plaster improved it rapidly. As an offset to this, a gentleman in Frederick county told me he had put $25 worth of ground bones per acre, on two acres, and 200 lbs. of guano per acre along side of it, and that the guanoed portion showed as much improvement as that with $25 worth of bones per acre. He also stated he had used guano for six or seven years, and his land improved all the time—that he had galls now covered with grass that were always naked until he commenced the use of guano. He also stated, guano brought in late varieties of wheat so as to be harvested as early as early varieties could be without it. This he said was a great recommendation to guano, as our late varieties of wheat, when they can mature without rust or blight, invariably produce the most per acre.

I. I. H.

[*For the Southern Planter.*

Three days in Chester County, Pa.

Allow me instead of another Essay on Improved Farming, to offer you some account of the real thing itself, as lately seen on a short visit to this famous farming region.

The soil of Chester and Delaware counties—except just along the Delaware river—is quite rolling and even hilly, much like our Albemarle lands, but not so red and with decidedly more sand. In old times the exhausting effects of rude cultivation were almost destructive; and tradition says, the

first efforts at improvement were accompanied by the introduction of clover and plaster. These, with their great attention to manures, grasses, &c., stimulated by ready access to market, have carried them rather ahead of any locality I have seen. In reaching and passing through this region, one is delighted with the scenery no less than the fertility—but scarcely hoping to convey any adequate impression I must come to particulars.

1*st day*. This was devoted chiefly to reviewing a farm of 300 acres which I had visited just 33 years ago. It was then, I thought, the most highly cultivated and improved I had seen—belonging to Mr. Abram Starpless—now to his son of the same name. What first struck me on approaching the neat and substantial stone house was, the see the hill which it crowns all covered with the richest growth of trees, chiefly evergreens of several choice kinds—planted almost entirely by the present owner—a boy when I was there before. This lesson should not be lost on us. The comfort, as well as ornament of such a grove is readily appreciated when seen—but how few of us begin in time to enjoy it. Then the grass! not only on this lawn and in favored lots, but literally over the whole surface of the farm, excepting, of course, that in actual crop. To give some idea of their estimate of good grass, I may state, that some of these fields which I saw in clover and timothy 33 years ago, have never had a plow in them since. They are now covered with green sward like the corners of fences in our best fields; and the cattle in grazing, rather avoid the most luxuriant parts. An Englishman lately in walking over these fields stamped his foot on the turf and said, "I have seen no better grass in England than this!"

Their usual rotation is simple—corn, oats, and wheat, chiefly Mediterranean—then 5 to 7 years in grass.

With farms of from 100 to 300 acres, and from 7 to 10 fields, they cultivate thoroughly, manure highly and raise good crops, though not much better than our good ones—but their grass is quite another thing. The clover heads in the first crop seem packed together, and after a year or two the Timothy is immense. After several years cutting for hay, it is then devoted to pasture. They get from two to three tons of hay per acre through the field—high land and low land.

Their farm buildings are most capacious and substantial. The barn is usually of stone, on a hill side, with a mound or bridge for loaded wagons to drive into a passage in the second story, with immense hay mows on either side, stable room underneath for horses, cows and fattening cattle. The spring-house too, with its floors covered with water and filled with vessels of milk, is well worthy of notice. The churning by horse power is the usual custom.

The superior fat cattle—they work oxen—such as I may have seen at a fair, but never on a farm before; the improved farming implements and various other objects of interest, made my visit very satisfactory.

The 2nd day being Sunday, I attended a well filled village church. Its history—as indeed that of most churches—was full of interest; what would our country be without them? The only strange thing to me was, amongst the chil-

dred baptized, to hear one named John Fremont! Out of our latitude decidedly. It reminded me of some I had known called Aaron Burr, and of others called after some French apostles of Liberty—such liberty as proved a curse instead of a blessing, or as a statesman once said, "suicidal to themselves and others."

The 3rd day I saw several choice specimens of farming, beginning with one of about a mile square under a thorough English manager with a salary of $700 to $750. He says that when a youth he left his father and other good farmers making 30 bushels of wheat to the acre; but in a late visit there, he found them raising 60 bushels.

This, though not entirely new to me, I never could realize so fully, till in my own harvest I observed a spot which looked as if you had gathered both armsfull and drawn them together till the straws almost touched. This was where a brush pile had been burned in fallowing the field, and gave me some idea of a 60 bushel crop. The English farmer does his part well—at least so that I saw no fault. His management of some freshly cleared ground was peculiar. After cutting a heavy growth of timber from a rich flat, he ditched the springy places, and filled up other low parts so that the water could drain off, and by grazing and the briar blade kept down the sprouts and weeds till it formed a natural turf. This is often practised as you go North. He used Atkin's Raking Reaper, and Ketchman's Mower; but they prefer Manny's machine if one only is kept for both purposes.

My friend, who was kindly taking me around to see these farms, and who had been with us in Virginia many years ago, had pressed me very hard to know why we could not manure ALL our lands as they did, and to my surprise asked me to state our system of farming as I had done before to him. This in few words I did. We put our land in corn, then wheat with guano, sowing clover and plaster: fallow the first or second year for wheat, and then let the grass stand as long as we could, plastering fully and helping thinner places by covering with straw and coarse manure—grazing very little and that on the older grass---the finer manure used chiefly for tobacco.

The Englishman said, "he did not see how we could do better in our circumstances." My friend then said, "if John Bennington says so, I give it up."

Our next visit was to Mr. Caleb Bunton, whose house stands on a height overlooking the Brandywine. The approach is on a broad ridge through a superb lawn of perfect green sward, ornamented by some fine Southdowns and a few choice cattle. His pasture land is in the low grounds extending to Chadds' ford, and has been unbroken, so far as he knows. I saw a lot of cattle just purchased at $52 dollars round, on which he expected to make $30 each by letting them run there till November. The beauty of this place is striking. After dining at my friend's house, who has a nice farm and the best water ram I have seen, we visited their model farmer, Mr. John Starpless. His father was to them what Mr. John Rogers was to us; and after being improved for 70 years by father and son, it is indeed a pattern farm. In showing me his cornfield—the

best of course—my eye was attracted by one adjoining in the first year's grass, and I asked him the history of that. He said, when he put that in wheat, he had so much use for his manure nearer the barn, that he guanoed this, 500 lbs. to the acre, and sold from the 20 acres 800 bushels of wheat! I saw his cows—about 40—each with brass knobs on their horns, and driven in and out with the help of a shepherd's dog. They yield about 250 lbs, of butter per week, and fatten on the butter-milk I dont know how many Chester County pigs. Here is where they come from. His farm of about 400 acres brings him in about $7,000 per annum; he is still buying land. One of his lots having a remarkable turf of green sward neither he nor his father had ever broken up. Our friend Barbour, in his eloquent phrase, sets us a task to perform, "to improve our lands till gulleys should be traditional, and broomstraw be reckoned a fabulous growth."

This task has been here accomplished—for in this day's ride of 20 miles, I did not see a gully, nor could I make them understand what broomstraw was.

For the Southern Planter.

TRANQUILLA, Madison Co., January 5th, 1861.

Gentlemen:—I want some information in regard to building a Tobacco House to cure from eight to ten hogsheads of Tobacco—can you inform me what size house it will take, and the best manner of putting it up? Any information with regard to this matter will be thankfully received by a subscriber to your most valuable paper. If you can give the desired information, be good enough to give it in the January number, as I want to go on with the building.

Yours very respectfully, A SUBSCRIBER.

One house is too large for the purposes of holding this quantity of Tobacco, because there is always some risk of *fire*. More than one house will be necessary.

NOTE.—The above letter was received too late for insertion in our January number; since its receipt we have requested a friend—whose tobacco houses we think are the best we have ever seen—to furnish us with his plans and estimates for publication. He promised to comply with our request, and hand them in in time for insertion in the present number, but failed to do so. We will see to it ourselves that they shall appear in our next issue. If any of our subscribers will furnish us with plans of good and suitable buildings for the purposes mentioned in the above letter, we will cheerfully give them place in our publication.

When Aristotle was asked what were the advantages of learning, he replied: "It is an ornament to a man in prosperity, and a refuge in adversity."

As the world grows more polite it grows more hypocritical. Truth is not always palatable, and it is so easy to varnish it over with a little of that compound which society calls "good breeding."

Solitude and society are the two great magnets which attract mankind, and both have exclusive claims to merit, and both have their votaries.

Editor's Department.

Horticulture.

In order to keep our readers in mind, that the Planter is a journal devoted to Hortieulture as well as Agriculture, and because this is the season to put in practice any suggestions that we may make upon the subjeet, we propose to devote a small space to the discussion of horticultural matters.

In what we have to say on this subject, it is not our design, at this time, to enter into the practieal details of gardening, fruit growing, &c.; our aim will be to show their importance, and to urge upon our readers the propriety of giving them more attention than they ordinarily receive. Every farm has its garden, and most farms of any pretension at all, have their orchards; but how few of these farms or gardens are what they should to be; how few of either, even on well eultivated farms, bear the same marks of eare and attention that the farm does, or that their importanee demands. Certain vegetables and fruits—the great staples, if we may so express ourselves—are, it is true, always produced in sufficient quantity for home consumption; but how few farmers gardens are capable of supplying the family with a constant suecession of the finest fruits and vegetables, from early spring until its return, sueh as we see displayed in our city markets. Now, if it were a difficult matter for the farmer to make a provision, which all must admit is calculated to add so much to the eomfort, pleasure, and even health of the family, we should be content to say but little on the subject; but when we know how easy it would be for the great majority of our readers to enjoy, in perfection, the eomfort and luxury of both the garden, and orchard, we feel that we are doing good serviee in ealling attention to it.

To those who, having an indifferent vegetable garden, and yet are desirous of knowing how they may have a constant sueeession of the finest vegetables, we would say, get sueh a work as Buist's Kitchen Garden and go to work without delay; prepare your ground, proeure good seed—the best of its kind—plant, and eultivate, and our word for it, you will thank us for our suggestions.

But while we would thus urge attention to the kitchen garden, we would, with still greater earnestness, counsel the eultivation of fruit. Only those who enjoy the luxury of good fruit, from the first dish of strawberries and eream in May, until the disappearance of the last of the apples the following spring, ean thoroughly appreciate the importance of giving some attention to the fruit garden and the orchard. Plants and young trees of the very best varieties, and suited to our climate, ean be had from reliable nurserymen all over the country, and at sueh priees, that their expense ean be no argument against their eultiva-

tion, even among farmers of the most limited means. A small bed of say 200 strawberry plants, such as Hovey's or Wilson's seedlings, properly taken care of, will, in the second year after planting, afford as many fine large strawberries as a common sized family can possibly consume; from 50 to 100 raspberry bushes, such as the Red Antwerp, will in the same time yield an equally abundant supply of raspberries. A few grape vines properly selected and cared for, will soon reward the grower with an abundance of luscious grapes; and so will peaches, pears—dwarf pears—cherries, plums, &c.; while a small orchard of well-selected apples, standard pears, &c.. would leave nothing to be desired.

In this connection we would most cordially recommend Barry's Fruit Garden, wherein the processes of propagating, cultivating, and preserving fruit trees, &c., &c., are fully discussed, and where all who are interested in such matters, may learn with how little trouble or outlay, a constant supply of delicious fruit may be secured.

There is another argument in favor of fruit growing—we will only detain our readers long enough to advert to it; the ease, rapidity, and certainty with which now the most delicate fruits may be transported from distant points to our large cities, makes the growing of certain kinds of fruit a matter of great pecuniary importance, and an orchard of well selected trees frequently becomes by far the most profitable portion of the farm. At this moment, a barrel of good apples is worth almost as much in Richmond, as a barrel of flour—and as to pears, why they cant be had at any price.

Farm Arrangement.

We have several times had occasion to express our views of the importance of a radical change in some of our farming customs, particularly as regards manuring in such quantities as will greatly increase the crop on a given surface. Labor has commanded such prices, for several years past, that he must be a good manager indeed, who after hiring a few hands on his farm, and receiving our current rates for produce, can make buckle and tonguc meet at the end of the year.

Good management requires something more to explain it than the mere act of doing well some of the most necessary and important services of the farm, such as plowing, &c. There must be a systematic arrangement of the work to be done—that each job of work may have its own hour, or day, as the case may require. By the exercise of this forecaste, all confusion is avoided; and if a man chooses to take the trouble, he can know weeks and months ahead what ought to be done on his farm, how long it will take to do it, and *when* he has a better right to expect a few days of limited employment during some month or other, for reasons more tangible than the uncertainties of the weather.

Every farmer should have a list of work to be done, and as each item of it is accomplished, let it be marked off. This list should be carefully revised, for the

purpose of classifying the different jobs, that some may be postponed to a more convenient season, others getting that precedence of attention which their importance demand.

Perhaps the best winter arrangement a farmer can make, is to get ready during the cold and inclement months every implement which will be needed during the year. See first, that every wagon and cart is in perfect order for hauling out the manures which have accumulated about the stables and barn yards. Having these properly cared for, have every part of the plantation harness overhauled, repaired, *and fitted snugly to the animal which is expected to work in it.* If this is not done, in all probability the farmer who neglects it, will have a parcel of teams more dead than alive—with shoulders galled, backs skinned, and mouths badly cut. Apart from the positive loss which must accrue to every man who owns stock who are thus maltreated, we think he is justly liable to censure for such gross carelessness, on the score of proper humanity.

With the present number of labor saving machines, (i. e., machines which substitute the labor of horses and mules for that of men), on most of our farms, it is absolutely necessary that our Teams should emerge from Winter Quarters fat, strong and healthy, since they are likely to have little rest until winter sets in again.

To secure for them proper condition to stand *hard* work, they should be *well fed* and *thoroughly groomed*, besides having a warm comfortable stable all winter, since they cannot take on fat, if they are allowed to suffer with cold, because the amount of food they consume will be required to furnish them with animal heat. Without a good team, all the operations of the farm must be badly conducted: therefore, we would advise every farmer to rid himself of every indifferent animal he possesses.

The next thing in order, is to overhaul all the ploughs, cultivators, &c. Put on points and landsides to the former and strengthen and renew handles and rounds. Harrows and cultivators should have their teeth sharpened, any missing teeth replaced and wedged up tightly and thoroughly. A full sett of swingletrees should be made for each and all of them, and properly secured to them by lap links, so that all of these implements may be started into the field at any day, upon half an hour's notice. The man who neglects to take these precautions, will certainly lose much valuable time, which he cannot overtake, and instead of pushing his work, will find throughout the year that his work is sorely pushing him, thereby subjecting him to grievous discomfort and annoyance.

The first genial weather of Spring more properly belong to "seed time," than to a period of the year when a farmer can afford to wait for any thing or any body, for even a short while. "Everything is to do," and we all want to make good headway as soon as the frost is out of the ground. It is important, therefore, that all the farm "fixing up" should be gotten through with before our busy season sets in. Winter work is usually not very abundant with the mechanics who do our repairing, and they have time enough to turn out for us "a

good job," which we are by no means sure of getting later in the season, when work pours into their shops, and is always wanted directly.

From the time March sits in (to say nothing of January and February) until Christmas arrives, there is plenty of work for the farmer,

"To plow and to hoe,
To reap and to mow;

And there is no time for anything but the regular work.

Another hint as to the preparation for Spring work and we have done. Mark out a plan of your farm in such a manner that your overseer and yourself will understand the drawing, and it does not matter if no one else does. Lay off on your plat all your fields and patches, and write on each field represented, the crop it has now on it, or that you expect to sow on it, and also mark down any job of work which is particularly wanting there—grubbing, or draining, for instance, or manures of certain kinds which you expect to apply at some future time.

A plat of this sort will be a mutual benefit to the farmer and overseer, as it enables the latter to understand the plans for the year, and serves as a memorandum of jobs which can be executed at leisure times, if any such occur.

Just as we were finishing up the last "form" of our present No. of the Planter, the mail brought us the interesting account of a visit of our friend Dr. Meriwether to Chester Co., Pa. We congratulate our readers that it is in time for their perusal in this issue.

We think the rule of the H. and C. Club, applying to visiting members, a good one, and wish that all farmers would consider themselves under a like obligation whenever they travel. Were this the case, we should have much information and amusement afforded us, which we now loose, besides an occasional spur given us to tempt us to try and overtake some enterprising and strong thinking brother farmer.

If all men are "imitation animals," it is well for us to have a plenty of good examples to look at occasionally.

The farm accounts offered by Mr. T. J. Randolph, Jr., which were kindly sent us also by the Club, came to hand at an opportune season, and will appear in our next issue. The "old fashioned farmers" of Virginia must wake up, and put a new spoke in their wheels. We must all know what we are doing—and we cannot know this *without farm accounts*—or soon we shall find our occupation, or at least its profits, gone.

Let us turn over a new leaf for 1861, and see if we cannot better our condition by a fresh stock of caution and industry, with a keen glance *at the papers sometimes—once a month at all events.*

☞ Persons wishing to forward packages to Major Wm. Gilham, containing substances for analysis, are invited to leave them at this office. Such packages should be small, and need not contain more than a few ounces.

Fruit Trees.

We tender our grateful acknowledgments to *George W. Johnson, Esq., of Milton, N. C.*, for a very acceptable present of choice fruit trees. We wish every nurseryman of our acquaintance could have had a look at the bundle, which was so neatly and thoroughly put up as to afford them a sample worthy of general imitation, if so be any of these gentlemen *should prove* at any time, either unskilful or negligent in their manner of securing trees for shipment.

We shall take great pains in setting out these trees, and in their after culture. We hope we shall yet have the pleasure of eating some of their fruits in company with Mr. Johnson, at our own home.

The Hog Premiums of our late Fair.

A subscriber calls our attention to a report of the Committee on Swine, at the exhibition held last fall in this city, under the joint auspices of the Virginia State and Central Agricultural Societies, which he has seen published in *The American Farmer as a copy of a report published in this paper.* The only premium for swine which we did publish, was one for the best pen of fat hogs. The premiums on other classes were submitted to the Executive Committees of the two Societies for final settlement, and they have as yet made no report.

We suspect our neighbors of the *American Farmer* got the report alluded to from one of our daily city papers, probably the *Dispatch*, and the printers (as we know they are very apt to do) made a mistake in crediting copy.

By the way, the show of good swine at our Fair was the very best we ever saw, and it is a hard task to decide the premiums in any class of animals where the competition is as spirited as it was in several classes of animals exhibited at that time.

Pennsylvania Farm School.

We are under many obligations to Evan Pugh, Esq., of this Institution, for some interesting agricultural pamphlets, extracts from which we propose to lay before our readers in our next number.

We are glad to learn that this school has reason to expect a liberal patronage, and hope it may certainly receive it.

For the Southern Planter.

Inquiries.

Those who have experimented with the Drill putting in fertilizer and wheat at the same time, and can speak for or against the use of the Drill, in comparison with broad-casting the same quantity of fertilizer per acre, will oblige many farmers, who want information, by giving their opinions, based on experience, through the columns of the *Planter*.

If there be any farmers in the State who have used a Subsoil Plow for five or more years in succession, and who uses clover and plaster as improvers, they will oblige a number of inexperienced farmers by giving their opinions, after long experience, through the columns of the *Planter*.

Information is wanted among wheat growers as to the success of Manny's combined Reaper and Mower as a self-raker the past season. A FARMER.