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THE SOUTHERN PLANTER AND FARMER

DEVOTED TO

Agriculture, Horticulture, and the Mining, Mechanic and Household Arts.

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

CH. B. WILLIAMS, ED. & PRO'R. | JNO. M. ALLAN, HORT'L EDITOR.
FRANK G. RUFFIN, CO-EDITOR. | WM. L HILL, GEN'L AGENT.

New Series. RICHMOND, VA., NOVEMBER 1869. Vol. III.---No. 11.

CONTENTS:

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Dr. Voelcker's Chemical Investigations in 1868.

In a lecture delivered by Dr. Voelcker, in May last, at the rooms of the Royal Agricultural Society of England, we find reported some remarkable results of field experiments instituted at his instance, and especially interesting in regard to nitrogenous manures applied to clover, and the value of clover fallow as the best preparation for wheat. We submit them to the careful study of our readers, and commend them to their early attention:

"Let me give you a brief account of some of the field experiments which have been carried on for a number of years, chiefly by former pupils of mine, who are now members of a club which may be called the field club of the Royal Agricultural College, at Cirencester. That is a club in the proceedings of which I take much interest; because, as I have intimated, it includes many of my former pupils, men who are rising in the agricultural world, and who are willing and qualified to make trustworthy and useful practical field experiments. Now I would refer especially to a series of experiments of clover seeds and on clover, some of the results of which were published in the last part of the *Journal of the Royal Agricultural Society of England.* Without wearying you with many details, I would allude to a series of experiments carried out in the years

1867–68, at Escrick Park Home Farm, near York, by my friend and former colleague, Mr. Coleman.* In all my field experiments, I may remark, the same manuring substances, or their mixtures, were employed in the several localities in which the experiments were tried. They were the following: Nitrate of soda, sulphate of ammonia, mineral superphosphate, common salt, muriate of potash, sulphate of potash, and sulphate of lime. I am always careful to have two plots on which no manure is used. In preceding years I tried these various substances upon heavy soils; one of the objects which I had especially in view being to ascertain under what circumstances the artificial supply of potash was attended with practical benefit to the farmer. Speaking generally, I may say, the result was not favorable to the artificial supply of potash on most of the heavy soils. In the majority of cases the increase of produce was not sufficiently striking to repay the greater portion of the outlay attending the purchase of potash manure: while in many instances I could see no beneficial effect whatever resulting from the application of potash manures to heavy land. Now, if we look at the chemical composition of clays of a better description, we shall find that most of them abound in silicate of potash, and under the decomposing influence of atmospheric action they readily yield soluble potash. Indeed, in some of the experiments, the results of which I published some time back in the *Journal*, on the effect of water passing through the soil, it appeared that some kinds of liquid manure—very dilute, liquid manure, containing but little potash—in passing through clay soils, actually became charged with potash, the drainage waters possessing more potash than the liquid manure contained in its natural condition. This shows clearly that on certain clay soils the application of potash manure is not desirable. I here allude more especially to such soils as the excellent one—I use the word "excellent" in a purely chemical point of view—of Mr. Mechi's farm at Tiptree. Mr. Mechi had to deal with a very unproductive clay soil; but as it is full of mineral matters, he found the more he worked his land the better became his crops. In his case there was actually more potash removed from the land by passing the tank liquid through the soil than was contained in that liquid itself. Here we have a ready explanation of the fact, that in good clay soils an artificial supply of potash is not attended with any benefit to the person using it. I have, therefore, been anxious during the last year or two to try experiments, mainly in light soils,

* See October No. *Southern Planter and Farmer*, page 577.

and a capital opportunity was afforded for this purpose in the case of the extremely poor soil of the Home Farm, belonging to Lord Wenlock. I gave the analysis of this soil in the *Journal*. It there appeared that the soil contained as much as 91.8 (that is, nearly 92) per cent. of quartz sand, an exceedingly small quantity of potash, a mere trace of phosphoric acid, and very little lime. That soil was ascertained to be poor in every description of mineral matter which is necessary to bring agricultural produce to perfection; but I had the gratification of finding that on such a soil the supply of the mineral food required for the clover crop is attended with the most beneficial results. Incidentally I had occasion to make some observations with respect to the utility of nitrogenous manures; and I believe that such manures will prove very useful to the practical farmer who has frequently to deal with a variety of soils, and ought, therefore, to be in a position to judge what description of manure is best suited to particular classes of soils. Now, reverting to the experiments which were made at Escrick, I find that whilst common salt—that is, chloride of sodium—had no effect on the produce, muriate of potash—that is, the compound of chlorine with potassium—materially increased it. Soda is frequently a mere accidental constituent, which, in the form of chloride of sodium, indirectly tends to introduce food into the vegetable organism, but which, in its turn, is eliminated from the ripe produce. I find that chloride of sodium circulates in many plants, but that it does not enter into the chemical composition of the perfected seed of the plant. In perfectly ripe wheat you will find no chloride of sodium; in perfectly ripe beans and seeds, and many other plants, you find hardly any chloride of sodium; while this substance circulates very freely in the green plant, and is productive of very great advantage to the general condition of the vegetation. The case is, however, different as regards potash. Potash enters into actual union with many parts of plants, and it is absolutely necessary to bring the plant to perfection. To show you the difference between the physiological effects of potash and soda in this respect, I would just mention that, whereas you can wash out chloride of sodium with water from a substance like the root of the mangold, or the leaf of the beet-root, or the stalk of wheat, or from grasses, you cannot remove potash so as to show its presence simply by the mechanical process of washing; you cannot prove its existence before you have incinerated the plant, destroyed its organic structure, and thus reobtained the potash in the ash. It has, in fact, entered into an organic combination, from which it cannot be removed by the mere

mechanical process of washing. On one of the experimental plots of the Escrick Park I used mineral superphosphate alone, and, to my astonishment, no effect whatever was produced by its application. This is an interesting result, seeming, as it does, to indicate that the great deficiency of potash, which is characteristic of the soil in that experimental field, entirely prevented the display of the usual functions which we know perfectly well superphosphate of lime discharges on land of a better character than that at Escrick. The superphosphate (or, rather, the phosphoric acid,) in that manure did not act, simply because potash was not present to form part of the substance of the clover plant. You can, I think, readily understand that. Place before a man all the dry food which tends to entice the appetite, and at the same time withhold from him drink, and you will find that he cannot assimilate the dry food. You may give him every description of dry food that can tempt him to eat, but if you keep from him for any long time that unimportant substance, as we are too apt to consider it—though it is, in fact, a most essential thing—water, he will ultimately perish. Potash is non-essential as regards many clay soils, because many clay soils contain abundance of potash; but it is most essential on poor sandy soils, because, generally speaking, these soils are very deficient in the necessary amount of potash which is required to bring clover crops, and I may also say root crops, to perfection. The mixture of potash, salts, and superphosphate, yielded the largest weight of clover and rye grass, per acre, which was obtained on any of the experimental plots. Further, it was astonishing to notice that not only was the weight of the first cutting larger in the case of this particular plot than on any of the others, but the second cutting also yielded a much larger quantity. Let me give you the actual figures as respects the produce on these particular plots. With no manure whatever the soil yielded per acre of fresh clover 8 tons, 5 cwt., 40 lbs; mineral phosphates alone gave 8 tons, 4 cwt., 12 lbs. Thus there was actually a rather smaller result; but then you must make allowance for variations of soil in the field, and avoid thinking too much of small differences of results. Practically speaking, the produce was the same in the case of the plot manured with superphosphate as that in the plot which had no manure. The extent of these plots was 1-20th of an acre in each case, but the yield is calculated at so much per acre. Well, muriate of potash gave 9 tons, 16 cwt., 28 lbs., while the mixture of superphosphate and muriate of potash gave 13 tons, 15 cwt., 40 lbs., showing a great increase of produce above that of the unmanured portion of the field—that

is, in the total amount of produce. This was distributed over two cuttings. The first cutting from mineral superphosphate and muriate of potash gave 9 tons; the second cutting nearly 5 tons; whereas the first cutting on the unmanured portion of the field gave 5 tons, 9 cwt, 72 lbs., and the second one only 2 tons, 15 cwt., 80 lbs. Thus, you will observe that, although through the application of manure, a larger amount of produce was obtained, yet the agricultural condition of the land after the application of superphosphate and potash was better than it was when no manure whatever was applied. On the other hand, I find that nitrate of soda had an unmistakable tendency to exhaust the soil of both the plots in which it was used, the second cutting weighing less than that of the unmanured plot. It is true that the first cutting weighed rather more than that of the unmanured plot; but the second actually weighed less, showing clearly that nitrate of soda has an exhausting effect, which tells badly on poor land, and that this effect is produced rapidly. From these experiments we may learn that nitrate of soda alone, or even in combination with superphosphate, should not be used as a top-dressing for artificial grasses on very poor sandy soils, not even with superphosphate, because it does not supply the needful alkali potash. Indeed, nitrate of soda, and, to a considerable extent, at least, ammoniacal salts, are the worst manures that can be used on poor soils. They tend rapidly to the complete exhaustion of such soils, and do serious injury to the land, while they do not even benefit the tenant-farmer who may apply them for a season with the view of obtaining a very large produce. On very poor sandy soils not only do purely nitrogenous manures rapidly exhaust the land, but the produce also becomes very inferior. My friend Mr. Coleman was so much struck with the appearance of a particular field that he asked me to go down and inspect it. I did go down, and I must say that never in my life was I more struck with the aspect of a field which had been manured with these different fertilizing agents. On the land manured for clover with sulphate of ammonia and nitrate of soda there was not a plant of clover to be seen, and, quite contrary to my expectation, the true grasses, the Italian rye grass, etc., which should have been very luxuriant after the first cutting, were quite wanting. The land was, in fact, completely burnt up. I should have thought that the soil would stimulate the growth of Italian rye grass, and that a second crop would grow luxuriantly; but, contrary to my previous expectations, not even rye grass would grow—clearly showing that, although ammoniacal manures may be very useful for the production of grass and

corn crops under many circumstances, yet they are not useful when there is an insufficient supply of mineral food in the land, and that the poorer the land is the more rapidly it becomes unproductive when salts of ammonia alone are applied, even as regards those plants which in the ordinary course of farming are decidedly benefited by the use of ammoniacal salts or nitrate of soda. In fact, the application of nitrogenous manures in this case evidently tended to the complete exhaustion of the land. On the other hand, I was struck with the remarkable effects which potash, applied in conjunction with phosphatic manures, produced upon the clover plant. You could see to a line where the potash and superphosphate had been used. There the clover plant was growing luxuriantly and healthy, and keeping in check the Italian rye grass with which it had been sown. So much, then, with regard to these experiments. I will not detain you by referring to similar experiments which were made last season. I will only observe that they fully confirm the results of the experiments of the preceding season, and at the same time show that in very dry seasons it is most desirable to apply saline manures sparingly, and also to apply them early in the spring. Allow me to impress upon you, that when you apply top-dressings to pasture, or to artificial grasses, or to cereal crops—wheat, oats, or even barley—you should apply them early in the spring, in order that the manure may have a chance of getting thoroughly distributed through the soil by being washed into it. I tried similar experiments on clover—a mixture of clover seeds of different kinds being sown without rye grass or any other grass seeds. The experiments in that case were undertaken by Mr. Kimber (a former pupil of mine), on land which was naturally rather poor, but which had been done extremely well. The clover was sown in the preceding year with a barley crop coming after a good crop of swedes, being well manured with dung and drilled in with 3 cwt. per acre of superphosphate of lime, and fed off by sheep. In consequence of the applications of good dressings of farm-yard manure, of the artificials used for the turnip crop, and of the feeding off the swedes by sheep, with corn being given to them at the same time, the soil seems to have been in excellent agricultural condition. Neither nitrate of soda nor sulphate of ammonia produced any effect on the clover; and that appears to indicate either that the land must have been in an excellent agricultural condition, as I believe it was, or that the clover plant is not benefited by nitrogenous manures. On this latter point we have no conclusive evidence. I have been extremely anxious to ascertain under what circumstances, if any, am-

moniacal salts, or nitrogenous organic substances, or nitrates, benefit the leguminous tribes of plants. Some years ago I made some experiments which seemed to indicate that nitrogenous manures have no beneficial effect on the clover tribes, and probably none either on other leguminous plants. At any rate, I could never see where sulphate of ammonia had been applied to clover, nor could I notice any beneficial result from the application of ammoniacal salts to peas and beans; whereas I could perceive minutely the effects of nitrogenous manures when they had been applied to wheat or barley, or any of the graminaceous family of plants. I was anxious, therefore, to ascertain whether nitrogenous manures have any effect on clover. In the experiments which were conducted by Mr. Kimber, at Tabney Warren, near Abingdon, the nitrate of soda and the sulphate of ammonia had no beneficial effect whatever on the clover.

At the present time the Scientific Committee of the Horticultural Society is engaged in making experiments on special plants. Amongst these are several varieties of clover on which we intend to try the effect of ammoniacal salts alone, and of various mixtures, and I hope the result will be to bring out some useful information on the subject. It is sometimes difficult to conduct experiments on a large scale with sufficient scientific precision; I therefore strongly recommend the Committee of the Horticultural Society to institute some experiments in boxes. A number of boxes are now set out at Chiswick, and I hope that on a future occasion I shall be able to give you the results of the observations which we are making there with respect to the peculiar action of some special fertilizing agents, such as potash and nitrate of soda. So much, then, with regard to the field investigations which occupied so much of my attention during the last season. In close connection with these field experiments I have undertaken to investigate the causes of the benefits which result from growing clover as a preparatory crop for wheat. It is well known to most practical farmers that if they can succeed in growing a good crop of clover they are almost certain to get a good paying crop of wheat. You see how all agricultural matters depend upon each other. If we can by chemical means enable the Farmer, on land which otherwise would not grow clover, to produce a good crop of clover, we shall thus place him in the very best position for afterwards obtaining paying crops of corn. I have come to the conclusion that the very best preparation, the very best manure, if you will allow me thus to express myself, is a good crop of clover. Now, at first sight nothing seems more contradictory than to say that you can remove a very large quantity of both mineral

and organic food from the soil, and yet make it more productive, as in the case of clover. Nevertheless it is a fact, that the larger the amount of mineral matter you remove in a crop of clover, and the larger the amount of nitrogen which is carried off in clover hay, the richer the land becomes. Now here is really a strange chemical anomaly which cannot be discarded, and invites our investigation; and it is an investigation which has occupied my attention, I may say, for more than ten years. I first took it up in my leisure hours when I lived at Cirencester. In the paper which I published in the *Journal* last year, you will find analyses of clover roots and clover soils on the College Farm at Cirencester. Chemists are much in the same position as painters; we cannot finish a work off-hand at once; we take up a thing and then leave it for a time. We then take it up again; just as the opportunity occurs to add to our experience, we take up new matter and make it the subject of investigation. Now this clover investigation has very much interested me for a great number of years; but only during the last season have I been able to bring it to anything like completion, so as thoroughly to explain the strange anomaly that is presented to us in the growth of clover as a preparatory crop for wheat. The explanation is very simple, though puzzling when you know not the chemical points that are involved in the investigation. I cannot deny myself the gratification of showing to you, in a few figures, that, in a thorough chemical point of view, clover is the most exhausting crop that you can possibly grow, whilst in a thorough practical point of view, it is the most restorative crop, and the best preparation for wheat that you can possibly grow. Now if we examine what is taken from the land in the shape of clover, we shall find that, assuming an acre of land to yield four tons of clover hay, these four tons of clover hay will remove 672 lbs. of mineral constituents, and not less than 224 lbs. of nitrogen, which is equal to 272 lbs. of ammonia. Four tons of clover hay, the produce of one acre, must contain a large amount of nitrogen, and remove from the soil an enormous quantity of mineral matters abounding in lime, potash, and also much phosphoric acid. Now, comparing what is removed by a crop of wheat, we find that, in a clover crop, we remove fully three times as much of mineral matter, and a great deal more, six times as much, I believe, of nitrogen, as we do in a crop of wheat. The total amount, to give the exact figures, of mineral matters removed in an average crop of wheat amounts to 175 lbs. an acre; that is, taking in both the grain and the straw, the total amount of nitrogen removed in the grain of wheat amounts to only

26.7 lbs. per acre (not quite 27 lbs.), and in the straw of wheat 19.2 lbs.; or in both together 46 lbs. of nitrogen, which is only about one-fifth of the nitrogen contained in the produce of an acre of clover. We should, therefore, naturally expect that clover, which removes so much more nitrogen from the soil, would be greatly benefited by the application of nitrogenous manures; but the reverse is the case. Wheat, it is well known, is benefited by the application of nitrogenous matters, but not clover. On the other hand, clover is benefited by mineral manures; and at the same time it leaves the land even in a better condition in this respect for the succeeding corn crop than it is without the intervention of clover. I believe a vast amount of mineral manure is brought within reach of the corn crop by growing clover. It is rendered available to the roots of the corn crop, while otherwise it would remain in a locked-up condition in the soil, if no recourse were had to the introduction of the clover crop. Clover, by means of its long roots, penetrates a large mass of soil. It gathers up, so to speak, the phosphoric acid and the potash which are disseminated throughout a large portion of the soil; and when the land is ploughed the roots are left in the surface, and in decaying they leave in an available condition the mineral substances which the wheat plant requires to enable it to grow. Although in clover hay these mineral matters are removed in great quantity, yet the store of mineral food that we have in six or twelve inches of soil is so great that it is utterly insignificant in comparison with what remains; in other words, the quantity of mineral matter which is rendered available and fit for the use of the succeeding corn crop is very much larger than the quantity which is removed in the clover hay. But the accumulation of nitrogen after the growth of clover in the soil is extremely large. Even when the clover crop is insignificant a large quantity of nitrogen amounting to tons is accumulated in the surface soil, and the better the clover crop the greater is the accumulation of nitrogen. In one of my experiments I tried to determine the amount of nitrogen which is left in the portion of the field where the clover was, comparatively speaking, poor, and I found that on the brow of the hill in that field, for it had a considerable declivity, the clover was weak, the produce to an acre being 1 ton, 11 cwt., 99 lbs.; whilst at the bottom of the hill, where the clover was stronger, there being more soil, it was 2 tons, 2 cwt., 61 lbs. Observe, too, that at the bottom of the field the wheat was always better. Now, it is in virtue, I believe, of this accumulation of nitrogen that the wheat grew so much more luxuriantly. I had another experiment tried two sea-

sons ago upon land on which clover grew tolerably well. The experiments to which I refer were tried at Leighton Buzzard, upon the farm of Mr. Robert Valentine. We had a capital field of clover, and I thought I should have a good opportunity of ascertaining whether there was more nitrogen accumulated in the soil after the clover crop was cut twice, or whether more was accumulated when the clover was mown once, and then allowed to run to seed. At first sight you would think that the land was in a worse condition when the crop is grown for seed. We know, indeed, that this is generally the case; but in the case of clover we have a remarkable exception to this rule; and I find, on looking into this matter, that, after growing clover for seed, a very much larger quantity of nitrogen remains in the surface soil, in the first six inches of soil as well as in the second six inches, than when the clover is mown twice. I have ascertained that when you feed off clover by sheep, when it is still young, and everything is returned to it as it is removed from it, the land is in a worse condition than when you take off the clover hay. This is an anomaly. You say it is against all principle and against all reason. But when you see positive evidence in our fields, I think no scientific man has a right to say that it is against all reason and against all principle. It is certainly not against fact. All who are practically acquainted with the subject must have seen that wheat invariably grows less luxuriantly when you feed it off quite young, and that the best crop of wheat is produced when you grow clover for seed. I have repeatedly and repeatedly seen it. Now, if I had been always shut up in my laboratory, I should never have seen it or investigated it. I should have followed in the track of those scientific men who so frequently turn up their noses at anything they cannot understand, or that they think unscientific. Therefore, the men who make the practical experiments must be wrong; and they must be right. Now, I think this is a proceeding which cannot be commended. When we see a plain matter of fact, our simple business is to investigate it carefully and conscientiously. Then we shall find frequently, as I have found in other departments of chemical investigations—I allude to my investigations in farm-yard manure—that a practice which is at first sight contrary to all theory, at least with what we call theory, but not against true science, on being investigated, is found to agree perfectly with the established observations of good agriculturists, and that there are really good causes which fully explain apparent anomalies which sometimes are very puzzling. Referring to those clover investigations, I would just give you the total amount of ni-

trogen which I found in different layers of soil in the same field, and upon one-half of which the clover was mown twice, and upon the second half of which the clover was mown only once, and then left for seed. The percentage of nitrogen in the clover soil twice mowed for the first six inches amounted to .168; in the second six inches to .092; and in the third six inches to .064. Thus you see that it becomes very much less the deeper you go down. The accumulation takes place chiefly in the surface soil, and I believe it is principally due to the dropping of the leaves. When we grow clover for seed those leaves continually drop and enrich the surface soil; and if it be the case, which I think is likely, that the clover tribe of plants is satisfied with the ammonia which exists in the atmosphere, we can at once account for the accumulation of nitrogen in the soil. The clover plants take the nitrogen from the atmosphere and manufacture it into their own substance, which, on decomposition of the clover roots and leaves, produces abundance of ammonia. In reality, the growing of clover is equivalent, to a great extent, to manuring with Peruvian guano; and in this paper of mine I show that you obtain a larger quantity of manure than in the largest dose of Peruvian guano which a farmer would ever think of applying; that there is a larger amount of nitrogen accumulated in the first six or twelve inches of soil than there is in the heaviest dose of Peruvian guano that any person would think of using. On clover soil once mown and left for seed, I found in the three layers of soil a larger percentage of nitrogen than where the clover was mown twice. In the first six inches it was .189; in the next six inches .134; and in the lowest six inches .089. Now the total quantity of nitrogen calculated per acre for 12 inches of soil amounted on that portion of the field mown twice for clover, to 5,249½ lbs.; whereas the total amount of nitrogen in 12 inches of soil on that portion of the field which was mown only once and then left to stand for seed, was 8,126½ lbs.; thus producing an excess of nitrogen on an acre of soil 12 inches deep, calculated as ammonia on the part of the field mown once, and then seeded, amounting to 3,592 lbs. A very large quantity of nitrogen was accumulated when the clover was left for seed; and the total amount of large clover roots was much greater in the part where the clover was grown for seed; for the longer it is left in the soil the more the roots extend. In the different layers of the soil, also, in every instance more nitrogen was found where the clover was left for seed than where it was twice mown. There was, as just mentioned, upon one acre 3,592 lbs. more ammonia in the land where the clover seed was grown than on the other portion

where the clover was made entirely into hay. The chemical points brought forward in the course of this inquiry show plainly that mere speculations as to what can take place in the soil, and what cannot, do not much advance the true theory of certain agricultural practices. I would just mention that it is only by carefully investigating subjects like the one under consideration that positive proofs are given showing the correctness of intelligent observers in the field. I have frequently been struck with the remarkably luxuriant appearance of wheat after a heavy crop of clover has been removed from the land. I at first doubted it; but at last I was obliged to confess that it invariably follows when you get a good crop of clover that you also get a good crop of wheat. An enormous amount of nitrogenous organic matter is left in the land after the removal of the clover crop, and this gradually decays and furnishes ammonia, which, at first, during the colder months of the year, is retained by the well known absorbing properties which all good wheat soils possess. An investigation which I have now in hand, however, shows me that the ammoniacal salts in the soil are rapidly transformed into nitrates. Gradually, the oxidation of the ammoniacal salts which are produced from the decomposition of the clover roots takes place, and nitrates are eliminated; but the benefit that we derive from the growth of clover is very much greater than the benefit that we can derive from the direct application of nitrate of soda, because if we use nitrate of soda, we must just hit upon the right point when it will be beneficial to the growing crop. If there is not sufficient rain or water to wash the nitrate of soda into the soil, it does no good, but rather may do harm by burning up the land. If there is too much rain, it may pass into the drains. Nitrate of soda is not retained by the land—not even by clay soils. It passes through them as through a sieve; therefore, it is the most precarious kind of manure that you can use. It is well if you can hit upon the right time; and this you must find out for yourselves. By observation you will find out the right time in the particular locality where you are placed. You may go wrong once, but for a number of years you will generally hit upon the right time. Speaking generally, I would say that about the middle of February, in most localities, is the right time for the application of nitrate of soda; but, useful as nitrate of soda may be in some special cases, I think the less you use it on poor soils the better. I should like more indirectly to accumulate nitrogen on my land, and not go to any great expense in buying nitrate of soda when my land is in poor condition. It is well if you have very good land, but under

ordinary circumstances it is perhaps better not to rely upon this source of supply. Nitrate of soda may readily be washed out: but you will notice that the benefit that you obtain from clover roots is, that you have a continuous source from which nitrates can be produced. It does not matter if some of the nitrates pass away in the drain; you have an enormous accumulation of decaying organic matter. The clover roots and leaves are not all at once changed into ammonia; but there is a gradual transformation of the organic matter, first, into ammoniacal salts, and a gradual change from ammoniacal salts into nitrates, and you have a complete series of chemical transformations which is highly conducive to the gradual development of the plant. Whereas, by using nitrate of soda, you run the risk of getting it washed away into your drains. Thus, there is more certainty of growing a good crop of wheat through the instrumentality of clover than through the direct supply of the nitrate of soda. These, then, are the chief points which have been established, I believe, by my chemical experiments in the laboratory with respect to the chemical history of the clover crop.—*Journal N. Y. State Agricultural Society.*

Carbolic Acid.—A Paris correspondent of the *Rural World* says: A disinfectant, which, from the newness of its employment may be called a fresh discovery, is rapidly coming into favor, to the exclusion of the chloride of lime. This new agent is carbolic acid, or impure phenic acid. Chloride of lime has not only an insupportable odor, but rapidly absorbs the humidity of the atmosphere, losing thereby part of its efficacy—nay, more, it provokes coughing, and reacts on the respiratory organs. In well-ventilated out-offices, the matter is not serious, but in buildings, where animals are "cabin'd, cribb'd, confin'd," the use of chloride of lime becomes grave. Carbolic acid, on the contrary, presents none of these objections, and it is cheaper; it may be combined with lime, and used either in the form of a powder, or as white-wash—the latter is the best, and has the peculiar effect of chasing away insects. A good way to prepare it is, to add to twenty pounds of quick lime about three pounds of the acid—which costs about twelve sous a pound—when a pale, rose-colored powder results. To make the white-wash it is best to add a pint of water, immediately after employing the acid, pouring more water till the necessary consistency is attained. I may remark that this acid forms a "perfect cure" for the bites of venomous animals. Dissolve it in double its own weight of spirits of wine, and add one hundred parts of water.—*Metropolitan Record.*

Hints on Horse Flesh.

BY DR. LEMERCIER.

As five years are required for the completion of the bone structure of the horse, it is important that he be carefully used until that age. If he is early over-worked, the ligaments which unite his one hundred and thirty bones are prevented from becoming sufficiently fixed to the frame, and he is dwarfed, and wears out or dies long before reaching the full twenty-five years which should be the average duration of his life and vigor. The muscles of a fine horse ought to be thick and very long; thickness ensures strength, and length an extended sweep of limb.

Properly constructed harness is as essential to the comfort of a horse as easy clothes are necessary to the comfort of a man. If harness is not well fitted to the form, the veins are compressed, circulation is retarded, and disease ensues. When in motion, the horse regulates his centre of gravity by using his head and neck. The check-rein is therefore inhuman and injurious.

If a horse is compelled to run when his head is held in a vertical position, the gravity is thrown too far back, and he advances with difficulty. The ears may be called indices of a horse's mind. Intelligent animals prick up their ears when spoken to—vicious ones throw their ears back. A blind horse directs one ear forward and one backward, and in a deaf horse the ears are without expression.

The ears of the horse are short and wide apart, the eyes are well open, and the forehead is broad. A broad forehead indicates good brain. The Arab says: "The horse must have the flat forehead, and the courage of a bull." The horse breathes by his nose and not by his mouth; hence the nostrils should be large, so the fresh air may be taken freely. Dealers enlarge the nostrils of their horses by artificial means. The mouth of a young horse is round; in age it becomes narrow and elongated.

The Arab says, in speaking of his horse: "The first seven years are for my young brother, the next seven for myself, and the last for my enemy."

A horse has only one jugular vein, a man has three. The withers can never be too high; the higher they are the easier the animal travels. The loins should be short, the chest square, and the shoulders well devcloped. The veterinary surgeon who said, "no foot, no horse," was perfectly correct. The hoof is a curious and complicated mechanism; an elastic box, which expands and contracts as the horse raises or puts down the foot. Shoeing should

be done with care and skill, or the natural form of the hoof is destroyed. Above all, so noble an animal should be treated with the greatest kindness, and no pains should be spared to make his bonds as easy to wear as may be.—*Southern Agriculturist.*

Lotion for Cutaneous Irritation.—*Editors Country Gentleman:* I am much indebted to Prof. Liautard, of the New York College of Veterinary Surgeons, for the following:

6 fluid ounces water,
2 fluid ounces glycerine,
40 drops carbolic acid,

as a lotion for cutaneous irritation on horses, scurfiness, &c. If applied with a small sponge to the roots of the hair of mane and tail, dampening the skin thoroughly, it brings away the dandruff in a surprising way, and allays itching, which often causes horses to disfigure their manes and tails by rubbing. The glycerine keeps the skin soft and retains the carbolic acid much longer, by preventing evaporation, than when the acid is used in water only. A half pound bottle can be bought in New York for 80 cents. When wanted the bottle is immersed in warm (not hot) water, for 10 seconds and a sufficient quantity is liquefied for use. It is an excellent remedy for wounds.—T. J. H., *in Cultivator and Country Gentleman.*

Bots in Horses.

BY DR. WM. ABRAM LOVE, ALBANY, GA.

My attention was first called to the subject of bots in the year 1846. A very valuable horse belonging to a friend, was suddenly taken sick, and, as at that "*bloody age,*" everything that sickened must be bled—man or beast—the knife was popped into the mouth—he bled profusely, and the bleeding could not be stopped. Being on the premises, I was requested to arrest the hemorrhage. On examination, I found the palatine artery opened, and the flow was arrested with some difficulty. Soon the horse died, and, to satisfy myself as to the cause of his death, made a post mortem—found over half the mucous membrane of the stomach destroyed, the other portion highly inflamed, with here and there patches of grubs or bots firmly fastened to the membrane, sometimes forty or fifty on a place—other and smaller ones were mixed with the contents of the stomach, and scattered with the same in the cavity (peritoneal) out-

side the bowels. They had passed through a rupture in the walls, evidently caused by the distention, the injured part giving way (possibly after death), from the accumulation of gas fermentation having been very rapid. This accounted for the death of the horse. The bots were then collected in a vessel and series of experiments instituted, to ascertain, if possible, what would destroy them, without destroying the horse; tried innumerable drugs without producing the least effect. They were then subjected to more severe tests, in nitric, sulphuric, muriatic and acetic acids, in turpentine, decoction of tobacco, and in various tinctures they lived astonishingly. These experiments satisfied me that there was no chance to destroy them with such remedies, without the remedies first destroying the horse.

I observed that *they seemed to relish syrup or sweetened water, and that green vegetable juices of any kind seemed to sicken them*, making them lie dormant for hours. Some would eat the vegetable juices sweetened, and then remain dormant, the same as when immersed in them. I used up all my subjects and this was all the information gained. This much, however, suggested an idea, which was afterwards, by experiment and observation, found to be correct. By feeding the horse on *green vegetable matter*, as corn, millet, wheat, rye, oats, or peas, until his bowels become a little affected, and then giving him a purge of Glauber or Epsom salts, he would discharge the grubs if there are any in him. For years, I have every Spring pursued this course, even until the present time, and though living behind horses for over a quarter of a century, under this plan of treatment, have never lost one *from bots*.

The next *post mortem* made, was in a horse that had been more or less, severely, for several days, perhaps for weeks, showing symptoms of bots, of colic, &c. In this case, as in the other, found the grubs, but not in such numbers, there being only thirty-seven in the stomach, (the bowels were not examined.) These seemed to have been at work longer; some had penetrated deeper, some were entirely covered with *their* mouths on a level with a mucous surface, whilst others had burrowed *between the coat of the stomach* for two, three, five, and as far as eleven inches. Two had thus passed entirely through and were attached to the outside (peritioneal), coat of the bowels, the places, through which they had passed, being distinctly traceable by the lines of inflammation, showing that they, too, had burrowed between the coats from inside to outside. The openings thus made by their exit, were closed by plastic lymph, as well as by the valvular ar-

rangements of the coats, when this viscus was distended. Had they passed directly through, the case would have been more rapidly fatal, by the passage of the contents of the stomach into the outside (peritoneal) cavity, which is always fatal; here it was noticed, for the first time, that the grubs traveled, or penetrated *tail foremost.* They were attached to the mucous membrane *by the tail,* their mouths dipping into the contents of the stomach; this brought up another subject of investigation. They were placed under the microscope, and dissected. In the tail, centrally, is placed a lance shaped piercer, which, by an internal arrangement of muscles, can be protruded or retracted at pleasure, as in the sting of an insect. On either side of this lance shaped piercer there is found a curve grapple, (so to speak), having the same muscular attachments, but by muscular contraction the points are thrown outwards, describing the segments of a circle, having for their starting point, the point of the piercers, thence towards the head. When the piercer is retracted, the points of all three are about on a line. With the points of the grapples the coats of the stomach are hooked up—by muscular contraction they are thrust into it, laterally; while the piercer penetrates in the line of the axis of the body of the grub. On the body, in regular order, is arranged a series of grapples of the same shape, very sharp at their points. They extend in consecutive rings nearly around the body, and so arranged that, commencing with the lateral grapples, they can lift what they catch toward the head and hook it on, or place it within reach of the grapples of the next row above, and so on, until the whole body of the grub has marked its way into the tissues. In this position, by the irritating motion of these grapples, (which are very hard and horn like) the grubs generate pus, upon which they may prefer to subsist while entering what may be termed their chrysalis state, or when they have arrived at or near maturity, and are about to change into the perfect fly.

From this examination, I was satisfied *that they will penetrate the stomach—that they will not eat into it,* but penerate by means of the piercer, and successive rows of grapples, as mentioned above. In other *post mortems,* similar condltions have been found to exist, but no remedies could be suggested further than those mentioned before for the destruction of the grubs.

Some time after this, I attempted to quiet an angry swarm of bees by slipping under the gum a sponge containing something over half an ounce of chloroform and succeeded admirably. When they had become quiet, I removed what honey could be spared from

their stores and left them all quiet. They are quiet still, for the chloroform had killed the last bee.

It is useless to say anything about the multitude of experiments instituted on bees, bugs, butterflies and beetles, to ascertain how much chloroform a hive of bees could take with impunity.

These experiments convinced me that a *very little*, however, would kill any specimen of insects found in this country, and such being the case, it was very natural to conclude that, if half an ounce of chloroform would kill a swarm of bees it would as certainly kill a swarm of bo's, and I determined when an opportunity served, to try it. I had given over an ounce to a horse, by the stomach, with a very happy effect, for colic, and felt that here might be found the long sought grub poison. Soon an opportunity presented in the case of a mule; gave one ounce chloroform in one pint of syrup, with half a pint of water. In a short time, he seemed easy and got up. Directed, at the end of two or three hours, a heavy dose of salts. Within twenty-four hours he discharged between three and four hundred bots, every one as dead as my angry bees. Since that time I have invariably used chloroform in such cases, and always with success, *when used in time*. It will not sow up and heal up in a ruptured stomach, nor will it cure one, but it will kill grubs as surely as it will kill bees.

There is sometimes some difficulty in distinguishing bots from colic and other acute suffering; the horse discovers to you that he is in pain in either case. With colic, he is more or less swollen, from the spasms of the bowels not moving forward the accumulated gases, yet there are few cases of grubs in which this condition of things does not follow sooner or later as a necessary sequence of the destruction of digestion, from the condition of the stomach, produced by the irritation of the grubs. Still, in the treatment, there is no very material difference, as chloroform, by its antispasmodic powers, will relieve colic equally well, and is, without exception, the best remedy. Knowing these things, I, many years since advised my neighbors and friends to its use, and many of them have availed themselves of it with entire satisfaction. Through some of them some years since, the recommendation reached the press, but such things are but little attended to, and no confidence is placed in them, inasmuch as no reason is assigned for the treatment, and, in the majority of cases, no one is responsible for the suggestion made; they are the mere *on dits* of the press, and are so received.

To answer all, or most of the indications in the majority of cases of supposed grubs or colic, the following compound will be found

effectual as a general prescription, and farmers and stock owners, who keep a supply of the medicines on hand for emergencies, will have no occasion to regret it, as by its timely use, they may save many valuable horses and mules during a season.

Take of chloroform one ounce, laudanum one ounce, tincture of Assafœtida, one ounce—mix. Give it in a pint and a half, or a quart of thin syrup, well shaken together. When the horse will eat or drink, give him gruel freely, and follow the dose, in a few hours, with a brisk cathartic of salts. Glauber salts (sulph. soda) is, perhaps, the best, from its anti-acid and anti-septic properties, though Epsom salts, or any other convenient cathartic will answer the purpose, the object being to remove the destroyed grubs, preventing lodgment in the valves of the bowels, where they would produce irritation and inflammation. The saline cathartics answer, as a general rule, a better purpose, as they are febrifuge and reduce the irritation and febrile action in the stomach, bowels and general system.

Some writers contend that *grubs* do no harm to horses, within certain periods of their existence; this is true, but, there is a time when they are seriously detrimental, if not certainly fatal. By following them through one generation *that time* may be seen to the satisfaction of the most skeptical. Like most of the insect tribe, they have four distinct stages of existence—the egg, the grub, the chrysalis and the perfect fly.

The grub fly, or (as it is known in the South) *nit fly*, deposits its eggs, by preference, under the chin of the horse, but being defeated in this by the instinctive restlessness of the animal, it glues them to the hair on the fore legs or breast, or on the mane. Sooner or later, by the greater or less heat of the body of the animal, the larvæ are hatched, when they start immediately in search of food—(this larvæ, though very minute, is but a diminutive grub, armed with a piercer in the tail—the two lateral curved and pointed *grapples*, with the successive rings of the same kind as described above, all perfect.) Fastening or hooking these into the hair, *they travel backwards*, (as do some other species of grubs,) until they reach the skin of the animal. Their efforts to penetrate this produces an itching sensation; the horse scratches them off with the upper teeth—they are caught on the lips, to the mucous-membrane of which they fasten themselves and feed on the mucous secretions; otherwise they perish. Becoming mixed with the food, they are conveyed into the stomach. Here they subsist on the gastric juice, (chylopoetic and pancreatic fluids, and mucous secretions, *until they are full grown grubs*, or reach the age of maturity. Up to this

period, they do not materially interfere with the health or comfort of the horse, insomuch as they are well supplied with food from the contents of the stomach and the visceral secretions. But when they have reached this mature age, they cease to feed and cease to grow, and, like grubs or worms of other insects—as the silk worm, the grass worm, and the various other moth beetles and fly tribes—become dormant after fastening themselves, and enter the chrysalid stage—so to speak—preparatory to coming out perfect flies. Just at this stage they become dangerous. It is as natural for them to *fix* or *bury* themselves when they have finished feeding and are going into their dormant state, as it is for the silk worm to spin its cocoon, the cotton worm to wind itself in a leaf, or the grass worm to bury itself in the earth, or beneath some object, where, undisturbed, it can pass the chrysalis state and come out in its perfect state a moth. It is not in feeding, (though the grub is carnivorous,) but in seeking this resting place, this grave, as it were, that they injure the stomach.

By an instinctive common consent, all of mature age, at the same time, go about this work; by collecting into colonies and fastening themselves close together, they mutually aid each other in the work of penetrating the stomach or other tissues. The younger grubs, hatched from a different deposit of eggs, do not join with those of mature age, but bide their time. When this fixing or burrowing commences, the horse gives signs of pain, and, if their work goes on, it will surely prove fatal, sooner or later, as the grubs may be in greater or less numbers. Should there be but few, and the animal be able to withstand them, after a given period they *hatch*—a wingless gad fly is the product. This passes with the defecated foecal matter, when, by exposure to the air and the solar rays, its wings are rapidly produced, as in the horse and other flies. The perfect gad-fly is thus generated, male and female. In this stage they copulate, after which the male dies, and the female goes on her work of depositing her eggs, from two to three hundred or more, instinctively seeking a place where the larvæ can be nourished with proper food.

Thus tracing the history of one generation, which is the history of every generation, we readily see why some have concluded that bots do no harm. They have been found in horses dying from other causes, or killed in good health, where no signs of injury by them could be detected. They had not reached, in such cases, that age when they were about to change to the chrysalis stage, for it is here and here only, that they are injurious to any material extent.

When they are fastening themselves, or burying themselves, to change to the perfect fly, they do their evil work, but failing to fasten, they pass off doing no injury. They live on animal fluid; are fond of the sweet taste of *pus*. When the eggs are deposited on the cow, the larvæ sometimes burrow into the punctures made by the black cow fly. In this position, *still working tail foremost*, they, from the irritation produced by the motion of their sharp *grapples*, generate pus, more than enough, at times, for their own consumption, and it terminates apparently in a boil. From this they hatch the perfect fly. In the rabbit the larvæ are able to penetrate the tender skin, where, in the same manner, they generate their own food by irritation. In the nostrils of sheep they are also very troublesome,and their work is sometimes mistaken for distemper, &c. Naturalists claim that these are all different species of œstrus. Be that as it may, their habits, their form, their anatomy, and their natural histories, are the same with this difference: that one gains admission into the natural cavity, whilst the other finds or makes an artificial one.

The writer has known one case where the larvæ made its way into the face of a man, (perhaps entering through the excretory orifice, or duct of a sebaceous gland,) producing irritation, which was at first supposed to be a carbuncle. The man contended very strenuously that there was "something alive in it." This partook so much of the character of Voodooism, (as we find it in these latter days,) that it was treated as a joke, until medical aid was called, when an incision revealed a nearly full grown "*wolfe*"—*a regular glad-fly grub*.

Whether, in this case, the fly deposited its eggs on the whiskers, or the man, in working with his horses, accidentally had the larvæ transferred to his face, was a question not to be decided. It was on the right lower jaw, and was very painful.

This much on the subject of bots. These observations, many of them, were made nearly one-fourth of a century since, and the conclusions drawn apace with them. The writer has seen no reason to change his opinions here expressed, after over twenty years' investigation. If they are worth the attention of your readers, and any should chance to profit by them, he will be amply repaid for the little time spent in throwing them thus loosely together for the benefit of the curious or the interested.—*Southern Cultivator.*

He that observeth the wind shall not sow; and he that regardeth the clouds shall not reap.

Pigs—Their Rearing and Fattening.

Every animal likes comfort, and pigs like comfort just as much as any other animal does, and they thrive on it. To secure this comfort a convenient piggery must be erected; long narrow houses suit best, with yards opening on; and those yards must be flagged, having the feeding troughs at the ends with weather roofs to protect the food and the pigs from excess of weather. Again, the troughs must have louvre boards that revolve easily, so as to allow the food to be placed in the troughs from the outside of the yard, and to prevent the pigs from seeing it during the time it remains in them for cooling or mixing, and also to protect the troughs from the inroads of other animals at times when they are empty. When feeding time has arrived, the louvre boards should be shut, to secure quiet to the pigs. When the feeding is over they should be raised to allow the troughs to be cleaned out. The troughs had better stand six inches from the ground, and they should rest on solid masonry, and be of cast iron. Troughs made to stand on legs allowing crevices between, are nothing but a polite invitation to rats and mice to take up their habitation under them. The yards of the piggeries are best open, and care must be taken to grade them so that all water may flow to the centre and thence off to the main drain or overflow of the barn-yard. The houses ought to stand eight feet in the clear on the inside, and about eight feet more from the flooring of the lofts to the pitch of the roofs. The lofts insure warmth in severe weather when they contain the winter's bedding, and coolness in summer, as they keep off the direct rays of the sun. Withered leaves, dried ferns, and coarse hay or straw not excellent enough for feeding purposes, should constitute litter for all animals; pigs particularly enjoy a bed of dry leaves as they nestle in them, and the bed is still more grateful if it have a few inches of fine sand underlaying it, thus keeping the animals drier than otherwise they could be, and also protecting them from the stone floors.

The piggery should be divided into several compartments, separated as to the yards, with strong railings with wicket doors in them to permit any communication for cleaning.

Not only must every breed be kept separate, but all ages get on best when only allowed to associate with those of their own standing. Two boars, even of tender age, cannot remain in one stye; no more can two sows that have bred dwell together in peace, and sucking pigs should have free room to run about in proximity to the mother, unmolested by other ages. Store pigs and fattening

pigs must live apart. The former require more freedom and a wider range, as, if pent up, instead of growing they will fatten, and the latter, if not kept close, will take longer time preparing for the butcher. Twice in the day is sufficient to feed store pigs, and three times will suffice for fattening pigs. Sucking pigs, when first weaned, should have abundance of nourishing drink, and should get small quantities of cooked roots several times in the day for at least ten days after being taken from the mother. Hot food is highly injurious to all pigs. Warm sloppy drinks of bran water are better than those made with cold water, but they cannot constitute daily food except for nursing sows.

When the sow is first pregnant she may feed and range largely, but as she comes near to farrow she had better be kept more quiet, and her food must be nourishing but not fattening. For three to five days after the birth of the young, she should have tepid bran drinks, and cooked roots sparingly added to them four or five times in the twenty-four hours, and it will be necessary to watch her for some time lest she overlie her young, and to provide her with a soft bed, not too deep, as the young pigs love to cover themselves in the litter, and are thus very liable to come to harm.

The black Essex are a thrifty breed, easily kept and easily fattened. They require cleanly food and warmth. Having that they prosper. They are wonderful rooters, and if allowed the run of stubble during the Autumn months, they appear in good order as stores in the first days of November.

The Berkshire are a good breed for those who have high-situated farms. They are more hardy than the Essex, but they do not take equal condition with them. Some white breeds are excellent for size and fineness of meat, but none surpass the true Essex.

Pigs must never really run out of flesh. If they do, sad indeed is it for their owner's pocket; but it is a bad speculation to keep pigs, unless the farm, the dairy and the kitchen garden supply them liberally. Buying mill produce cannot pay. When the farmer has to buy for his pigs the sooner he sells them the better.—*N. Y. Times.*

Book Farming.

Those who are opposed to book farming are requested to read the following and give us their opinion:

There was a farmer once who hesitated not to hurl all manner of invectives against book farming, and those who consulted books for

advice. By long experience and practical information he had become quite successful in the culture of grapes and trees. His fields were clean and fair, and highly productive. His trees were vigorous, well adjusted and profitable.

In conversation with a friend he related his experience in raising grapes and trees, entering into the minutest details, sometimes becoming quite eloquent when describing his victories over the enemies which infest them.

"His knowledge," he said, "was gained by dint of application, by actual experience, and hard labor. It was none of your book knowledge, written by men who knew nothing about farming."

"Well," said his friend, "if all this valuable information, gained by assiduous labor and observation of so many years, and which you have so clearly described, were written out and published, which would you have a young and inexperienced man do, take this as he finds it from your pen, or go through the same tedious process that you have gone through with, including all its vexations and losses?"

The question puzzled him, and he was silent for a moment, but was obliged to confess, after all, there was much that was valuable in books, because combining and relating the results and experience of practical cultivators.

Do not condemn book farming. You may criticise certain books very severely, because written by ignorant, theoretical hands; but there is always good wheat as well as abundant chaff. So there are many good books as well as poor ones. The time may come when a single hint from a book or paper may save your farm or orchard, or add to your wealth, by telling you how to increase your crops.—*Independent.*

International Industrial Exhibition.—A movement is on foot at Washington to inaugurate a plan for an International Industrial Exhibition in that city in the year 1871, and the idea has been regarded with much enthusiasm. At a meeting held a few days ago, a national executive committee was appointed, consisting of the President and Vice President of the United States, Chief Justice Chase, the heads of Departments, the Governors of the several States and Territories, and the Mayors of the principal cities; also a local Special Executive Committee of ten for the District of Columbia, to which are to be added the Secretary of the Interior, the Commissioner of Patents and the Commissioner of Agriculture. Other committees are to be appointed. It is proposed to establish a capital stock of one million dollars in shares of $50 each.

Manures—How and When to Use Them.

The best method of using stable or barn-yard manure for corn or potatoes, is to haul it fresh from the cellar in the condition in which it rests in the vaults, spread it upon the ploughed field, and harrow it in with a Geddes harrow. This is what is called "long manure," and is a form which, according to the opinions of many farmers, is unsuited to immediate use; also, it is objected, that in spreading fresh manure upon ploughed fields and covering it only superficially with earth, much of it is lost by evaporation; or, more correctly speaking, certain volatile, gaseous constituents rise on the breeze and are wafted away. In our view, both of these notions are incorrect. The excrement of animals must undergo a kind of fermentation, or putrefactive change, before it is assimilated by plants, and it is better that this be carried forward in the field, as there it is in contact with the soil, which is greedy to absorb all the products of the chemical change. Creative power has bestowed upon dry earth prodigious absorptive capabilities. If a lump of fresh manure as large as a peck measure is placed upon a ploughed field uncovered, and allowed to ferment or decay in the open air, the absortive powers of the earth are such that it will actually attract toward it ammoniacal and other gases, and thus rob the atmosphere of its natural volatile principles. A film of earth no thicker than the rind of an orange, placed over a lump of manure, will effectually prevent loss of manurial products, under all possible circumstances. It will be agreed, then, that a harrow is equally as effective as a plough in protecting manure in the open field. It is better to have the manure near the surface, as the rains can reach it, and dissolve the soluble salts, and by percolation carry them down to the hungry roots of plants. Long manure is not lost when deeply turned under by the plough, but the farmer does not secure the whole value of his dressing under this mode of treatment in any case, and on some soils the loss is a most serious one. In the process of soap-making, it becomes necessary to set up a leach. Now, the farmer will not attempt to exhaust the tub of ashes of its potash by forcing water into the bottom and dipping the liquid off from the top. The natural percolating or exhausting process is downward, in accordance with the laws of gravity. The soluble alkalies and salts are driven downward, and in the case of the leach we must have a vessel ready to receive them at the bottom; and in the case of the same substance leached from manure, we must have the manure so placed that plant roots will be at hand to absorb them before they pass beyond their reach.

Manure is never so valuable as when it is fresh. It then holds in association not only all the fixed soluble substances, natural to the solid excrement, but much that is of great value, found only in the liquid. It is in a condition to quickly undergo chemical change, and the gaseous, ammoniacal products secured are double those resulting from that which has been weathered in a heap out of doors for several months.—*Boston Journal of Chemistry.*

The Norfolk and Great Western Railroad.

The Philadelphia *North American*, of Friday, the 11th instant, has an article headed, "Norfolk, Memphis, El Paso and Guyamas," in which it directs special attention to the Norfolk and Great Western road, as an essential link in the great chain that is destined to extend from ocean to ocean, along the shortest and most favorable route. The *North American* pronounces it a "grand undertaking," and adds, "there can hardly be a doubt that eventually it will succeed." It says:

"The westward construction from Norfolk would seem to be in a fair way of being tried, and to depend as much upon the conduct of politics in Virginia—rendering immigration desirable, and so making a market for the lands subscribed—as upon anything else, or all things. There can be little doubt that, with such a population as the State can subsist and needs, this road is a necessity; nor any more doubtful that the construction of the road would invite a great amount of immigration. The immediate question is whether the lands sold will bring enough to construct the road so far that it can join the Memphis road. If it can, that will be a powerful agent for the construction of the El Paso Pacific road, since there will then be two Atlantic ports and two cis-Mississippi lines interested in the work. There is now a route from Norfolk via Lynchburg, Abingdon, Knoxville, Chattanooga and Corinth, that really accomplishes the proposed union, but a great loss of time and increase of distance. In order to compete with other roads now operating, Norfolk must have the shortest possible line. That would be many miles south of Lynchburg, though cutting the North Carolina line near Abingdon, where the Virginia and Tennessee line passes. It would protract the road due southwestwardly, and much nearer to Nashville than Chattanooga, which is rapidly being converted into a sort of grand junction for all Southern roads. From Memphis this road is partially constructed as far west as Little Rock. We need not recite the course or distances here, as we have already

given them at length. We say of this road that eventually it wil be built beyond a doubt. It gives a port to a great and rich interior country between the Mississippi and Atlantic, that needs such accommodation and is rich enough in agricultural and mineral wealth to sustain it. The port of Norfolk is one of the very best on our whole border. Norfolk will unquestionably pursue the policy of Northern ports as fast as she can procure population and money for doing so. The sales of her lands ought to furnish her both at an early day."—*Petersburg Express.*

Self-Culture.

Much has been written to stimulate the youth of our land to constant exertions and unremitting toil in, and self-sacrificing devotion to their great, grand aim of being Congressmen, Governors and Presidents. Much good has resulted from it. But the field is broader, the laborers more numerous, the prospect for a more abundant and richer harvest greater, and the needs for incentives more pressing, when we write directly to the young mechanic, farmer and day-laborer, and advise them to become, through self-culture, well educated, not in the binomial theorem and quadratics, not in Latin and Greek, but to be well educated in their respective vocations, and in consequence be able to become great and successful men. Not to the fastidious, the drone, the coward do we write, but to him who is not ashamed of his trade or calling; to him who is willing to work and lug and tug; to him who fears no obstacles, is intimidated by no seeming dangers or supercilious sneer, do we write, and, begging, ask him to "shake off the soft dreams that encumber his might and burst the fool's fetters that bind him." We have no objection to the blacksmith's being an aspirant for congressional honors, or the farmer's fond desire of filling the gubernatorial chair, or the hod-carrier's delusive dream of occupying the White House, but as so few, so very few out of the many, do realize the consummation of their bright imaginings, we say seek first distinction, young man, in your own trade or calling, through self-culture, by improving the many opportunities within your reach; by pursuing steadily, with an unflinching determination, your one aim of being at the front and head of your vocation. Invent, improve, and invent again. Be unsatisfied, but constantly progressive. Devote your days to physical work, your nights to mental, for headwork must be the pioneer, the foundation, the contriver and the director. Then pursue those studies, although under many diffi-

culties, which assist you in your trade, and throw light on your business. Be an ornament to your profession. Elevate it. And then, if you desire, seek political fame, or better still, let it seek you.

We are satisfied that the political arena is crowded. We are equally satisfied that the same amount of effort and mental culture, bestowed upon the farmer, the mechanic, and the day-laborer, would make more successful men, would dignify labor, and would result in untold blessings to the age and race. Read the lives of successful men—no matter in what field of labor—and be comforted and encouraged by their trials, be moved by their success, follow their example, and be determined to succeed.

We invite your attention to Washington, who was a surveyor and farmer; to Franklin, who was a printer; to Roger Sherman, who was a shoe-maker; to Murat, who was the son of an inn-keeper; to Ney, who was a notary's clerk; to Sir William Hershel, who was a drummer-boy in the English army; to A. T. Stuart, the prince merchant, who was an irish emigrant, with only a capital of twenty-five cents; to James Gordon Bennett, who was a penniless boy, and who commenced the great New York Herald on a borrowed capital of five hundred dollars; to Horace Greeley, who walked into New York barefooted and almost bareheaded; to George Law, one of the wealthiest sons of New York, and who was a stone-cutter and mason, and who worked on the Dismal Swamp Canal locks; to John Jacob Astor, who accumulated millions from units; to Christopher Columbus; to Elihu Burritt, the learned blacksmith; to Stephens of Georgia; to Sir Humphrey Davy; to Abraham Lincoln and Gilbert C. Walker, and to a host of other successful men through self-culture.

Do you wish to be successful in life? Then follow their example; let the wonderful potency of the human will inscribe, high up on the tablet of fame, your name as an educated, successful worker. Dare to do. What man has done, man can do.—*Portsmouth Gazette.*

MANY value mules more than horses; they live longer, are tougher, require less food and smaller harness, and can jump higher.

WHAT goes against a farmer's grain? His mowing machine.

Agricultural and Mechanical Fairs.

It is gratifying to see both in the North and South the revival of interest which is manifesting itself in agricultural fairs. The great States of New York, Pennsylvania and Indiana have already held this fall their annual exhibitions, though the pleasure of the occasion in the last named State was greatly marred by the boiler explosion which entailed such a fearful loss of human life. The general renewal which we are witnessing of agricultural fairs is of happy augury to the most important department of our national industry, and which, indeed, lies at the foundation of the commercial and manufacturing activity and of the general prosperity. The State fairs and the district and county fairs which, in our own and neighboring States, are affording promise of becoming established institutions, furnish evidence of expanding strength and progress in the direction of agricultural development which may well enlist the sympathies and co-operation of the whole country. The cultivators of the soil, who, a few years ago, were called from their industrial pursuits to engage in the destructive enterprises of war, are, with redoubled energy, repairing the wastes thus produced, and by the aid of agricultural machinery and labor-saving implements and appliances, have been enabled during the past year to gather in an extraordinary harvest. The necessaries, and what were once considered the luxuries of life, can now be obtained with comparative ease and cheapness. Even the change of the system of labor in some of the States, and the demoralization from political agitation, have not prevented the earth, under the influence of a favorable climate and fertile fields, from bringing forth an abundant increase. There is scarcely a country in the world which combines so many advantages as the United States for cultivating and perfecting all the necessary elements of subsistence, comfort, and even luxury, while our extended system of internal improvements affords ready transportation for the products of the soil, so that if there should be a failure of crops in any particular section, it would not be felt in a degree past remedy.

The annual agricultural fairs, which before the war were so popular and useful, have proved themselves of great practical value to agricultural enlightenment and progress, as well as afforded valuable opportunities for the interchange of views and experiences by the agricultural community, and of social enjoyment. It is the ambition of those engaged in getting up these exhibitions to collect together by liberal premiums the best herds of cattle, horses, sheep,

hogs, poultry and fowls, the varied products of the garden and farm, the specimens of housewifely industry, and manufactures of various kinds, machinery, &c., facilities for conveying which are increased by the liberal terms upon which the railroad and steamboat lines generally afford transportation on these occasions. The county and district fairs are valuable tributaries to the State fairs, and facilitate the selecting of the best articles for the great exhibitions, besides awakening and concentrating the public interest upon the subject.—*Baltimore Sun.*

New Process in Wheat Culture.

The result of an experiment made during the past season, by R. A. Gilpin, at his farm in Westown, on the wide planting and cultivation of wheat, appears to be quite remarkable. In giving an account of the experiment, Mr. Gilpin says: The ground measured an acre within a fraction; it was not selected on account of any inferiority, but was much the same as the rest of the field, and was manured and prepared just the same. The seed was the red Mediterranean, and not very good, being taken from the wheat grown on the place the previous season, which was injured by the weevil. It was drilled in at the rate of three-quarters of a bushel to the acre, on the 25th of September, at the same time as the rest of the field. The peculiarity in the treatment was, that every other pipe of the drill was stopped, so that the rows of wheat were twenty inches apart, or double the usual distance. In the spring, when the ground had become sufficiently dry to work, a small garden hoe harrow was run between the rows, working the ground to the depth of about three inches; this was done only once. The effect of this working was very apparent; the wheat took a rapid start and outgrew the rest of the field.

As the season advanced it grew tall and strong, and no amount of wind or rain had any effect to lay it down; when the heads formed, their greater length was very apparent. It was backward in ripening, and the rest of the field was cut and hauled in a week before this was ready. Now for the result: the experimental wheat yielded twenty-three bushels to the acre, and the rest yielded only nine bushels to the acre; the quality of each was about the same. Whether from defect in the seed, or the wet season, or the late planting, the whole of my wheat was injured both by rust and weevil, and the experimental part did not escape—it was affected just as the rest was.

This experiment cannot be regarded as entirely satisfactory; the season was exceptional, the seed used was inferior, and the yield of the experimental part of the field was not absolutely great, but only by comparison with the rest of the crop, which was a poor one, from the effects of the rust and the weevil; but the result is, under any circumstances, sufficiently reasonable to attract the attention of farmers and induce a further trial.—*Farm Journal.*

Cotton Manufacturing South.

The South, as we have seen, has made gratifying progress in the manufacture of cotton, as well as in its culture, during the last few years. And in view of the probability of an early recovery from the wastes of war, a proposition for the Southern States to work up their fine long cotton into yarns for the English and other foreign markets, instead of exporting the bulk of the raw staple, as in times gone by, has been revived, and is meeting with great favor. Such an industrial development, it is seen, would be equivalent to a positive increase of the active labor on the plantations, since it would utilize a class of the population not available for the fields, but which is at present measurably useless, and, to some degree, a positive drag on society.

The South, it is well known, has important advantages in the manufacture of cotton. It has the raw material at hand, an abundance of food within easy access, an unlimited water power, an unsurpassed climate in many sections, plenty of timber and coal, together with extended and extending facilities for communication and transportation. The only present drawback, or impediment, of any importance, is the lack of adequate capital; but as this is already being supplied, there would seem to be no good reason why manufacturing industry should not at once take deep root, since it has been demonstrated that the relative cost of converting cotton into yarn, as between England and the South, is in favor of the latter. The Superintendent of the Salada Cotton Mills, at Columbia, S. C., has furnished some interesting facts and figures on this point. He assumes, by way of comparison, the price of cotton at Columbia to be 20 cents per pound; at New York, 23.5 cents; and in Manchester, England, 24 cents, which he assumes are fair proportions. On this basis the cost of making a pound of cotton into yarn at Columbia would be 9 cents, while in New York it would be 14.31 cents, and in Manchester 11.25 cents. Taking into account the freight and insurance from Columbia to New York, and the cartage, commission,

and other charges here, the cost of manufacturing yarn is found to be fully 5 cents per pound cheaper at Columbia than in New York, assuming that the article is worked up here. A similar calculation having been entered into, as between Columbia and Manchester, shows that the manufacture of cotton yarns can be done cheaper at the South than in England, by about the difference in the value of currency and gold. The figures of a manufacturer of yarns in Manchester, show the cost of a pound of yarn there—taking 24 cents per pound as the cost of the cotton, and 11.25 as the cost of conversion—at 35.25 cents. The cost of the transfer of the pound of Southern yarn—costing in the South 29 cents—from the South to England is, including both freight and insurance, bare 1.5 cents. This, added to the preceding cost, makes the cost to England 30.5 cents, whereas the pound manufactured in England costs 35.25 cents; showing that the Southern manufacturer can put his yarns down in England 4.75 (5.20) cheaper than the English manufacturer can make them there. If these figures, which refer to No. 20 yarns, are substantially correct, they surely afford a very strong argument for pushing the manufacture of cotton at the South, as well as its culture. By working up the surplus cotton into yarns for exportation, it has been roughly estimated that a profit of twenty dollars a bale would be realized over and above the profit of growing the staple. In a crop of three millions of bales, this would afford an extra profit of sixty millions of dollars—enough, surely, to create a strong incentive on the part of the men of means to engage in the business.—*Economist and Dry Goods Reporter.*

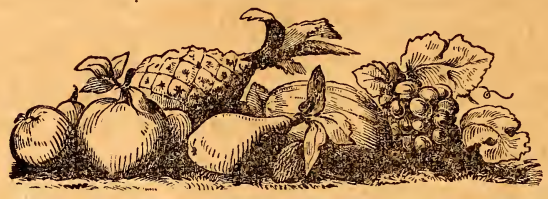
Where Woman's Power Lies.

The true power of woman is the resistless power of affection. In asserting this, am I attempting to mask the great questions of the day with "a glittering generality?" Am I disposed to deny any lawful claim which woman may make for a more extensive recognition of her rights, or a larger field for her powers? No; I am not doing any such thing. Let woman do whatever her faculties can achieve—let her go wherever her instincts demand. If she truly follows her instincts, I am sure she will not go wrong. I am sure of this also, that wherever man may lawfully go, woman may lawfully go. Wherever woman ought not to be, it is a shame for man, it is a shame for humanity to be. I merely insist upon this, that whatever woman may accomplish in the world, with brain or hands, will draw its vital efficacy, its talismanic virtue from the heart; and

that her strength in all these various shapes of action and of influence, in its root and essence, will be the strength of the affections. The biding of a woman's power must ever be in the fervor and steadfastness of her love. And her most triumphant characteristic is love, culminating in its highest expression—that of self-sacrice. A thoughtful writer has observed the contrast between the sexes even in their play. "The boy," he says, "gets together wooden horses and a troop of tin soldiers, and works with them. The girl takes a doll and works for it." This is woman's great peculiarity —the work of self-sacrifice—working for others.—*Rev. Dr. Chapin.*

Greasing Wagons.—Few people fully appreciate the importance of thoroughly lubricating the axles, etc., of wagons and carriages, and still fewer know what are the best materials and the best methods of applying them. A well made wheel will endure common wear from ten to twenty-five years, if care is taken to use the right kind and proper amount of grease; but if this matter is not attended to, they will be used up in five or six years. Lard should never be used on a wagon, for it will penetrate the hub, and work its way around the tenons of the spokes, and spoil the wheel. Tallow is the best lubricator for wooden axle trees, and castor oil for iron. Just grease enough should be applied to the spindle of a wagon to give it a light coating; this is better than more, for the surplus put on will work out at the ends, and be forced by the shoulder-bands and nut-washers into the hub around the outside of the boxes. To oil an axle-tree, first wipe the spindle clean with a cloth wet with spirits of turpentine, and then apply a few drops of castor oil near the shoulders and end. One teaspoonful is sufficient for the whole.—*Exchange.*

How to Keep up your Hay Crop.—A farmer who had been in the habit of selling his hay for many years in succession, being asked how he kept up his hay crop without manuring or cultivating his land, replied: "I never allowed the after math to be cut." If this rule is generally followed there would be less said about the running out of grass fields or short crops of hay. Some farmers feed off every green thing and compel cattle to pull up and gnaw off the roots of the grass. Cutting rowen is certain death to hay crops. A farmer had better buy hay at forty dollars per ton than ruin his hay field by close grazing. The general treatment of grass lands in this respect is wrong and expensive, and should be abandoned as a matter of profit and economy.—*Exchange.*



Horticultural Department.

JOHN M. ALLAN, - - - - - - - EDITOR.

The Augusta County Fair.

The second annual exhibition of the Augusta County Agricultural Society was held at their grounds, near Staunton, on the 13th, 14th and 15th ultimo. Large numbers of visitors were in attendance each day, and financially the Fair was a grand success. The exhibition was creditable. The number and variety of articles were not as great as might have been expected from such a wealthy and flourishing county, but the quality of those exhibited was very fine. The main cause of the paucity of articles was that too much dependence was placed upon foreign contributions, and not enough effort made to bring out home productions. This is the fault of our county and district Fairs; they look to distant cities for their exhibitors; and while it is well to do all they can to encourage these, still they should not overlook the fact that their main object is to develope home resources. The Central State Societies will of necessity attract the attention of parties at a distance, and it is not possible for these to attend all the county as well as the State exhibition. The Horticultural department was not by any means full, but the show of apples was very fine. Some good specimens of grapes were also upon the tables; while the vegetables exhibited were of first quality. Too much credit cannot be given to the President (Col. Baldwin) and the Executive Committee for the great care taken to make the visitors enjoy themselves, and nothing could have passed off more pleasantly than did the whole exhibition. The grounds of this Society are admirably adapted to its purposes, and we are sure that a long and prosperous career awaits it.

WORK.—The *unit* by which quantities of work are measurable is the labor necessary to raise one pound the height of one foot through space.

Grapes Under Glass.

While so much is being done to foster the cultivation of our native grapes—to determine their relative value for wine-making or table use—to ascertain what varieties are best suited to each section of our vast country, and to produce new kinds, each one of which, as it makes its appearance, is loudly proclaimed to combine all the excellencies of its predecessors—we wish quietly to call attention to another kind of grape culture—that is, the cultivation of foreign sorts under glass. Every one who knows anything of them will readily acknowledge the superiority of most of them over any, even the best, of our native kinds, in size of bunch and berry and in flavor. If they could be grown out doors without protection, away would go Catawba, Norton, Delaware, Iona, Rebecca, Eumelan, and the host of others which require a catalogue of ten pages for their enumeration. But some protection they must have, and this has deterred many who are able to enjoy this luxury, from the attempt to grow them. The cost of a suitable structure is much less than is generally supposed; and though skill and experience will always excel, good results may be attained by following simple directions. First, as to structure. A simple frame house, weatherboarded back and front and at the gable ends, with common hot-bed sash well fitted on for a steep roof, is all that is necessary. A house 20 feet long, 6 feet wide, 7 feet high at the back and 4 feet high in front, will cost as follows:

300 feet plank, - - -	$7.50
7 pieces scantling (12 feet), - -	3.50
6 sash 5x6½ feet, - -	18.00
Door, - - - -	3.00
	$32.00

Any man who can use a saw and hatchet can build it, and any one who cannot will pay about ten dollars for the work. Of course this is not very accurate, as nothing is estimated for nails, digging post holes, &c. Nor is the proper allowance in the length of the house made for the strips between each sash, but it answers the purpose of showing that the plan is feasible to persons of very moderate means. This is the house; now for the grapes. A border must be prepared the whole length and in front of the house by digging a trench three feet wide and two feet deep; this to be filled with well rotted stable manure, woods earth, and good top soil in equal parts. The vines will be planted near the centre of the

trench, about four feet apart, and trained along under the surface of the soil to the apertures made for them in the front wall. It is better, however, that they make their first summer's growth in the open air. The holes through which they pass into the house must be carefully covered with earth. Once inside and fairly under way, the pruning and training is quite similar to that of grapes on a trellis out doors. The supports should not be nearer than six inches to the glass. The sash, or, at least, every other one, must be movable, so that there may be proper ventilation. Common sense, with such information as can be obtained from books, will soon settle all the details of management, and in the third summer there will be ample repayment for all the labor and cost.

We commend the experiment to all who are fond of Black Hamburgh, White Muscut, Barbarossa, Lady Downes, and other delicious grapes, which they can only obtain now by paying fruit venders one dollar per pound for them.

This, of course, is only intended for those who know absolutely nothing about cold graperies. Those who grow for profit are experienced, and have much more elaborate houses than the one suggested above.

Parlor Flowers.

The frost has already nipped many of our more tender flowers, and the more hardy ones will soon succumb to its rigorous demands. It is time, therefore, to arrange for in-door bloom, to enliven the dull and dreary days of Winter. The fortunate possessors of conservatories may have a large variety of beautiful flowers, from which those less fortunate are debarred; but there are many plants which can be grown and will bloom well in the drawing room.

Make a shelf by a southern or eastern window, and fill it with some of the following list; water when dry, and do not keep the room at too high a temperature, (the cooler the better, provided frost is kept out,) and you will have flowers until the Spring suns bring out early bloom in the garden: Hyacinths, in glasses and in pots. Bouvardia—all the varieties of this plant are showy, and though not profuse, are constant bloomers. The Camelia Japonica is almost indispensable, even in a small collection, and can be had in endless variety, from pure white to deepest crimson; these should be kept cool. Cincrania requires patient waiting until the latter part of Winter, when its ample show of bright eyed bloom will well repay the little attention required. Some varieties of Fuchsia will

bloom constantly through the season; to produce the finest effect, they should be kept in pyramidal shape. Of Geraniums and Pelargerims, the varieties are numerous, and nearly all are valuable as window plants. Add to these Heliotrope, Mignonnette, Sweet Allyesum, Primroses, and Stovia, for a constant show of white flowers.

Nut Culture.

The Hickory (*Carya*).—Had Columbus discovered nothing in the new world but the hickory tree, it would have been worth all the labor, danger and expense incurred by that inspired navigator. This may seem an extravagant statement, but we make it deliberately. But whatever *Goth*, *Vandal* or *Yankee* bestowed upon it, the harsh and uncouth name of "hickory" deserves not our thanks. Blessings on the gentle botanist who tried to make amends to the stately and precious fruit-bearer, by giving it the musical denomination of Carya. We will describe only the two most valuable varieties—Shell-bark (*Carya alba*), and the Pecan (*Carya olivæformis*)—first, however, giving the general characteristics of the tree. The soil it prefers is a deep alluvial loam, yet it grows well upon uplands. The Shell-bark is found in abundance in New York and other Northern States, but the Pecan is peculiar to the South and West. No tree of the forest attains a loftier height, or is clothed with a richer, more beautiful foliage. S. B. Buckley, Esq., states that he measured a Pecan on the Brazos, in Fort Bend county, Texas, which was sixteen feet, five inches in circumference at three feet from the ground, and one hundred feet in height. The County Surveyor of Navarro county, in the same State, says he measured one on the Trinity river which was *twenty-three* feet in circumference at three feet from the ground. There are few things about which Englishmen evince so much national pride as their oaks. They will give you the history, the age, and the dimensions of every famous oak in the three kingdoms. The *Beggar's oak*, in Bagot's Park, they will tell you is *twenty* feet in girth five feet from the ground. *Wallace's oak*, at Edenslee, near where Wallace was born, is *twenty-one* feet in circumference, and sixty-seven feet high—thirty-three feet lower than Buckley's Pecan in Fort Bend. A tradition states that Wallace and three hundred men hid themselves from the English in the branches of this great oak.

The Shell-bark has a broader leaf than the Pecan, and both are of a rich, dark and luxuriant green.

The Pecan (pronounced *pecon*, accent on the last syllable,) grows as far north as Missouri, and as far south as the Gulf of Mexico. Michaux states that he saw a swamp of 800 acres on the right bank of the Ohio, opposite the Cumberland river, entirely covered with it. The nut is about an inch, or an inch and a half long, smooth, cylindrical, and thin shelled. It is a delicious nut, but not quite equal to the Southern Shell-bark, which is much superior to the Northern variety. The latter, however, are rarely seen in the market, while the former are abundant, but higher priced, even here, than any imported nut. It is delightful to see the ease with which they grow from the seed. You may rely on them with as much certainty as any other crop whatever. I have about fifty young trees, all obtained from the seed. A fine Pecan stands in the Capitol grounds in Washington, and it is said, bears abundant crops of excellent nuts. The nuts can be obtained almost anywhere for planting; every fruiterer keeps them.

The wood of the hickory is very valuable, being employed in almost every branch of mechanics where tough timber is required, and for fuel it has no equal. Hickory hoop-poles are always in demand. The hickory is worth cultivating for hoop-poles alone. It is worth cultivating for mechanical purposes alone. It is worth cultivating for fuel alone. It is worth cultivating for its beauty as a park tree alone. Its value as a fruit-bearer is beyond estimation. Plant ten acres for your son, in Pecans and Shell-barks, and our word for it, he will find his ten acres quite enough.

The Government ought to encourage the planting of beautiful nut-bearing trees, by exempting all land planted in valuable fruit-bearers from taxation. I see no use in planting trees that are not valuable, when it is just as easy to plant those that are.

Care of Newly-Planted Trees.

Many tree-planters think that when the roots of a tree are once in the ground, the work is done; when, in fact, it is only begun. After the tree is carefully planted, it should be mulched with leaves, straw, tan, or whatever similar material is most accessible; not so thick as to exclude the air, but sufficiently so to retain the moisture in the soil; for, although there may be plenty of rain early in the season, the probability is that there will be a drought, more or less severe, before the end. The top should be shortened to correspond with the quantity of roots lost in digging up; and, in doing this, cut to a good bud, and one so placed that the shoot

which grows from it shall improve the shape of the tree. This will generally be on the outside of the shoot. As the prevailing winds in this country are from the west, it may be well to leave the limbs on this side a little longer, to assist in balancing the top. Make a neat cut, close, but not too close, to the bud, and, if you are very particular, cover the cut with grafting-wax to prevent evaporation. The cutting-back should be done as early as possible. If in an exposed situation, it must be staked, or otherwise prevented from shaking by the wind. It is sometimes difficult to drive a stake firmly in the soil just loosened by planting the tree, and, the larger the tree, the greater the leverage on the stake; so we prefer to steady the tree by placing large stones on the ground around it, which also assist to keep the ground moist. But for very large trees, we have found the best way to be to fasten four guys near the top, first wrapping a cloth around to prevent chafing, and making the lower ends fast to a short stake driven in at some distance from the tree. The lines need not be large; one of two or three ropeyarns twisted together will fasten a tree twenty-five feet high so firmly, that nothing but a hurricane can shake it. The further care will be mainly in destroying insects, and pinching out any useless shoots as soon as they start, and the ends of those which grow so much stronger than others as to impair the balance of the tree. —*Journal of Horticulture.*

AUTUMN TRANSPLANTING has many advantages over Spring transplanting; the first, and not the least important of which is, the comparative leisure of the season, especially to nurserymen. We know of no greater satisfaction than the reflection, at the approach of Winter, that all the work which could possibly be done to save time in the hurry and drive of Spring work has been thoroughly done; that all the gaps in the young orchard rows have been carefully filled, and the roots protected by sufficient litter against the cold of Winter, and the tops staked, or otherwise guarded against being shaken by the wind.

Another and perhaps a still greater advantage of Autumn planting is the superior condition of the soil—dry, warm and friable; while in Spring, especially on heavy soils, and even on light soils, in the early part of the season, the ground will often be so wet and cold that it is impossible to plant a tree properly. A man cannot set a tree in the best manner without putting his hands into the

dirt; and the discomfort of handling cold, wet earth, is not unworthy of consideration. Every owner of a fruit garden of any size should have a few large trees in reserve, so as to replace any that may die without injuring the uniform appearance of the rows; and, as these will require special care in transplanting, it should by all means be done in the genial days of Autumn, when both air and earth are favorable for the work. In such days, how can any man who intends to plant trees possibly defer it to the hurry of Spring, and very likely to the end of the season, when the buds are starting, and the danger of injury is tenfold? Besides the greater loss from evaporation, the greater injury of rubbing off the bud in handling is a serious consideration.—*Journal of Horticulture.*

Root-Pruning of Fruit Trees.—The *Western Rural*, in a careful article on root-pruning, prescribes this method for doing it best:

"In root-pruning, a trench is opened around the tree to be operated on, at a suitable distance from the trunk, that distance depending upon the size of the tree and the consequent extent of the roots. About one-fourth of the roots may be cut away, and as they extend nearly as far as the branches, the diameter of the circle formed by the trench may be regulated by the spread of the branches. In root-pruning small trees, the soil need not be dug out of the trench, as the roots may be cut by driving down a very sharp spade to the required depth. When a large tree is to be operated on, the lowest roots can scarcely be reached without removing the soil from the trench to the depth of a foot and a half, and then cutting a circle with the spade in the bottom of the trench, at least one foot in depth.

"When a tree has been deprived of the greater number of its fibrous or feeding roots by this method of pruning, manure should be applied to encourage the growth of others. A root-pruned tree, without the application of suitable manure, generally produces a large number of very small fruit; but when the trench is filled with suitable manure, and a heavy top-pressing of it applied to the area within the circle, very favorable results may be expected. On the whole, root-pruning has been found to be injurious to the longevity of trees, and should not be resorted to until all other expedients have failed. The best time for performing this operation is in the Fall, immediately after the growth of the tree has ceased."

Trenching for Roses.

So far as I have noticed, the very dry weather of this summer is producing an unusual amount of Mildew among the roses. As I happened to have one bed of hybrid perpetuals, all of which are in the most perfect health imaginable; free from even a suspicion of mildew during all the dry heat, it will interest many of your readers to know how this result has been obtained. It is simply by *trenching*.

The soil in this bed would, by most persons be considered extremely unfavorable for growing good Roses, being really nothing but light sand, such as is looked upon as just the thing for sweet potatoes. Two years ago last Spring it was trenched 20 to 24 inches deep, and very liberally manured with ordinary stable manure, the Roses being then planted a littte more than three feet apart. They made a rapid growth, and towards the end of November were deeply mulched with strawy manure, all of the mulching being removed about the first of April. Last year the bloom and growth were both admirable. They were again mulched during the winter, and as soon as the mulching was removed in the Spring, the Roses were pruned and the shoots pegged down in such a manner as to completely cover the bed.

Such masses of rich foliage and superb blossoms as they produced last June can hardly be imagined, and were worth almost any amount of trouble to procure. And as I said before the foliage is still in perfect health, in spite of the extreme heat and dryness; for the roots run far down into the cool and moisture of the deep soil.

GEO. SUCH, *in Gardener's Monthly.*

PEAR GROWING IN DELAWARE.—Against my own judgment, I left a few pear-trees in variety without cultivation. They have not done half as well as when I cultivate, and the fruit will only average about one third the size. I have an orchard of sixteen thousand pear-trees on my farm in Denmark, Delaware, one half standards and one half dwarfs, four, five, and six years in orchard this spring. My Bartletts and Belle Lucratives are producing from half-peck up to a bushel to a tree. Fire-blight is the great drawback to the planting of pear-orchards in this and other sections. I have not lost, I believe, one tree by fire-blight in my orchard of ten thousand trees. The seventeen year locust destroyed some for me last summer. I should have been pleased for some of your Boston pear-men to have seen my orchard in fruit.

Yours truly,

RANDOLPH PETERS, *in Journal of Horticulture.*

Wilmington, Del., Aug. 23, 1869.

Successful Plum Culture.—William Day of Morristown, N. J., an inveterate curculator-hater, lays down his rules for successful plum culture:

"First, let the planter be sure to secure thrifty trees; for no after-culture will compensate for the loss and consequent mortification and vexation of any attempt to recurerate *stuned plum-trees*; like a stunted mule, they may *grow*, but seldom *thrive*. Next plant as compact as admissible—say sixteen feet apart—in rows, in the form of a peach orchard, to the extent of one quarter or half acre at least, as a less quantity of ground occupied than we propose would hardly be a remunerative experiment. At this distance each way, 170 trees would plant an acre. Give the trees good nursing, care and attention, by constant cultivation, *until they are ready to bear*. I should have said the plat should be adjoining the hog-pen; then run around the patch a suitable inclosure, and turn in the hogs, and give them the 'freedom of the city,' from the time the first blossom is seen until the fruit is ripening, then turn out the hogs; spread clean straw around the trees for the fruit to be gathered upon; handle it with the greatest care; send immediately to market; pocket the profits, and lie down at night upon your pillow with a clear conscience, thanking the Almighty for so great a blessing as the delicious plum."—*Horticulturist.*

A Brilliant Flower-Bed.—Select or make a small isolated bed in some spot fully exposed to the sun, and let it contain fine sandy peat, or fine sandy soil of any other kind; and let it be well drained, of course, and place a few rustic stones round the margin and through the bed, half or more buried in the soil, so that the whole will be elevated a little above the grass level. Over the bed, beside the stones, &c., plant a few, a select few of the best dwarf sedums and saxifrages of the incrusted section; and perhaps, if you are fond of them, a few of the very choicest spring bulbs,—such, for instance, as that, little Siberian exquisite *Puschkinia scilloides*—just to vary the bed a little at all points, and give it unsurpassed charms in spring. But for the brilliancy and chief beauty, you must have a number of plants of a very beautiful hard perennial, *Calandrinia umbellata*. Make the groundwork of your bed of these, and put a few good specimens on the little elevations about the highest points and tiny rocks in your little bed. Plant in spring, give a good soaking of water in dry weather and wait for the result. The *Calendrinia* is a continuously-blooming plant; and it begins to flower, if well grown, you may expect a display of the purest magenta-colored flowers for many weeks.—O'Shane, *in Floral World.*

Mining Department.

Mineral Wealth of Nations.

IRON AND COAL.

[From an interesting and instructive essay, by Albert D. Richardson, on Mining, in the *American Year Book* for 1869,* we extract the following articles on Iron and Coal, two very important constituent elements of the mineral wealth of nations:]

IRON.

Iron, like gold, was known to the ancients. We read that "iron is taken out of the earth," and again that Tubal Cain was an "instructor of every artificer in brass and iron." One of the attractions of the Promised Land lay in its being a country "whose stones are iron, and out of whose hills thou mayest dig brass." And when Crœsus showed Solon his stores of gold, Solon answered, "If another king cometh who hath more iron than thou, he will be master of all this gold."

Iron is the most useful, most abundant, and most valuable of all the metals. It can be beaten into any shape, cast into the most intricate patterns, rolled into thin plates, and drawn into fine wire of the greatest tenacity. It is alike adapted to the most massive and the most delicate works. As an illustration of the enhancement of its value by labor, it is asserted that the worth of a piece of iron in different stages of manufacture may be as follows:—In the bar, $5; in horse-shoes, $10.50; in needles, $55; in pen-knife blades, $3,285; in shirt buttons, $29,480; in hair-springs of watches, $250,000.

Iron was used long before the Trojan war. Solomon's saying, "as iron sharpeneth iron," relates to a practice ancient even in his day. Monuments of Thebes and Memphis, forty centuries old, represent butchers sharpening their knives upon steel. Scythia was termed the "mother of iron." As early as A. D. 120, the Romans erected forges in Britain, and remains of their furnaces are still found upon the tops of hills. The ancients, however, had only wrought iron. The earliest notice of cast iron is found in the records of the 15th century. American Indians were altogether ignorant of the metal.

In Virginia in 1620, a ton of iron cost £10, the price of a man's labor for a year. Among the early American colonists, an iron pot

*Edited by David N. Camp, and published by O. D. Chase & Co., Hartford, 1869, pp. 824.

was often bequeathed to some heir as a special mark of esteem, and all pots and kettles used were of wrought iron. Virginia in 1662 forbade sending iron out of the colony, under a penalty of 10 pounds of tobacco for every pound of iron exported. The first iron works in the United States were built "on Falling Creek in Jamestown river," in 1619; but, three years later, the Indians destroyed the furnaces and massacred the workmen and neighboring settlers to the number of 347 persons. Iron works were established at Lynn and Braintree, Mass., in 1644. The first iron vessel cast in America was an iron quart pot, about 1650. In 1673, New England had five furnaces. In 1790, the first furnace was erected west of the Alleghanies.

The ancients melted the ores in open furnaces, into which air was forced by hand bellows. The metal collected in a "loop," and was then beaten on an anvil, the impurities separating in a semi-fluid cinder. The ores are now reduced by suitable fluxes in huge blast furnaces raised to an intense heat, sometimes estimated at nearly 3,000° Fahr., by currents of hot air driven in by powerful machinery. The resulting pig iron is then passed through puddling and rolling mills, and converted into wrought iron of commerce, which again, by the addition of a slight proportion of carbon becomes steel. The high blast furnace was invented in 1558. Up to 1700, the ores were reduced by charcoal; then bituminous coal was substituted. The puddling process was invented in 1784, and the hot blast introduced in 1827. Anthracite coal was first successfully used for smelting in Pennsylvania in 1835. The following statement of the iron product of the United States for 1867, shows the amount of pig iron produced by the different qualities of coal:

Anthracite pig iron, 784,783 tons; raw bituminous coal and coke, 318,647 tons; charcoal, 344,341 tons; total, 1,447,771 tons.

The early uses of iron were few and comparatively rude. Modern civilization has greatly stimulated its product, and introduced it into nearly all the industries of life. The first great increase in demand was due to railroads. Wooden rails were used until about 1700; then strap iron came in, but was not generally adopted. In 1767, the Colebrook-Dale iron works in Shropshire, England, had a very large quantity of iron on hand, as the prices were extremely low. The wooden railway belonging to the works requiring frequent and expensive repairs, the proprietors laid down their pigs of iron for rails, observing that when the prices of metal rose, they could easily take them up. Their greatly superior value soon became obvious, and it was found that ten horses could do the work which

formerly required four hundred. Still it took many years to bring them into general use. Now the total length of railways in the world is upwards of 170,000 miles, an iron belt that would encircle the globe six times, and is almost long enough to connect earth with the moon. In 1828, the annual product of pig iron was: Great Britain, 700,000 tons; United States, 140,000 tons; total product of the world, 1,000,000 tons.

The yield for 1866 (the latest full annual returns received), was:

England	4,530,051 tons.	Russia	408,000 tons.
France	1,300,320 "	Spain	75,0 0 "
Belgium	500,000 "	Italy	30,000 "
Prussia	800,000 "	Switzerland	15,000 "
Austria	12,000 "	Zollverein	250,000 "
Sweden	226,676 "	United States	1,175,000 "
Total			9,322,047 tons.

No gold and silver mines have ever been the sources of such uniform and long-continued prosperity as some of the rich deposits of iron in Great Britain and Pennsylvania. The iron product and manufacture of the United States has increased enormously within the last few years, and the vast beds of iron convenient to coal in various parts of the Union, are destined to make America the chief source of supply for the world. Pennsylvania takes the lead of all our States and Michigan follows. The Lake Superior region which made its first shipment in 1855, already produces nearly one-fifth of the iron ores of the United States. The product of this region is increasing with great rapidity. So is the yield of Missouri, whose three mountains of solid iron known as Iron Mountain, Pilot Knob, and Shepherd's Mountain, are among the most remarkable natural curiosities on our continent. Oregon is beginning to supply the markets of the Pacific coast with domestic iron. The product is very pure in quality and exceedingly abundant. The only furnace yet in operation is at Oswego, on the west bank of the Wallamet river, six miles south of Portland. Another company is formed, and works are building on the Columbia river, below the mouth of the Wallamet; and within the next few years the iron product of the State is likely to be very large. Colorado is already producing iron; and the ore is found in greater or less quantities in nearly or quite all the new States and Territories, as well as in all the older ones. Where coal is not convenient to the iron beds, the ore is often shipped to other States for reducing. The following table shows the estimated product, not of ore, but of pig iron, in our several States, for 1868:

Pennsylvania	850,000 tons.	New Jersey	47,000 tons.
Ohio	220,000 "	Michigan	60,000 "
New York	180,000 "	Missouri	20,000 "
New England States	35,000 "	Other States	65,000 "
Total			1,477,000 tons.
Add the amount of iron made in forges and blomaries direct from the ore, without being first reduced to pig iron			35,800 "
Total production of domestic iron in United States for 1868			1,512,800 tons.

Imports of iron into the United States for the first nine months of 1868:

Iron, pig and puddled	68,069 tons.	Castings	963 tons.
Bar, Angle, Bolt, and Rod	29,040 "	Hoops, Sheets & Boiler plates,	11,933 "
Railroad, of all sorts	209,368 "	Wrought, of all sorts	3,128 "
Total iron			322,501 tons.
Steel, unwrought			11,322 "
Grand total			333,823 tons.

COAL.

The English use this word generally in the plural, as "coals are high;" but with them it refers only to bituminous coal, the variety commonly used in Great Britain. In this country, the singular noun is applied to all the varieties. The two great divisions are bituminous and anthracite. Anthracite contains fewer gaseous products than bituminous, and is richer in carbon.

Coal was an article of export from Newcastle, England, in 1281. During the reign of Edward I. its use in London was prohibited by several acts of parliament, the smoke being regarded as injurious to health. But as wood grew scarce, coal was substituted, and for 200 years it has been the chief fuel of Great Britain. During the last half century, the growing use of the steam engine has enormously increased its consumption everywhere. The annual coal product of the world is now estimated as follows:

Great Britain	104,000,000 tons.	Belgium	12,000,000 tons.
North America	22,000,000 "	France	10,000,000 "
Germany	17,000,000 "	Other countries	7,000,000 "
Total (value $375,000,000)			172,000,000 tons.

The area of workable coal-beds in all the world, outside of the United States, is estimated at 26,000 square miles, of which 1,500 are in Australia, 6,000 in Great Britain, 1,000 in France, 800 in Austria, 500 in Belgium, and 100 in Russia. That of the United States, not including Alaska, is estimated at over 200,000 square miles, or *eight times as large as the available coal area of all the rest of the globe.* It has been calculated that at the present rate of consumption, the world's supply of coal would run out within

a few generations, but doubtless some new fuel will be introduced, or some new discoveries of coal made, before such a period comes.

Coal veins are usually reached by vertical shafts, but when found in hills are worked by horizontal galleries. On the slope of the hills opposite Pittsburg, 300 feet above the beds of the Monongahela and Ohio, may be seen the openings of many of these galleries. This mode of taking out the fuel is far cheaper than hoisting it. Coal shafts in England sometimes reach a depth of 2,000 feet. Upon the largest of them, ten years' labor has been expended, costing half a million of dollars.

The ventilation of the mines is an important point, and is best accomplished by up and down shafts, the foul air ascending in the former, and atmospheric air passing in to the workmen by the latter. Bituminous coal gives off large quantities of explosive gas, often causing terrible accidents. The Davy and Stephenson safety lamps prove of great service in preventing the ignition of this fatal fire-damp. Carbonic acid gas resulting from the explosion is known as choke-damp, and suffocates all who breathe it. Despite every precaution, such accidents are not unfrequent. One near Wigan, Lancashire, England, occurred in the latter part of November, 1868, causing the death of sixty miners.

The coal deposits on the James river, fifteen or twenty miles from Richmond, were the first worked in this country. The great anthracite region of Pennsylvania, with its thriving cities and large population, was a dense wilderness half a century ago. Thirty years ago few mines in America were sunk below water level. Anthracite was first used for ordinary fuel in 1804, and for generating steam in 1825. The first railway for its transmission was built in 1827. It now gives employment to upwards of forty railroads and canals.

Pennsylvania takes the lead of all our States in coal production, and, indeed, her yield is more than 77 per cent. of all the coal product of the Union. That from the central portions of the State usually goes east to tide water. That from the rich bituminous region about Pittsburg and the head waters of the Alleghany is used for local consumption, or passes down the Ohio and Mississippi rivers. Nearly all the States along the Alleghany mountains have rich coal fields, as have also Ohio, Illinois, Indiana, Iowa, Michigan and Missouri. Coal is found in workable form in more than three-fourths of all our States and Territories. The following table from the Census Report, gives the statistics of coal mined in the United States during the year ending June 1, 1860:

ANTHRACITE.

Pennsylvania	8,114,842 tons.
Rhode Island	1,000 "
Total	8,115,842 tons

BITUMINOUS.

Pennsylvania	2,690,786 tons.	Iowa	41,920 tons.
Ohio	1,265,600 "	Alabama	10,200 "
Illinois	728,400 "	Washington Territory	5,374 "
Virginia	473,360 "	Missouri	3,880 "
Maryland	438,000 "	Rhode Island	3,800 "
Kentucky	285,760 "	Michigan	2,320 "
Tennessee	165,300 "	Georgia	1,900 "
Indiana	101,280 "	Arkansas	200 "

Total Bituminous	6,218,080 "
" Anthracite	8,115,842 "
Grand total (value $20,243,637)	14,333,922 tons.

Increase in value since 1851, 182 per cent.

No full official statistics have been collected since, but the returns of the Internal Revenue for 1864 show the product of that year to have been 16,398,186 tons, and the total product for 1868 did not vary far from 19,000,000 tons, valued at $26,000,000. The ratio of the several States has not changed greatly since 1860, except that the product of California, has sprung up. Her Mt. Diabolo mines are yielding about 200,000 tons annually. A land carriage of six miles and a water carriage of fifty, takes their product to San Francisco. The Bellingham Bay mines, in Washington Territory, already yield largely, and are capable of much greater development. They produce an admirable quality of coal, used extensively on the Pacific coast for manufacturing purposes. In our Atlantic cities, English cannel coal is used for making gas. The duty on imported coal is $1.10 per ton of 28 bushels. Our imports and exports for 1867 are given as follows by the United States Bureau of Statistics: Coal imports, 521,305 tons, value, $1,455,044; exports, 285,101 tons, value, $1,846,199. The export is chiefly anthracite, and more valuable than the imported qualities.

MEXICO is extremely rich in gold and silver. The total product of her mines, since the conquest by Cortez, has been estimated as high as $3,000,000,000. The ancients worked veins of silver, tin, and copper, but were ignorant of iron.

Erratum.

There is an error in the article on "Coal" in our October number, eighth line from the top of page 625: instead of "1752" read 1792.

Household Department.

Rural Architecture.

No. 2.

Not only is the hexagonal form the best for the interior of dwelling houses, but for the exterior, it is, in my opinion, infinitely more elegant than any other form. The English artist, architect and poet, John Ruskin, thus discourses on the external features of architecture. "Until our street architecture is bettered, until we give it some size and boldness, until we give our window recesses and our walls thickness, I know not how we can blame our architects for their feebleness in their more important works. Their eyes are inured to narrowness and slightness; can we expect them at a word to deal with breath and solidity? An architect should live as little in cities as a painter. Send him to our hills, and let him study there what nature understands by a buttress, and what by a dome. Positive shade is a more necessary and more sublime thing in an architect's hand than in a painter's. As the great poem and the great fiction generally affects us most by the majesty of their masses of shade; so there must be, in this magnificently human art of architecture, some equivalent expression for the trouble and wrath of life; and this it can only give by depth or diffusion of gloom, by the frown upon its front and the shadow of its recess. And among the first habits that a young architect should learn, is that of thinking shadow, not looking at a design in its miserable liny skeleton, but conceiving it as it will be, *when the dawn lights it and the dusk leaves it*, when its stones will be hot and the crannies cool; when the lizards will bask on the one and the birds build in the other. Let him design with the sense of cold and heat upon him; *let them cut out the shadows as men dig wells in unwatered plains*; and lead along his lights as a founder does his hot metal; let him keep the full command of both, and see that he knows how they fall and where they fade. We thank thee, Ruskin, for this matchless word-painting; and humbly answer, that our hexagonal exteriors answer all these requirements; now projecting with bold strength of outline, into the warm sunlight, and now nestling into the cool shadows of piazza, *loggia*, pavilion now porch. And all this variety of sunshine and shadow is not wrought out for the mere purpose of making a building beautiful, but is primarily ob-

tained for the *strength and economy of the structure.* Architects have hitherto tried in vain, to secure the greatest amount of beauty, with the greatest economy and strength of structure. We think the hexagon house secures both beyond any thing that has yet been built. It has been known for ages that bees construct their calls of the largest size and strength possible, in proportion to building material employed, and *each cell is a hexagon.* So, even in architecture, instinct may instruct reason. Instinct makes no mistakes, and may convey many valuable lessons to the proud reason of man, if he will but stoop to learn. In a magazine article, we cannot enter into details; but we hope our readers will follow out these hints for themselves, and we will close this part of our subject with a few more quotations from our favorite Ruskin. "Architecture is an art for all men to learn because all are concerned in it, and it is so simple, that there is no excuse for not being acquainted with primary rules, anymore than for ignorance of grammar or spelling, which are both of them far more difficult sciences." "When men do not love their hearths, nor reverence their thresholds, it is a sign that they have dishonored both." Our God is a household God, as well as a heavenly one.

Cloth from Hop Vines.—Mr. Van der Schelden, of Ghent, in Belgium, has discovered that the hop contains a first-class textile material, and has invented a process by which the fibers of the vine can be used for cloth without, in the least, interfering with the crop of hops. The following is said to be Mr. Van der Schelden's process of separating the fibres:

When the hop blossoms have been gathered, the stems are cut, put up in packets, and steeped like hemp. This maceration is the most delicate process, since if it be not made with all due precision, it is very difficult to separate the threads of the bark from the woody substance. When the stalks have been well steeped, they are dried in the sunshine, beaten like hemp with a beetle, and then the threads come off easily. These are carded and worked by the ordinary process, and a very strong cloth is obtained. The thickest stalks, also, yield the material for several kinds of rope.

Soaping Cloth for Sewing.—We often wish to make garments of new, bleached muslin before washing the fabric, and the starch contained in it makes it difficult to do so. To obviate the difficulty, take a bit of hard soap and shave it down to an edge, and run it along the edge of the cloth you wish to sew, and you will find it will have a magical effect. It is equally efficacious if yon are to use a machine.

THE SOUTHERN PLANTER AND FARMER.

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Editorial Department.

Augusta County Fair.

It gives us pleasure to report that, the late exhibition of this association is generally represented to have been attended with decided success. A detail of many particulars of the proceedings on the Fair grounds, in addition to what are given elsewhere in this issue, would have proved highly interesting to our readers, but we are withheld from presenting them by the appropriation of all of our disposable space to the reproduction, in part, of the admirable address of Prof. Mallet. We say in part, because we are compelled, for want of room in this number, to reserve a portion for our next issue. This address is fraught with the rich and matured fruits of his profound knowledge of chemistry, and its cognates as applied to agriculture, and is expressed in language so simple and upretending, and yet so clear and perspicuous, as to adapt its teachings to the commonest standard of popular intelligence:

ADDRESS OF PROF. J. W. MALLET,

DELIVERED AT THE AUGUSTA COUNTY FAIR, WEDNESDAY,

OCTOBER 13, 1869.

Gentlemen of the Agricultural Society of Augusta County:

In accepting the invitation with which I was honored a few weeks ago to address you upon this occasion, I was conscious of my inability to bring before you much of interest or value, but I felt that the invitation was one which, on several grounds, it would have ill become me to decline.

The conditions which surround us in Virginia at present are such as to render it in a very high degree desirable that all the useful arts of life, and especially agriculture, from which all the others spring, shall be fostered and advanced by every legitimate means.

The work set before the men of our day is so plainly the re-building of the ruins in the midst of which we find ourselves placed, that no difference of opinion upon this head exists, and no discussion of so simple a proposition is necessary. We all see that the results of

the toil of generations that have preceded us are swept away, and that we are called upon, by more than the usual incentives that stimulate the exertions of men, to labor for the speedy restoration of material comfort and prosperity amongst us. It may safely be said of Southern men that they are *willing* to go to work, and that they manifest an increasingly strong disposition to do so, not singly and selfishly, but with such mutual aid and encouragement as come of united public efforts. Those are none the less willing to work *together* helpfully and hopefully now who remember that they have stood shoulder to shoulder in other and yet more severe trials in the past.

Amongst such united efforts at advancement in material prosperity there seem to be few better calculated to do good than the annual meetings of societies like yours, bringing together the people of large districts of the State in pleasant social gathering, affording opportunity for full discussion of questions of industrial interest, and displaying the actual results of improved agricultural practice and the novelties of mechanical ingenuity.

It is the duty of every member of the community to aid on such an occasion in any way he can—best, by far, in the exhibition of some visible success achieved with the plough or the hammer; but if not so, then even in the inferior capacity of the speaker of a few feeble words, which, so far as they go, may at least be not inappropriate.

It is not only as a member of society, however, that I feel a most lively interest in the operations of such societies as yours and a hearty readiness to assist in them by any humble means in my power. The duties of the Chair which I have the honor to hold in the noble University of the State make me particularly desirous of profiting, as a student of agricultural science, by the valuable opportunities for gaining information, both by eye and ear, which occasions like the present afford.

He whose duty it is to teach, if he would be more than a mere charlatan and pretender, must be especially solicitous to learn himself—and one can seldom, during the year, find himself so well situated for collecting information bearing upon agriculture, for getting at new and interesting facts, and for comparing the various opinions and experience of many intelligent men, as in the midst of an assemblage like the present.

But, yet further, I have felt that a peculiar obligation rests upon me to appear before you to-day, as affording a fitting occasion for the acknowledgement of a debt of thanks which the State University and the State itself owes to the liberality and public spirit of a former citizen of your county.

The professorship of Chemistry, in its special applications to agriculture and the other useful arts, is one the probable utility of which had long been recognized, but which could only be established in a really efficient form by the expenditure of large sums for buildings, apparatus, and material, so as not merely to provide for the performance of chemical operations by the teacher, but also for the

practical instruction of students working with their own hands. It is upon the bequest of the late Mr. Thomas Johnson, of Augusta county, that the University of Virginia has been able some two years ago to introduce the study of the scientific relations of agriculture amongst the subjects of instruction within her walls, and since then to erect a new Laboratory building of such ample size and thorough equipment as to challenge comparison with any institution of learning in America, in which the student may verify upon his own work-table the facts of nature of which he reads, and may learn to determine such facts for himself, to ascertain the constituents of a soil, analyze a specimen of manure, find out the real value of a marl, or prove the nature of a supposed metallic ore. A still larger gift to the University, intended for the promotion of agricultural science, has of late added to its means of usefulness in the same general direction; but, as I have said, the present is a peculiarly suitable occasion for acknowledging the original obligation of the State at large to your county for a service, the value of which you can correctly appreciate.

When called to the professorship in question, and in attempting to enter upon its duties, I have felt most strongly that, in order to any really rapid and steady progress in scientific agriculture, it is of the highest importance that there should be a more thorough mutual understanding and more concert of effort between scientific workers in the Laboratory and practical farmers in the field than have generally existed heretofore—that the chemist shall by all means help the farmer if he can, but that the farmer shall also be willing to help the chemist, and shall see the importance even to himself of his so doing—that both shall work together in a spirit of mutual good-will toward the attainment of such knowledge of the laws of nature as may help us in the great task of bringing forth from the earth food for the use of man.

It is to a few remarks upon this head that I venture to ask your attention to-day:

To almost any one who has noticed the general progress of scientific agriculture for the last thirty years it will be evident that there has been a want of such concert of thought and effort as I refer to.

Scientific writers, at least those really deserving of the name, have addressed themselves almost exclusively to scientific men—their works have been based mainly upon experiments made on a small scale, in the laboratory, or under more or less artificial conditions—their reasonings and conclusions have been expressed in language so far technical as to repel the greater number of general readers. On the other hand, the efforts made by practical farmers have been made, in far too many instances, without an adequate knowledge of such well-ascertained laws of nature as bear upon the questions at issue, without acquaintance with the facts already ascertained by workers in the same direction, and without such a degree of accuracy and precision in the determination and statement of the means employed, and the results obtained, as can alone render useful to others the experience of those devoting themselves to such research.

Such one-sided investigations, whether by the men of science or the tillers of the soil, are greatly to be deplored.

Amongst the noblest pursuits that can engage the thought and energies of man is the discovery of the unchangeable laws of eternal nature and the manner in which we must make our work accord with their dictates if we are to draw from the stores of wealth with which a kind Providence has surrounded us, all that we may enjoy of comfort and prosperity.

There are four principal steps in the process by which man learns to subdue the resources of the world about him to his service and enjoyment:

First—*Observation* of facts in nature.

Second—*Experiment*, for the discovery of further facts.

Third—*Logical deduction* of principles from the facts ascertained.

Fourth—*Application* of facts and principles when determined, to the practical wants of our daily life.

The husbandman notices the regular return of seed-time and harvest, the usual succession of the seasons, the facts that certain plants require certain climates and thrive best in certain soils, that in a new country a dense natural growth of hard-wood trees is an indication of fertile land, while thin scrubby pines furnish as distinct evidence of poverty of soil.

As regards such observations, the main requirement is that they be *accurate*—that they be recorded in such a way as to really represent the truth, not a part of the truth, but the whole truth, fully, fairly, and impartially stated. Thus, for instance, it is matter of the most common remark that the accounts given by travelers, in distant, and little known countries, of what they have seen and learned vary enormously in reliability. Two men will visit a foreign land, and, although both men of intelligence, both having had fair opportunities for observation, and both free from any disposition wilfully to deceive, they will make reports differing from each other almost as light from darkness. The one may be careful to examine into the sources of his information and to verify his supposed facts as he accumulated them—the other may set down as facts what he has but imperfectly seen or uncertainly heard. Or, even though both reports contain nothing but well-ascertained facts, nothing but what could be proved to be true, yet the one may contain a large and fair collection of *all* the principal facts bearing upon the questions discussed, while the other contains only such unusual and exceptional facts as totally misrepresent the general condition of things. I know not what your experience here may have been, but further South there are few people who have not, within the last three or four years, heard just such conflicting accounts of the observations made in Brazil and some other countries by those who went thither at the close of the recent war; some of those who returned represented the region visited as a paradise, in which it scarcely required more than the exertion of dropping the seed to ensure the most luxuriant harvests, while others brought away the impression that the hardest toil and greatest privations could scarcely be

expected to result otherwise than in half starvation, ruined health, and shattered fortunes.

It is not so simple or so easy a matter as it at first appears, to see truly, fully, and without distinction what is before our eyes, and then faithfully report what we have seen, neither more nor less, to others. A farmer who has always lived in certain portions of Virginia might state as the result of his observation that red land yields good crops. Another, living in parts of Georgia or Alabama, might assert that the poorest soil is that of the red lands—both statements might be locally quite correct; but if either be put in the form of a general observation that all red land is good or all bad the error of fact is manifest, and the two observers might dispute forever over their so-called facts without deriving any benefit from the arguments.

But the thoughtful man is unwilling to rest satisfied with simply thus observing what passes before his eyes in the undisturbed course of nature. He often desires to change the conditions which go to produce a certain result—to see what will happen if such and such arrangements be made by himself beforehand—to take the plant which he has always noticed growing by the water side and see whether it can be made to grow in upland soil; and, if so, whether its habit and character will be altered—to determine by experiment in the labroatory what are the substances drawn from the earth by a particular crop; and by experiment in the field whether the application of these substances artificially to poor land may not increase its fertility—to find out the several circumstances which separately seem to favor the production of any form of vegetable growth, and then, by attempting the culture of the same, under all these favorable conditions united, to try what is best, and the largest product which can in practice be obtained.

In making such intentional changes of natural conditions *in trying experiments*—the same accuracy, the same careful attention to what really takes place before our eyes must be observed as when we simply notice the operations of nature unassisted by the efforts of man.

And, in addition, much thought must be bestowed, much judgment must be exercised in deciding upon the precise manner in which, and the extent to which, special arrangements are to be made to bring out the precise result of which we are in search.

Every experiment is a question asked of nature, and nature never returns a false answer; but we must take care, first, that we ourselves know exactly what question we want to ask; secondly, that we ask that question and no other, no more and no less, and thirdly, that we understand what the answer returned actually is.

Three farmers might undertake to experiment upon the effect of common salt upon the soil—one might report that the result was excellent, and the improvement of the crop manifest—another exactly the reverse, that positive injury was done—and the third that no effect of any kind was produced. On sifting the matter it might be found that one had used a certain moderate quantity of the

material in question, another an enormous and excessive amount, and the third so little as not perceptibly to influence the crop at all. Or it might appear on examination that the same quantity had been used by all, but upon different soils—by the first, upon land some of whose dormant constituents were rendered soluable and useful by the salt; by the second upon a soil poor in most of the necessary mineral ingredients, but already containing largely of salt, and susceptible of injury by further addition of it; by the third upon a soil sufficiently supplied with soluable mineral matter of all needful kinds to do perfectly well without the solvent action of the salt, yet not liable to special injury by such surplus of this material as had been brought in by the manure. Or, yet again, the experiment might have been tried upon similar land, but upon altogether different crops or in altogether different seasons.

While, therefore, we must be very careful in sifting the details of the information, we suppose ourselves to have gained from observation of what is going on in nature about us, and must be equally careful in arranging the conditions of our experiments and in stating the precise character and extent of the evidence accumulated by such experiments, we must still further exercise caution as to the logical conclusions we draw from our facts when we have got them—as to the manner in which we reason from these facts, assuming that they have been well determined.

There are many ways in which we may deceive ourselves as to what is really proved by admitted facts before us.

Thus, we may arrive at a conclusion from considering a number of separate statements taken as true, but of which some are in fact only probably or approximately true, and uncertainty of the conclusion increases astonishingly fast with the number of such doubtful assumptions, though there may be very little doubt about each of them by itself. For example, one may assert that his experience fully proves that a particular farming practice will be found profitable, making out, perhaps, a very clear statement of expenditure and return under the proper head, but assuming a little with regard to each—that the cost will be about so much—that the difference of cost to him, and to other farmers, cannot be more than about so much, and that about such returns may be looked for on an average of different years. A very little error under each head will often be found to lead to woful error in the general result.

Again, it is extremely common to find facts—themselves thoroughly well established—coupled together in the relation of cause and effect without any proper warrant, but simply in consequence of some, perhaps accidental coincidence of time or place. A sick man is visted by the Doctor, who prescribes a dose of a particular medicine—the patient takes this, and soon after gets well or gets worse, as the case may be—how often do we hear the assertion that this *proves* that the patient has been cured or injured by the medicine, though, perhaps, the result would have been exactly the same if he had refused to take the prescription at all. In like manner it is amusing to notice the different styles in which the supposed effects of different

manures are spoken of in seasons of particularly favorable or unfavorable weather. In a very favorable season pretty nearly all crops do well, farmers are in too good spirits to make very precise comparisons, and every one who has used any fertilizing material is disposed to say that, because he has made such or such an application to his land, and has obtained a fine return from his fields, therefore he has "made the good crop by the manure," and that the particular fertilizer he has used is that he is going to stick to in the future, and to recommend it to his neighbors. On the other hand, in a very unfavorable year, one of excessive heat or continuous rain for instance, *no one's* crop succeeds; every one is disappointed, and there is a strong tendency on the part of all those who have employed fertilizers to declare the materials they have severally used worthless—each farmer, whether he impute fraud to the manufacturer of whom he purchased or not, at any rate vowing that he will never again use the special material to which he attributes his ill success.

It is highly important to remember that, while a particular result following after a particular procedure *on one occasion* of itself proves but little as to there being any true connection between them, if a like coincidence happen a second time the probability that the one is caused by the other is much strengthened, and if such experience often repeated shows that the supposed cause is always or almost always followed by the same result, while in the absence of the former the latter is also absent, the mind can arrive at but one conclusion.

If a single farmer had on a single occasion strewn super-phosphate of lime upon his field, and in that season made a good crop of rutabaga, it would be far from proved that the proper manure with which to prepare land for this plant had been found—but, when we find that the application of super-phosphate of lime after having been tried for many years and by thousands of farmers, almost always is succeeded by fine crops of field turnips, we are justified in concluding that the manure used has really been the cause of the general success, and that the exceptional cases of failure have been due to other causes—peculiar to the place or season—interfering.

But even if our experience has been extensive enough to fully satisfy us of the dependence of a certain effect upon a certain cause, we may be wrong in assuming that that cause acts *in a particular way.*

Correspondence of Southern Planter and Farmer.

To the Editor of the Southern Planter and Farmer:

Dear Sir—Judging from newspaper accounts, one would suppose that the negroes had taken possession of Washington, and were ruling it with a high hand, politically and socially; on the contrary, very few negroes are seen on the streets or at public places. I was at the President's grounds this evening,

where the Marine band, uniformed in red like true Britishers, discoursed delightful music, and among at least one thousand persons which literally filled the grounds, there were not more than fifteen or twenty negroes of both sexes to be seen, and they behaved as well as in time of yore.

I have seen the much talked of Capitol. The external view is very fine indeed; the architecture is simple and chaste, but the dome is too large for the height of the building, and looks like a nightcap on a burly, well-dressed alderman, if such a homely comparison is admissible—but, be that as it may, the *tout ensemble* looks well enough and the effect is rather pleasing. I was rather disappointed, though, on viewing the interior; it is true that the rotunda, like the cupala, is on a grand scale, but all the corridors and passages are narrow, contracted, and not at all in proportion with the central figure of the architectural pile. The Halls of the House and the Senate are not what I expected them to be; they present nothing that strikes the eye, and the adornment and gilding are all gingerbread work. The paintings in the rotunda, so much admired by some people, are hardly second rate works of art; the execution is coarse; the conceptions are neither ideal nor poetical; they are matter-of-fact pencil sketches without originality or even spirituality. The men and women painted are not those they are intended to represent, neither in person nor appearance; they are really men and women of the present day, and not of the best type; but the fresco painting in the dome caps the climax; it is simply absurd in its conception, too glaring in its coloring, and too spiritless in its execution. Washington, beatified in Heaven, looks like an ash-colored ghost, with a piece of pale, purple-colored cloth thrown over his knees. The Goddess of Fame and the Goddess of Liberty are certainly two Massachusetts women of stalwart frame, but not too fine looking. War is represented by some grotesque human figures carrying the incendiary torch, and belching forth bullets from a cannon. But Commerce excels all the others in absurdity; it is represented by Mercury, who does by no means look like a god, holding out a purse of money to Robert Morris, the revolutionary financier—what an idea! Finance and Commerce are not exactly the same, and require different symbolical figures; but it is hardly worth while to spend more ink on this worthless production of the fine arts.

I ascended and descended the three hundred and thirteen steps that lead to and from the uppermost gallery of the dome, and I enjoyed the view, which is not grand but beautiful, of the city and Potomac; mountains are wanting to make the prospect a grand panorama of nature; the Potomac, be it said in parenthesis, is certainly a grand old river, and presents the most beautiful sheet of water I have seen in these States—far superior in every respect to the *beautiful* James, beautiful only to the eye of Virginians, probably on account of its pleasant associations and old reminiscences.

In all the public buildings I have not seen a single specimen of sculpture, with the exception of that of some public man.

The grounds around the Capitol are handsome, but too small, considering that this is "*la grande republique*"—the country that has the longest rivers, the highest mountains, the largest lakes, and everything else the best. I went from the Capitol to the White House—this looks very neat and somewhat stylish, but does not recommend itself particularly as a work of art; it has the same fault as the Capitol; all the rooms, the blue, green, red, are narrow and contracted. The furniture would be elegant for the parlors of a private person, but it is not such as might be expected from a people who spend annually four

hundred and fifty millions of dollars to pay their officials, and provide for the frauds and stealings of their public men; it would be in perfect harmony with republican simplicity, provided the expenditures of the Government were not exceeding those of any other country, and the public money were not spent with monarchical, if not imperial liberality.

From the Presidential Mansion I went to the Patent Office; this building is indeed very fine, but the interior has again disappointed me. The halls of exhibition, at least one portion of them, display too much color, like some parlors or sitting rooms. They have columns, massive and strong, but painted blue, with black and white striped pedestals—what perversity of taste! Half an hour's rambling through the model rooms satisfied my curiosity completely. After I left the Patent Office, I took a ride on the cars to Georgetown—the street cars are a great institution here, especially as you can make a railroad promenade of five or six miles for the paltry sum of six cents. Georgetown is an old, ugly town, and presents nothing that is remarkable. On Saturday I paid a visit to the Smithsonian Institute—the materials used in building are very appropriate, as well as the style, only it is too small for a world institution, such as it is designed to be. There, for once, the interior corresponds with the outside appearance, and everything is in harmony and proportion. The Indian and Asiatic cabinets, indicative of the civilization of these races, are somewhat original. The zoological, mineralogical, and geological collections are extremely limited, and the specimens are not always of the best kind. The only collection that presented great interest to me was that of corals, which is, perhaps, the best in the world, and includes some of the most beautiful specimens I ever saw. The officials of the Patent Office and Smithsonian did not have great advantages of education, for in the first, on a label, nutritive was spelt *nutrative*, and in the latter, chief justice was spelt *cheif* justice—these are certainly good specimens of Washington employees. I next went over to the Agricultural Bureau, and here I found everything gotten up in fine style, and beautifully arranged; the gentleman at the head of this department is systematic, and performs his duty well. The museum is small, but very neatly gotten up. The frames presented by Vilmorin, of Paris, containing specimens of at least fifty or sixty different kinds of wheat, are in very good taste, and beautifully arranged, as it seems only a Parisian is capable of doing. I also had the pleasure of taking a close view of the famous Washington monument—it is designed to reach a height of five hundred feet, but has only attained to the diminutive stature of one hundred and seventy-five feet; if it ever rises to its full altitude, it will be the highest structure in the world, with the exception of the Tower of Babel, whose fate it may share of remaining unfinished. I saw the stones so far contributed; they are mostly from Masonic lodges, Odd Fellows, Temperance societies and Sunday Schools—Bremen, Switzerland, Greece, and a few others, are the only European contributions. On some of these stones there are engraved the name of the officers of the society, to immortalize themselves instead of Washington, but they will be defeated, because they will be placed so high that no one will be able to discern even the letters. Speaking of monuments, I cannot refrain from remarking that the Washington monuments are perfect abortions. Lafayette and Jackson, both represented on horseback, are placed on such low pedastals that the effect is entirely lost, they look as if they were about leaping on horseback over a small hillock that obstructs their path. Lincoln in marble, placed on a marble column, in citizens dress, looks more like a horse jockey than a

man who deserved a memorial in brass or marble. Let me, however, add that the Richmond Washington monument is, perhaps, the finest on the continent; the design is beautiful, the execution is spirited and elegant, if not classical.

The Plough from a Philological Standpoint—The Root AR.

Any philological discussion may seem foreign to that practical character which an article for an agricultural paper should have; but perhaps it may interest your readers to trace the word for plough from its Argan origin into our modern English, and thereby to deduce the importance and dignity of agriculture from the very words we utter, and at the same time to show how an original root ramifies as it comes down the ages, after branching off into a numerous family of words, connected by the tie of a common origin and a family likeness, but differing in meaning as much as the children or grand children of the same parents often differ in occupation, location, and habits of life. In order to make the tracing of this root *ar* or plough perfectly intelligible, it is necessary to state that comparative philology develops the fact that the Saxon, German, Latin, Greek Sanscrit, ancient Persian, &c., are all sister languages, having the same relation to each other and to a parent language, which the French, Italian, and Spanish have to each other and to the ancient Latin as a parent language. Philologists tell us that there was a time when the progenitors of those races which use or used the Indo Germanic or Argan family of languages dwelt together on the plains of central Asia, where they reached a considerable degree of cultivation at a very early period, probably cotemporaneous with Noah himself, and where they impressed that character upon their offspring which has made them, from time to time, the ruling races of the world. It is not to our present purpose to inquire when, or how, or why this people left their original; but they did leave them and migrated. Some went southward and eastward to India, where the Sanscrit cultivation was soon developed, with its wonderfully perfect language and its magnificent literature; and this, too, at an early period—long before Solomon built his temple, while as yet the mythic gods and mythic heroes that contended around the walls of high Troy were far back in the womb of the future. But while some of the original clan wandered southward, most of them went toward the west—some by the southern route to Greece—developing the Greek language, mythology, and literature; some farther north to Etruria and Latium, founding the Latin civilization; some went still farther northward to Germany; some farther still to Scandinavia, and these last are our Saxon ancestors. This original, central clan called themselves *Ar*gans or *plough*-men, and this original root, *ar* or plough, appears in the whole Indo-Germanic or Argan family of languages. Muller recognizes it in the Sanscrit, Old High German, Gothic, Gælic, Old Norse, Welsh, &c. The Greek has it in *aro*-o I plough, *aro*tron a plough, *aro*ura a ploughed field. It appears strongly in the Latin, *aro* being I plough—*ara*tor, a ploughman—*ara*trum, a plough—*aro*um and *ager* a ploughed field—*ar*mentum, work cattle. And it appears specially in the Saxon. We have in English *ar*able, *agri*culture, &c., through the Latin; but independently of the Latin we have many purely Saxon words exhibiting the same root. The Saxon word *ear*th itself is simply what is ploughed—*ear* (of grain) is simply the result of the labor of the plough; while by a slight change of initial breathing

we get *year*, meaning thus, plough or work time. *Hearth* exhibits the same *ar* aspirated, and points to a time when our ancestors lived in cabins, or on the naked ground, having their fires on the *earth* or *hearth*. Max Muller, who mentions most of these examples, refers *aroma* also to the same root—and also art, artist, artistic. In this sense *aroma* is primitively the smell of a ploughed field—Isaac comparing the smell of Jacob to the "smell of a field which the Lord had blessed;" while the first and most important *art* is in this sense the art of handling the plough; the first *artist* a ploughman, and *artistic* work good ploughing—an interpretation, by the way, from which some of our modern artists might beg leave to demur. An original root would soon beget a numerous family of words having the family likeness, but different meanings. Labor of the plough would, when the Argans reached the sea, naturally pass into labor at the *oar*, the *oar ploughing* through the water as the plough did through the land—which by a very common transposition was called *rowing*. This derivation of oar and row is defended by the fact that the English plough is the Greek ploion, a *ship of burden*—and the classic poets often speak of a *plough sailing* through the field, and of a *ship ploughing* the sea, and we preserve the latter figure in modern English. And as the ship *oared* through the water, so the bird *soared* through the air, that is, ploughed the air with his wings, a derivation defended not only by the family likeness of the words, but by the classic expression "remigio alarum," "by the oarage of his wings," so often applied to Mercury, Perseus, &c. As the *ear* protrudes from the stalk, so the *ears* of animals protrude—and to use the *ear* is to *hear*; the Argan word for plough thus naturally but strangely naming one of the most important senses. The English *arm*, *arms*, *armour*, through the Latin *arma*, *armare*, and the obsolete Greek *aro* I fit, I join, probably have the same origin, the first fitting or joining done by the old Argans being in the manufacture of their rude ploughs, their first *arms* being the peaceful implements of agriculture, which, however, so soon degenerated into the deadly armour of bloody war.

Examples might be multiplied; but enough has been said to illustrate the root *ar*, and to show that our very language gives dignity to agriculture, and makes the plough the foundation of all prosperity, and that our ancestors, so far from being ashamed of manual labor, called themselves *Ar*gans or *plough*men. Enough has been said, too, to interest those who fancy such speculation in the exceedingly rich and varied science of comparative Philology.

Book Notices, &c.

ANNUAL REPORT OF THE BOARD OF REGENTS OF THE SMITHSONIAN INSTITUTION, showing the operations, expenditures, and condition of the institution for the year 1868. The report is presented by the venerable Secretary, Joseph Henry, and addressed to the President of the Senate and Speaker of the House of Representatives. The programme of the institution as adopted by the Board of Regents, December 15th, 1847, is republished, and there is a general appendix to the report containing interesting and instructive memoirs of Cuvier, Oersted, Christian Frederic Schoenban, Encke, and Eaton Hodgkinson—also, Recent Progress in relation to the Theory of Heat; Principles of the Mechanical Theory of Heat; continuous movement of all matter, Ponderable and imponderable, &c., &c., with a large amount of practical matter on which we may often find occasion to draw for the instruction and entertainment of our readers.

Farmers' and Mechanics' Manual. With many valuable Tables for Machinists, Manufacturers, Merchants, Builders, Engineers, Masons, Painters, Plumbers, Gardeners, Accountants, &c., 506 pp. octavo, by W. S. Courtney, revised and enlarged by Geo. E. Waring, Jr.—E. B. Treat & Co., publishers, 654 Broadway N. Y. Sold only by subscription. Nearly fifty pages of this valuable book are devoted to soil, the composition of different kinds; Exhaustion of Soils; Manures, liquid and artificial; Draining, and the reasons for it; Rotation of Crops; Properties and composition of milk, butter, &c.; Butter and Cheese making; Soiling cattle; Steaming food for stock; Gardening for market; Steam cultivation, &c., &c.

The American Year Book and National Register for 1869—Astronomical, Historical, Political, Financial, Commercial, Agricultural, Educational, and Religious. A general view of the United States, including every department of the National and State Governments, together with a brief account of foreign States, embracing Educational, Religious, and Industrial statistics; facts relating to Public Institutions and Societies, miscellaneous Essays, Important Events, Obituaries, &c. Edited by David N. Camp, published by O. D. Chase & Co., Hartford, Connecticut. In a word, containing more useful and practical information on many subjects than can be found in a reasonable time by a widely extended research through many volumes, each written on one or another of these specialties.

Abortion in Cows.—We are indebted to the courteous kindness of the accomplished Secretary of the New York State Agricultural Society for the report of Wm. H. Carmalt, M. D., Commissioner of that Society, for the investigation of "Abortion in Cows," an exhaustive treatise on the subject, founded on the most careful inquiries and observations, with explanatory illustrations. Address the Secretary of the New York State Agricultural Society at Albany, New York.

Blackwood's Magazine for October has been received. *Contents:* A Year and a Day, The Old Monk on the Belfry, Inventus Mundi, The War in Paraguay, Cornelius O'Dowd—(Forfeiting Paradise, Persano, Light business requiring no capital, Studying the Land Question.) Great Whig Journalist, Charles Reade's Novel. Leonard Scott Company, 140 Fulton street, East of Broadway, New York.

Educational Journal of Virginia, Organ of the Educational Association. Editors: Charles H. Winston, D. Lee Powell, R. M. Smith, Thomas R. Price, and John M. Strother. Business Agent, M. W. Hazlewood, P. O. box 490 Richmond, Va.

The initial number of this valuable monthly appears on our table just as we are going to press with our November number. We defer a more particular reference to it to a future occasion, but meanwhile would recommend it to the patronage of all who are seeking light and instruction on this subject.

Subscription $1 a year.

The New Eclectic Magazine, which has now been in existence three years, and with which has recently been incorporated *The Land We Love*, stands at the head of the list of Southern publications. At this period of the year, when persons are in the habit of choosing their periodicals for the winter, it is especially requested of the public that they bestow at least a part of their patronage upon a periodical published in their interest, and which, the Southern and the Northern press both being the judges, is the peer of any magazine published

in America; both in its literary standards and the quality and attractiveness of its typography.

The Galaxy for November. New York: Sheldon & Co., 498 and 500 Broadway. A highly interesting number. Among its contents its readers will find the continuation of Susan Fielding, the Prince Suwarf, the English Universities, the Fire Fiend, Imperialism in America, the Play of the Period, And Editor's Tale, Literature and Art, Nebulæ, by the Editor.

The Carolina Farmer has completed its first volume, and will, on the 4th instant, appear as a weekly, in a new form, and will occupy an enlarged sphere. It will contain eight pages of five columns each; and in addition to a largely increased amount of agricultural matter, will give miscellaneous family reading, market reports, and general news. Subscription $2 a year. Address Wm. H. Bernard, Editor and proprietor, Wilmington, N. C.

The Phrenological Journal for November contains many interesting sketches, &c. Price only 30 cents, or $3 a year. A New volume begins with the January number. Address, S. R. Wells, Publisher, 389 Broadway, New York.

Bones.

Folks tell us, Dear Planter, the best way to grow,
Fine crops upon poor land, (as doubtless you know,)
Is to *fertilize well;* while clearly tis shown,
That "the best, and the cheapest," is *real raw bone.*

For one I believe it, since I understand,
The plan has succeeded, on all sorts of land;
And from what I have seen, the conclusion's foregone,
That the surplus of life *consists of a bone.*

For once, at my dinner, while carving some meat,
With "company" waiting, and eager to eat;
With something between a deep sigh and a groan,
I suddenly cut, through my meat, *on a bone.*

I moralized thusly—"Ah such is our life,"
(Even though we may be as keen as a knife,)
We may "go it" in crowds, or "go it alone,"
But we oft get stuck, unawares, *on a bone.*

Quite early in life, I loved a young girl,
With beaming blue eyes, and gold-tinted curl—
She said she loved me, and would be my own,
But her father said *No! I was stuck on a bone.*

In "market," however, quite soon did appear,
A suitor, to whom, she lent a kind ear;
"A fortune," *he* had, all in right of his own—
So *he* became *meet—I* was *cut to the bone.*

Long, long after this I got me a wife,
To cheer and enliven my "pathway of life"—
And tis patent to all, wherever she's known,
That the most of her "Heft" *is real raw bone.*

In matters of Church and of State tis the rule
The "official's" a wise man—the layman a fool;
And for all our follies they make us atone,
By eating *our* meat, and *leaving us bone.*

Your "merchant" who sells you Guano, down town,
At "Ninety some Dollars" for every short ton,
Will get all your wheat, when the threshing is done,
And you find out too late, *you're stuck to the bone.*

This "vain, foolish world" is prone to admire,
The party who keeps most fat on the fire;
Whose kettle will never grow cold like a stone,
While *dogs and poor Laz'rus may gnaw on a bone.*

Would you know what I am? When my last step is trod,
And my "mortal remains" repose neath the sod—
You'll find out on peering beneath a cold stone,
That death has left of me but Six Feet of Bone.

The Charlottesville Woolen Mills.

We would again call attention to the manufactures of this enterprising Company. From samples which may be seen at our office, we are sure that any one might make a tasteful selection, and we doubt not that our friend, Mr. H. Clay Marchant, the obliging superintendent of the establishment will make such an exhibition at our State Fair as shall fully justify our recommendation.

The Norfolk Oil Fish Guano Company

Is the style of a new Company recently inaugurated in Norfolk for the manufacture from Fish, of Oil and Phosphatic Fish Guano. This enterprise comes in most opportunely to supply a great need in the South, and we have no doubt it will be most lib rally sustained. All information about this Fertilizer will be most cheerfully furnished by John M. Donn, Esq., the General Agent of the Company, Norfolk, Va.

Drain Tiles.

The numerous inquiries after this article are at length answered in our advertising pages by Maurice Evans, Family Grocer, of high character, 326 Broad street, Richmond, Va.