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CANADIAN AGRICULTURIST.

VOL. I.

TORONTO, DECEMBER 1, 1849.

No. 12.

NOTICE TO SUBSCRIBERS.

THE first volume of the *Agriculturist* being completed, the Proprietors desire to address a few words to their Subscribers and the Public. For the support and literary assistance with which they have been favoured, they avail themselves of the present opportunity to render their grateful acknowledgments, and to express a hope that the same may be continued through another year. As the utility and profit of a paper of this character must mainly depend upon the extent of its circulation, and it being the wish of the proprietors to make this journal an efficient medium of communication between the districts of Upper Canada, on all subjects relative to agriculture, gardening, and the useful and domestic arts, they have determined on reducing the price, to Clubs and Agricultural Societies ordering 25 Copies, directed to one address, to HALF A DOLLAR PER ANNUM. This offer is made distinctly on the condition that a sufficient number of Subscribers shall be obtained, to guarantee the proprietors from a direct pecuniary loss. If the number should fall short of that point, the alternative will be adopted of reducing the size to 24 pages. To this the proprietors would be sorry to resort, since original matter, connected with and illustrative of the agricultural, manufacturing, and other industrial interests of the Province, is likely to increase in their hands, and therefore, instead of diminishing, they would rather increase the size of the publication. It is intended to make a proposal to the Directors of the Provincial Association, at their meeting in February next, to insert their reports and transactions; and it is believed that, if this enterprise is supported by the country, as its importance and utility appear to deserve, the *Agriculturist* may be placed in a position both remunerating and permanent, at the reduced price above proposed. No travelling agents will be employed, as the proprietors have found that such a system, with a paper so cheap as the *Agriculturist*, is certain to entail a pecuniary loss.

TERMS.

Single Subscribers.....	5s. per annum.
12 copies, each	3s. 9d. "
25 and upwards, each	2s. 6d. "

Present subscribers will have to renew their subscriptions, as no numbers of the new volume will be supplied, either without order or *pre-payment*. Agricul-

tural Societies will be expected to pay on the receipt of their usual funds. It is urgently requested that those who intend patronizing the paper will inform us, by the 1st of January at the latest, what number of copies they will take, that we may be able to determine before going to press, the edition required.

CLOSE OF THE VOLUME FOR 1849.

The present No. concludes the volume of the *Agriculturist* for 1849. A very full Index has been prepared for the use of those who wish to preserve the work, and we trust all who have taken it for the year, will feel a sufficient interest in the progress of agricultural improvement in their country, to preserve for future consultation and reference, the only paper published in Western Canada, exclusively devoted to the farmers' interests, and which may also be said to be the only record of the facts connected with, and illustrative of such improvement, that has been published for the present year.— We shall be happy to supply any subscriber who has not received the whole 12 Nos., with the No. or Nos. that may not have come to hand, upon being requested so to do, *post paid*, if by mail. We have plenty of back numbers on hand, and are very anxious that every subscriber should get all he bargained for. Mistakes and neglects will occur now and then in the "best regulated families;" and until our Post Office in Canada is placed on a better footing, mistakes and miscarriages will be frequent, let publishers be ever so careful.

The *Agriculturist* will again, we regret to say, prove a considerable loss to the proprietors, over and above the time and labour that have been expended on it during the year. Finding that the plan of employing travelling agents only added to our expenses and losses, it being utterly impracticable to enforce the *cash in advance* system, even for so small a sum as one dollar, we called in our agents at the commencement of the present year. We were consequently left to the support of Agricultural Societies and spontaneous subscribers. We had about 6000 names on our books for 1848. To each of these persons we sent three numbers of the present volume, to supply a deficiency in the volume of 1848, which occurred through the misfortunes of a former proprietor, and to remove all cause of complaint against the work on the ground that a former contract was not

completed. At the same time we informed those subscribers that the remaining nine numbers of the *Agriculturist* would be sent for 3s. 9d., in the hope that the great majority of them, seeing the improved and more costly character of the publication, would at once order the remainder of the volume. We confess that we felt a good deal discouraged, and lost much of our confidence in the progress of intelligence and desire for improvement among the farmers of Canada, when we saw that fully 3000 of those who received our first 3 numbers neglected to send their paltry 3s. 9d. to secure nearly 350 pages of practical and scientific information on agriculture, and to sustain the only publication in Western Canada entirely devoted to, and identified with their class and interests! Of the remaining 3000, a large majority are members of Agricultural Societies, and obtained the paper through their Society. The reduced rates at which we supplied Societies, and the loss of three numbers of the volume to the extent of 6000 copies, have left us something less than half a dollar for each subscriber this year. When we assert that less than 6000 subscribers (allowing for the usual losses and delinquencies) at half-a-dollar, will not pay for the paper and printing of a work so large as the *Agriculturist*, our readers may easily ascertain how much we have made by our enterprize this year! We have not yet obtained half the amount subscribed by Societies, owing probably to the delay in the payment of the usual government grant. Our paper makers and printers nevertheless had to be paid. We hope this hint will be sufficient to induce those who are in arrear to forward us our due.

We have made up our minds to discard the advertising sheet and reduce the number of pages to 24. Advertisements in a monthly paper do not pay for setting the type. Our paper will then be as large as the *Genesee Farmer*, and we shall be able to furnish it to Societies for half-a-dollar. At the present size it could not possibly be afforded at that price. The price to single subscribers will remain the same as at present, and by excluding long articles, which very few take the trouble to read, and by taking more pains in the selection of matter, obtaining wood-cut illustrations, &c., we believe we can make a more readable paper, and an equally useful one. We have already obtained several interesting cuts for the next volume, for some of which we are indebted to the polite attention of Mr. Moore of the *Genesee Farmer*. In this manner we shall reduce very considerably the expense of getting out the paper, without impairing its efficiency as an agricultural journal.

We have further to say, that if the *Agricultural Association* accept our offer to print their Report, which is in course of preparation, the probability is, that we should be able to give our subscribers, at the above reduced price to Societies, more reading matter than is contained in the present volume. The proposal we intend to make is simply this—to print a portion of the Report along with each number of the *Agriculturist* (but over and above the twenty-four pages), using the same type to

strike off as many copies of the Report as may be required, in a separate form, for the Association. We shall ask merely to be reimbursed the actual cost of the paper and printing, which will be no more, but probably much less, than it will cost the Association to print the Report in any other way; and the country will derive the advantage of a more general circulation of the statistical and other information which will be embodied in it, than could be obtained in any other mode. We presume the chief object of publishing the Report, or "transactions" of the Provincial Society—which may be made to embrace the proceedings of the District Societies also—will be to lay the information therein contained before the farmers of Canada. If so, the publication of these "transactions" along with the *Agriculturist*, will be the best way to attain it. The publication of such reports by the Legislature in the Appendix to their Journals, or even in a separate form, as has been recommended by some persons, would be an utter farce—nay, worse—it would be a useless waste of public money. The farmers of the country would never see them. We happened the other day, while in the office of an Honourable member, to get a hasty glance at the Appendix of the last session; and there we discovered, among a wilderness of public documents, reports of agricultural societies in Upper and Lower Canada, furnished under the acts by authority of which public grants are made to these societies. Some of the reports were quite lengthy, and contained matter of great interest. Judging from the number of pages occupied, and the enormous prices paid for the public printing, we have no doubt it has cost the province two or three hundred pounds to print these reports—which none but members of parliament ever read! The majority of these gentlemen being lawyers, and having an eye to other things than the improvement of agriculture, we strongly suspect even they do not read them! We would willingly have copied some of the facts from the reports in this formidable Appendix, but the honourable gentleman had but the one copy, and not wishing to borrow it for fear of accident, we left them buried in their present obscurity. Now, we ask our readers if such an expenditure of the public money be not a useless—a shameful waste? Three hundred pounds, properly applied, would spread all the information in these Appendices, and a great deal more which could be embodied in the report of the Provincial Society, before eight or ten thousand of the farmers of the country—the very class for whose benefit it is or ought to be collected and disseminated. We shall be prepared to submit a better mode to the Directors of the Association, and if necessary to the Legislature, the result of which we shall explain to our readers.

We shall make every effort to sustain the *Agriculturist* for another year; and if, under the arrangements we have mentioned, it fails to pay expenses, it must be abandoned.

BEAUTY is as summer fruits, which are easy to corrupt, and cannot last.—*Lord Bacon*.

PROFESSOR JOHNSTON'S EXPERIMENTAL AGRICULTURE.

We take the following review of Professor Johnston's new work from a recent number of the *Scottish Agricultural Journal*, believing that it will be interesting to our readers. We also append a list of the learned Professor's Agricultural works, with their prices and the name of the publishers, any of which may be obtained through the medium of Canadian booksellers that receive orders for English publications. Some of these works have been reprinted in the United States, and have had a very extensive circulation. There are no publications, with which we are acquainted, of equal scientific authority that will bear a comparison with those of Professor Johnston for *practical* purposes, and adaptation to the wants and comprehension of the thinking and improving portion of our farmers. They indicate deep and patient scientific research, correct and extensive observation of agricultural phenomena, and a cautious spirit of generalization, which cannot fail to lead to improvements based upon sound data. Every young farmer, imbued with the true spirit of his noble profession, ought to make himself acquainted with the facts and reasonings of these truly valuable publications.

This is, or ought to be, the work for the day. It presents a digest of practical agriculture from the most active mind engaged in the cause of improvement upon scientific principles. Opportunely as it appears, it could not nearly have come so much so, were it not the result of years of the most ample and energetic experience and enquiry. Professor Johnston's account of the volume is, that, with a view of gradually collecting a body of such data, he published his several series of "Suggestions for Experiments in Practical Agriculture," and succeeded in inducing such men as Mr. Fleming of Barrochan, to undertake field experiments, whilst the English and Scottish agricultural societies, and several local Scotch societies, of which he makes honourable mention, (viz., the Turiff and Strathmore), as well as the Guildford English Society, called forth other experiments by the offer of premiums. The transactions of the Highland and Agricultural Society have also given the results of numerous experiments with saline and other substances, applied to different crops, in soils of nearly all varieties, and upon many geological formations. Upon the records of all these experiments, Professor Johnston has performed a criticism for which no man could possibly be more competent. Worthless, conflicting and contradictory as they stood, they have resolved themselves into something valuable at his touch; for he has applied to them the philosophical discrimination required, to rectify results often incorrectly or carelessly stated—to separate

the good from the bad, and weigh their worth as experimental data.

We must, however, forewarn the reader, that the Professor does not express any overweening confidence, even in the materials thus sifted and purified. He frankly admits that his examination of what has hitherto been done in the way of field culture, has led him to the conviction, that scarcely any results we have as yet obtained are to be relied upon as sure grounds for scientific opinions. "Yet," he says, "they may be considered to have cleared the path to surer results, by pointing out sources of error previously unknown, and thus indicating the precautions to be adopted in future trials."

Aided by the labours of the present Author, the agricultural student will, therefore, find even bad experiments invested with a moral value; for it is but justice to Professor Johnston to state, that he has made it, before all things, his business to discuss the art of experimenting itself.

He has first unfolded the knowledge necessary for making experiments, and then explained the way in which they ought to be made and estimated. These are the important elements of the first of the two parts into which the work before us is divided; and we regard it as embracing the consummation of the whole—as one of the most remarkable contributions ever made to scientific agriculture.

The second part, it may be as well here to mention, may be considered as of much more immediate value. It is less novel, being chiefly the digest on which the learned Professor has founded all his institutes—considerations on actual experiments with saline and mineral substances, sulphuric acid, the sulphates of potash, soda, lime, magnesia, and iron; gypsum; chlorides of potassum, sodium (common salt), calcium and magnesium; muriatic acid; chloride of calcium; carbonates, phosphates, and silicates of potash and soda; nitrates of potash, soda, lime, and magnesia; salts of ammonia; lime; and the compounds of baryta and alumina; burned clay and shale.

To return, however, to part first,—Professor Johnston shows that the experimenter must know the substances, organic and mineral, of which the plant consists, and forthwith supplies a lucid general analysis of these constituents—the functions performed in plants by their organic and inorganic or minereal constituents, of which functions he furnishes a correct detail:—That he must know the functions of the several parts of the plant, the habits and analogies of the species on which experiments are to be made, and of their several varieties. The illustrations of this last requisite of knowledge in experimenting, are so characteristic of the way in which the Professor has adroitly contrived to supply the information for which he insists, that we cannot help citing it as a specimen of the work:—

"1. THE OAT and the red clover love a firm and stiff soil—a natural habit, which chemistry cannot hope to change. On some soils the Tartary oat yields heavy crops, while, on the same soil, the more valuable potato oat refuses a remunerative return. Where other varieties of oats grow sound, the Hopeton oat is subject to a disease called sedge or tulip root, which is gradually

driving it out of cultivation. I do not know whether these qualities of the potato and Hopeton oats be within the dominion of mechanical or of chemical causes.

"2. WHEAT.—Winter wheat fails in many places where spring wheat is found to do well. Such a result has been observed in the island of Islay, where so many improvements have, in late years, been made by Mr. Campbell of Islay. Is chemistry or climate, or the special constitution of the variety of wheat, or the mechanical condition of the soil?—and which of these causes has most to do with the capability of this or that field to grow white or red wheat, or with the greater productiveness of this than that variety of seed on similar soils?

"3. BARLEY affects a lighter soil, but the quality of the grain varies with the natural dryness, the drainage, or the quality of the land; and the malster, the feeder, or the pot-barley maker, buy it accordingly. Yet, in regard to the physical condition of the soil, different varieties have different tendencies. The chevalier barley grows on clays on which the Annat—one of our best varieties—does not succeed; and this is probably one reason why the chevalier barley has spread so widely, and yields good crops even on the Huntingdon clays. Some varieties show a great indifference as to the physical nature or condition of the soil, while others are most choice in their selection of a suitable soil. Thus the Annat variety, already mentioned, not only dislikes a clay, but a gravelly soil also, and thrives best on a dark coloured loam.

"4. RICE grows usually on low alluvial flooded tracts of land, and abundance of water at the earlier stages of its existence are, in most cases, a necessary of life to this plant. But there are varieties of hill rice which grow healthily, and ripen on dry land. This difference, though a little more striking, is, in reality, not more remarkable or deserving of attention than the constitutional differences above mentioned in regard to barley.

"5. THE TURNIP.—The numerous variety of turnip so generally known in this country, differ little less in habit, and tendency, and choice of soil, and power of resisting climate, than varieties of grain do. It is essentially favoured by a cold and humid climate. Hence it is a less profitable culture in our southern counties, and yields less abundant crops along our eastern borders. The yellow and the white varieties differ greatly in nutritive value and in climate habits. Of white turnips, again, varieties differ. Thus the *white stone* comes quicker to maturity than the *white globe*; so that what is fitted to nourish and bring forward the one will not promote the growth of the other in an equal degree, or cause it in the same month of the year to yield an equal crop. In different districts, also, and under different treatment, the same variety is differently nutritive—a circumstance of much importance in all experiments on feeding.

"The turnip is also liable to special attacks from insects, and special diseases—such as that called *fingers-and-toes*—accidents which are more or less completely beyond the calculations of pure or theoretical chemistry.

"6. As the cultivated carrot is the offspring of the wild carrot (*daucus carota*), so the white beet (*beta vulgaris campestris alba*) and the mangold-wurtzel (*beta vulgaris campestris*) are allied to the sea-side beet, (*beta maritima*), which, like them, has a fleshy root, and is good for food. This analogy indicates the probable wants of the beet tribe, the probable utility of saline applications to the plant while growing, and the especial expediency of making experiments upon it with that common salt for which the *beta maritima* frequents the sea shore.

"The farmers of the Guildford Club (Surrey), in a recent discussion on the growth of beet, came to the unanimous resolution that, in their soils, experience had shown common salt to be a valuable promoter of the growth of this root, and that it was worthy of being generally recommended.

"The analogy above stated throws light on this result of practical experience, and points out to the improving experimenter the special value to him of a familiarity with such analogies: they not only modify and restrain the conclusions to which pure chemistry might erroneously lead him, but they indicate new paths of enquiry on which his chemical knowledge may exercise itself to the manifest advantage of scientific agriculture.

"7. THE PEA exhibits, among its several varieties, similar liabilities to be attacked by insects as the turnip does, and which, as in the case of the turnip, do not admit of easy or satisfactory explanation.

"I lately saw on the home farm of Lord St. John, at Melshburne, in Huntingdon, a field of winter peas, sown in November 1848, which had been all treated and manured alike, but on one half of which the seed sown was the early maple—a common field pea; on the other half the Ringwood marrow dwarf—a white pea. The latter was attacked at Christmas by the slugs, and in great part devoured so as to require filling up with fresh seed, while the former—the grey pea—was untouched by them. There may have been some other reason besides the difference of variety for this limited attack of the slug; but it is obvious that circumstances or liabilities of this kind may materially modify the effect of chemical applications made to our crops, and may be the often unsuspected cause of important discordancies in our results."

Professor Johnston also shows that the experimenter must know of what the soil consists (telling him of course, in case he should not, in his own popular style), the difference of soils from geological origin—chemical combinations in the soil and plants—the general principles of husbandry, with local or individual practice. He must possess local climatic knowledge, and know the composition of the several parts of animal bodies—how they are built up and sustained; the general functions of the animal body, and special structure of the digestive organs; the general relations between the soil, the plant, and the animal. Through the perception of such relations it is that, according to Professor Johnston, analyses are to be corrected, and an exact knowledge of the composition of the plant, the soil, and the animal, arrived at. The experiments which he suggests, he says, will rectify past results, and suggest researches. "The results of these, again, will send us back to revise our opinions, and repeat our analyses; and thus, by the joint aid of the laboratory, the field, and the feeding-house, will Scientific Agriculture be carried slowly but steadily forward."

It is on that same progressive principle of investigation we attach importance rather to the elementary portion of Dr. Johnston's work, which shows us how to experiment, than to the latter part, which criticises experimental work performed. We do so however, not to discourage, but to stimulate experiment, and, if possible, direct it aright. And from time to time, we shall not fail to return to those *comptes rendus*, as a mine of the most valuable truths within the range of REPRODUCTIVE SCIENCE.

The following is the list of Professor Johnston's works, referred to:—

- Experimental Agriculture; being the Results of the past and Suggestions for future Experiments in Scientific and Practical Agriculture; 8vo., 8s.
- Lectures on Agricultural Chemistry and Geology, 2nd ed.; 8vo., 24s.
- Elements of Do., 5th ed.; foolscap 8vo., 6s.
- Catechism of Do., 24th ed.; 1s.
- Instructions for the Analysis of Soils; 1s.
- On the use of Lime in Agriculture; 8vo.; 6s.
- Contributions to Scientific Agriculture; 8vo., 6s. 6d.

Wm. Blackwood & Sons, Edinburgh and London.

AGRICULTURAL SOCIETY OF LOWER CANADA.

We learn from the November number of the *Agricultural Journal*, that the Roman Catholic clergy in the Lower Province are using their influence in aiding the circulation of that useful periodical among the inhabitants of their respective parishes. The Archbishop of Quebec has issued a letter to his clergy, urging upon their attention the claims of agriculture; and the Bishop of Montreal is employing his influence in the same good cause. His lordship observes, in a letter addressed to Mr. Evans, the Secretary of the Agricultural Society, "that in the opinion of the clergy, your enterprise will not become eminently successful, until there are established throughout the different parishes, model farms, for the purpose of developing in practice the advantages which would accrue from an improved system of husbandry." We are glad to see the Roman Catholic clergy of the Lower Province evincing so laudable a spirit of patriotism; and we hope the clergy of other churches, both there and in Upper Canada, will not be slow in emulating so valuable an example. The agriculture of the mother country is deeply indebted, in each of the three kingdoms, to the resident clergy. Some of the most efficient improvers in practical agriculture, have been exemplary and zealous ministers of rural parishes. Of all secular employments, the culture of the earth, from the character of the occupation and its historical and classical associations, seems most in accordance with the tastes of the scholar and the duties and pursuits of the divine. We also hear that the directors have resolved upon having annual agricultural exhibitions; the first to be held at Quebec, in September next. We heartily unite with them in the wish, that they may receive such support "as to enable them to have such an exhibition as shall be worthy of Lower Canada, and fully equal to those that have taken place in Upper Canada."

REPORT ON THE STATE OF AGRICULTURE IN THE OTTAWA DISTRICT.

A circular, to the following effect, was addressed by Mr. Sheriff Treadwell to the officers and committee of the Ottawa District Agricultural Society, and to several influential farmers in the district. This circular was the means of eliciting several interesting communications from different individuals, which Mr. Treadwell forwarded to H. Ruttan, Esq., President of the Agricultural Association of Upper Canada, who has kindly placed them at our disposal for publication. We publish this month Mr. Higginson's sensible letter, on an important subject, and the others will appear in the commencement of our next volume.

L'Original, 20th of August, 1849.

My dear Sir,—This district having decided on sending no delegates to the Grand Provincial Agricultural Exhibition, at Kingston, on the 18th, 19th and 20th of next month, and being anxious to lay before the society all the information I can collect on agricultural subjects, may I beg that you will furnish me with a statement of the different kinds of grain you cultivate with the greatest success; the best time for sowing; the quantity of seed you put on an acre; the kind of manure used; the quantity of hay you generally cut; and what crops you consider most neglected that might be cultivated with success.

Please reply at your earliest convenience.

I am, sir, your most obedient servant,

CHAS. P. TREADWELL.

The following reply has been received from Thomas Higginson, Esq., Superintendent of Common Schools, Ottawa District.

Vankleek Hill, 4th Sep., 1849.

Dear Sir,—In reply to your circular of the 20th ultimo, I would beg to decline making any remarks on practical agriculture, being satisfied that you will receive information from different sources, of much greater value than anything I could lay before you. While I would express my regret, for not contributing to the general mass of practical and statistical knowledge, still there is one point to which I would beg to direct your attention, namely—the necessity of providing more effectually for the instruction of young men devoted to agricultural pursuits. While physicians have a medical board—while students of law and divinity are compelled to pass through many and severe studies—while even the common shoemaker is required to spend three or four years of an apprenticeship to fit him for his calling;—while these, and many other pursuits that might be mentioned, are guarded by custom, and fenced in by legislative enactments, how stands it with that most important class of our community, the agriculturalists? Are there any steps taken to prepare him for the discharge of his most important duties? No! With the exception of the little knowledge he acquires at the common school, the young farmer is left to push his way to successful

eminence in his profession, or to plod on in the barren and unfruitful footsteps of his unenlightened predecessors. To dwell on these gloomy facts, is superfluous. What is the remedy? Although many schemes might be proposed, and though much may and ought to be done, to change the aspect of affairs, still there is one plan of paramount importance which stands out and demands our serious consideration. It is this, there should be a *model farm* in every district, where the student of agriculture might avail himself of the knowledge, the experience, and the scientific acquirements of a thoroughly educated practical farmer. There should also be attached to the said farm a competent teacher, who would impart the common branches of elementary knowledge, with agricultural chemistry, animal physiology, and at least the rudiments of natural philosophy. With such an establishment in each district, it would be next to impossible that either the intellectual standard of our rural population, the financial affairs of our country, or the moral character of our people, would long remain so low as they now are. It will be said, that there is now a model farm at Toronto,* why not reap instruction from that establishment? The distance alone prevents many from availing themselves of its advantages; the expense of going is a drawback on others, and it may be truly said, that to overcome the distance and expense, is with many, if not impossible, at least a great inconvenience. But establish a model farm and school in every district, and many young men would pursue their studies there, who are now fruitlessly sighing for the *time* and the *means* to carry them to Toronto; and further, it may be urged, if a model farm is necessary at Toronto, it is of equal importance in every other district in the province—if it is of essential service to the young men of the western part of Canada, it would confer equal benefits on those of the eastern—if the agriculturists around the western metropolis *should* understand their business, so should every man to the farthest verge of our settlements, and thus would our resources be developed, our prosperity extended, and the circumstances of our young and hopeful country expanded and improved. It is necessary in a communication of this kind to be brief. Much might be said, and arguments adduced, which the writer cannot now enter upon, but he is convinced nevertheless, that as soon as public attention is directed to this most important subject, there will be a correspondent movement in the right direction, that must be ultimately crowned with success, and every lover of his country, every friend to humanity, prays for its consummation.

It will be enquired, where are the means to come from, to purchase a farm, stock and implements in every district? The writer is convinced, that if half the money that has been granted to agricultural societies had been expended in this way, it would have produced a richer harvest and

better fruit. But independent of this, now, when part of the endowment of King's College has been diverted from its original purpose, let it be applied to the object above stated, and although we may have fewer classical scholars, we will have a much more respectable, aye, and profitable body of *practical farmers*; not quite so much metaphysical disputation, but a much more general amount of useful knowledge and common sense.

To promote this great object, let the district councils, the township council, the agricultural societies, and farmers generally, petition the legislature to *establish a model farm in every district*, and let us seek the improvement of that long neglected part of the community on whose intelligence and well-being the prosperity of the country depends.

Yours, &c., T. H.

C. P. Treadwell, Esq.,
President Ottawa Dist. Agr. Soc.

ON THE IMPORTANCE OF AGRICULTURAL AND INDUSTRIAL EDUCATION.

There is an excellent paper in the second number of the *Irish Agricultural Journal** on the above named subject; a few extracts from which we have no doubt will be read with interest by many of our subscribers. The writer commences by observing that one of the principal causes of the depressed condition of Ireland, has been the absence of proper means of education in those practical arts, which must ever form the staple of the occupation, and supply the means of living, of the people. It is not enough to be convinced that the country possesses immense sources of latent wealth, but the great work to be performed is so to educate the *heads and hands* of the people, that those sources of national wealth may be practically developed.

"Feeling thus we have placed it before us as one of the most valuable uses to which this journal can be applied, to fix the attention of the people of all ranks on the absolute necessity of thoroughly learning the business by which they are to live. Labour, whether by mind or body, is the lot of the human race. From the statesman whose business it is to govern, to the peasant whose business it is to dig, every man who fulfils his duty to society should have an occupation, and should understand it. This truth, palpable as it appears when thus roughly announced, is however by no means of general recognition. We have in Ireland a large community who, unfortunately for themselves, thought they had no business, and acted under that delusion, and thereby have been the sources of the social gangrene and paralysis which has revealed itself by general pauperism and ruin.

* This is a mistake; there is no model or experimental farm at Toronto. The thing has only been talked of. In the Normal School, instruction is given in the science of agriculture, and something has been said about establishing a chair or lectureship of Agriculture in the University of King's College.—EDITOR OF AGRICULTURIST.

* This is a quarterly publication of great promise and merit, issued under the direction of the "Royal Agricultural Society of Ireland." We have just received a complete set, and shall avail ourselves of the opportunity thus afforded of occasionally submitting such extracts and information as we hope will prove interesting and useful to our readers.

The man who in this world foolishly thinks he has no task before him, or he who is found unable or afraid to do it, is but a useless weed, occupying the place of a worthier plant; and he must inevitably, by the pressure of society, be rooted out, or ploughed into the ground to rot for the enrichment of the soil by which his more useful and more energetic successor is to be supported. It is quite true that the errors of which the present condition of Ireland is the result, have been the growth of circumstances which now happily belong to history alone; but we must recognise that for the reparation of those errors it is by no means sufficient for those circumstances to have ceased to operate. Totally new conditions and new influences must be brought into action for their atonement: we must use our best exertions to base the future prospects of the country upon a system of enlightened and remunerative labour; we must endeavor that the mental and physical powers of her inhabitants shall be brought fully and harmoniously into play for her improvement, by the cordial co-operation of peasant and of noble, of landlord and tenant, and thereby suppress that growth of social disorganization which has its strongest roots in sloth and ignorance. But to do this each man should be made aware that he must have a business, and that he must learn it; that he must be industrious and be educated. He who remains unconscious of his position must be content to learn that society will progress without him, and that he cannot be allowed to live in sloth upon the fruits of the exertions of more useful and more estimable men.

Before, however, the duties of society can be fulfilled in Ireland by those to whom our observations specially apply, it is imperative that the great obstacle to improvement, the general absence of practical industrial knowledge, should be removed. In Ireland instruction must precede improvement; that is, if it be really wished that the improvement of the country should be for the advantage of its inhabitants—a postulate which, as we believe we are safe in assuming, we shall not place under discussion. The corner-stone of whatever social edifice is to be erected or preserved in Ireland, must be the practical instruction of the people; and we therefore believe that we require the aid of the Board of Education far more than of the Board of Works; and we further believe that for every shilling that any plan of practical instruction could cost in Ireland, there would be repaid to the state tenfold the sum in smaller charges for extra-police, national defences, and special commission trials.”

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“Though we have above stated that, for observing the full results of education, we must watch the progressive development of the boy into the man, we still fully admit the general accuracy of the adage, it is never too late to learn; and we consider that in the improvement of this country the instruction of the adult population must occupy an important place. But that is not education: instruction is a totally different thing. In the boy you should form his mind, his habits of thought,

his morals; in the man you can only teach him to do properly a thing which he did not know how to do before. Even this will be doing a great deal under existing circumstances; and we consequently rank among the most efficient means of ameliorating the condition of Ireland, the practical instruction of the adult population.

We therefore consider that for the full educational improvement of the people of this country in industry, there should be the means afforded of supplying:—

- 1st. Instruction in practical agriculture to the adult farming classes.
- 2nd. Agricultural education in its full and proper sense to the rural population in the primary schools.
- 3rd. Agricultural education of a more advanced and scientific character in the academies or colleges in which the children of the middle and higher classes are educated.”

Under the head of practical instruction of the adult agricultural population, the writer pays a merited tribute of praise to Mr. Blacker, of Armagh, to whom agricultural improvement in Ireland is deeply indebted. This gentleman many years since proposed to the Irish landowners the importance of having experienced agriculturists to manage their estates; men capable of giving familiar oral instruction in the best systems of cultivation, adapted to the means of the people, and the wants of the country. We believe that Mr. Blacker's exertions were the means of forming several agricultural societies, and of eliciting a spirit of enquiry and desire for improvement among a considerable portion of the adult population. The agricultural instructors that were sent out last year under the patronage of his Excellency the Lord Lieutenant, and his Grace the Duke of Leinster as President of the National Agricultural Society, were the means, judging from their excellent reports, of creating a wide and deep interest in the cause of rural improvement. These men were wisely selected from among the Irish people, who consequently understood their peculiar habits and wants—and whose knowledge of agriculture *had been acquired in the field* as well as from books. It is to be hoped that this valuable agency will be continued. On agricultural instruction in Primary Schools our author observes:

“With the views which we have already endeavoured to express of the true nature and powers of education, it will be well understood, that it is to the operation of the national system of education we look for great improvement in the social condition of this country. Build up as you may with Corinthian capitals, or any other architectural ornaments, painted or gilded to entrap the admiration of the mere passer-by; if the building mate-

rial be unsound, if your cement does not set, if change of season opens the joints, and cracks admit the elements to work, your edifice will fall; the volutes and foliage of your capital will lie dirty and broken on the earth, when the pedestal gives way from want of soundness or of equilibrium. Thus, if the real materials of which the social edifice is constructed, be not all shaped to their berth, and pickled sound and well seasoned, so will it also fall. Such shaping and seasoning is education; such fitting to the work is the idea that each one has in society, his proper place, his proper duties, and teaching him how to fulfil them. But abstract development of intelligence is not education; acquisition of the means of learning is not learning. "Train up the child in the way he should go, and when he is old he will not depart from it." Educate the child in morality and religion, and he will become a good man and a good citizen. Educate the child in habits and principles of industry, and he will become an intelligent and skilful farmer or artisan. "Train up the child in the way he should go," is therefore the voice of the people calling to those to whom education is entrusted; and for the practical regeneration of Ireland, it is indispensable that the child should be trained so that he may learn how to go to work.

Upon this cardinal point, as we conceive, the entire organization of our national system of education ought to turn. It is absolutely a delusion to exhibit a sum total of half a million of children being educated, when in reality those poor children, after being so educated, are almost inevitably swept into the chaos of practical ignorance and consequent idleness which engulphs the country. So many per cent. of the lower classes know how to read and write; but how many per cent. of those classes can earn their bread? The unfortunate little boys in Kerry, who found profitable employment for a time, in calculating areas and sides for the Ordnance Surveyors, at a half-penny a triangle, were again starved, when that highly scientific commission was brought to a close; for although certainly well educated according to collegiate ideas, they were not trained to their proper trade. Every national school in Ireland should be an agricultural school if situated in a rural district, and an industrial school when in a large town. Every schoolmaster in Ireland, every functionary of education, should be impressed with and inculcate the one idea, that the gangrene of Irish society is absence of practical knowledge, and that the remedy which it is for them to apply consists in practical education and the formation of business habits."

With respect to superior agricultural instruction to be imparted in the higher schools and colleges, the writer makes several pertinent observations. He insists on the supreme importance of placing all classes of the community under a system of industrial training. *Work*, either of the head or hands, or of both conjoined, is the essential condition of individual health and enjoyment, as it unquestionably is of all social progress. We can make room only for the following extract:

"We look to the colleges that have been recently founded by the government in Ireland for supplying to the middle and upper classes this industrial education of which we have endeavoured to depict the want. We quite feel that in order to assert the rank and position to which those new establishments are entitled, they must adopt an university system, and meet the competition of other colleges not by divarication but by improvement. We do not wish, therefore, to see the literary and scientific courses of those colleges superseded by purely industrial education; but we do think that those colleges will disappoint equally the intentions of the government and the expectations of the country, if, whilst they advance to the fullest extent the proper objects of general university education, they do not found schools in each college of a specially industrial character, embracing, on the one hand, the studies connected with engineering, and on the other, those belonging to agriculture in its most extensive and most improved form.

"The latter department, with which alone we shall occupy ourselves at the present moment, we would expect to include the fullest instruction in all those sciences which are connected with agriculture, as chemistry, geology, and botany. But also we would expect distinct instruction in the theory and practice of agriculture; in the natural history and diseases of the different breeds of cattle; we would include also land-surveying. It is not our object to sketch any plan of such studies, but only to put upon record the idea which we have long since formed, that it is principally by giving a practical and industrial character to the higher departments of education, that those new colleges can prove themselves truly useful, or earn the permanent approbation of the country."

We learn with sincere pleasure, from recent Irish papers, that it has been determined to connect a botanical garden, and a model and experimental farm with Queen's College, in Cork; a sum of £5000 having been allocated by the Lord Lieutenant for this most valuable object. Earnestly is it to be hoped that the other new colleges will follow the example.

AGRICULTURE IN NEW BRUNSWICK.

We have been favoured with a copy of the *Courier*, containing the annexed report of the Saint John County Agricultural Society, a document which comprises several topics of interest and instruction. We shall make a few selections as our space admits.

During the past year monthly meetings had been held for the discussion of agricultural subjects. These meetings had been well attended, several useful papers read, and a circulating agricultural library commenced. The directors having learned that Professor Johnston was about to visit the United States, petitioned the Governor to invite him to New Brunswick for the purpose of taking a general survey of the agricultural and mineral

resources of the province. This we learn the Professor is now doing, and we shall be looking forward with much pleasure to his report.

The annual fair and exhibition took place on the 27th of September, the unfavorable state of the weather prevented a large attendance; His Excellency the Lieutenant-Governor was present. Four samples of wheat were shown, one weighed 64 lbs., and two over 60 lbs. a bushel. The oats weighed 46, 44 and 42 lbs. a bushel. The turnips, carrots, mangel-wurtzel and potatoes are described as being very superior. There is but little butter and no cheese made in the county. The Directors recommend large premiums to be offered for these important articles.

The Society had again imported from England and Scotland large quantities of turnip, carrot, beet and parsnip seed, together with wheat, barley and oats, all of which was readily sold, without loss; the results of these importations have been most satisfactory, and are stated in detail in the appendix, to some of which we may refer our readers in a future number. A machine for making draining pipes is about being imported from England, and a number of premiums have been offered for the most successful efforts at draining. Premiums were awarded for various root and grain crops, with one for the best essay on the preparation and value of manure. Branch societies had been organized, and one is already in successful operation at Loch Lomond. An oat, grist and carding mill had been established at Golden Grove, to which had been awarded £25 by the Society. The Directors had not been successful in introducing a bone-mill, which is felt would be a great desideratum. Besides the bones that are wasted, "large quantities are annually shipped off, to be returned in the shape of cabbages and flour." The utter waste of this precious manure is inconceivable. The Directors, in accordance with last year's report, petitioned the Legislature to appoint a Central Board, or Provincial Society, and to establish agricultural lectureships and schools, but nothing was done.

This arose chiefly from the opposition of the farmers in the Legislature, they being decidedly opposed to any additional expenditure for the improvement of agriculture. Three-fourths of them actually voted against the invitation to Professor Johnston! The Directors recommend that renewed efforts be made to induce Government to furnish means of education suitable to young men designed for farmers, by the formation of one or more large schools, with model farms attached, and by the science of agriculture being taught in all the common schools. Seminaries are maintained at the public expense for the education of those intended for other professions; and as farming is second to none in importance, it is neither fair to the farmers nor for the general good that this occupation should be deprived of those benefits which science and knowledge can afford.

The Directors have to report, in relation to the crops in the county for the past season, that hay, except on the marshes, was very light, probably not half an average, very little wheat was grown, but, where tried, yielded abundantly without rust

or weevil. Barley has not been successfully cultivated, probably because the land has not been put in a proper condition for it, that crop requiring a very fine tilth. Oats have been a good crop. Buckwheat has been extensively grown, and yielded abundantly. Potatoes kept quite free from the disease until fully grown and nearly ripe, and, in general, were not affected at all. In some sections, however, especially in the vicinity of this city, the disease made its appearance with all its former virulence. After blackening the tops, it struck down to the roots, and in different fields from a quarter to a half were lost. It appears, therefore, that the disease has not yet taken its departure, and that the potato ought not to be depended on as the only root crop.

Carrots and turnips have been extensively cultivated, and notwithstanding the extreme drought, are generally a good crop. Mangel wurtzel and parsnips, although better adapted for cows and pigs, and quite as easily raised as the others, have not been much tried. The English horse-bean or Heligoland bean has been grown for several years on one or two farms, and when planted early have ripened and yielded well. The white bean and field-pea have scarcely been tried, which is to be regretted, as they are a sure and profitable crop, and excellent alike for the table and as food for cattle.

The following general remarks are the results of, or suggested by, the discussions at the monthly meetings of the Society:

The state of agriculture and those depending on it in this Province, is admitted by all to be in great need of improvement. There is little or no farming capital: an exhausting mode of cultivation prevails, by which that little is becoming less. There is no surplus produce on which to feed those who would manufacture for us; nay, farmers do not raise even enough for themselves; and it is the reply to those who would wish to introduce draining, deep ploughing, a proper rotation of crops, and plentiful manuring, whereby the crops would be more than doubled; Oh, but there are no markets!—we have no capital!—we cannot afford to pay for labour!—we cannot sell at a remunerating price what we at present produce!—and why urge us on to what would be our ruin?

Were we seeking popularity, or desirous of gaining the favour of those to whom we address ourselves, we should probably, like the other quacks of the day, say to them that their present state is caused by an unpropitious climate, or a sterile soil, by errors of omission or commission on the part of Government, by a want of capital or a want of markets, and would urge them to seek for protection or free trade, toristry or responsible government, reciprocity, independence or annexation, as a cure for all their evils.

But we have other ends in view, we wish to raise the agriculturists of our country to the condition which belongs to them, to that of intelligent, prosperous, high-principled men, who know their rights and their duties, and will fearlessly assert the one and faithfully perform the other, and must therefore say, that from all that we have seen or can judge, we are sincerely of opinion,

that general prosperity can alone be obtained by a general increase of individual intelligence, energy, enterprise, industry, and public and private economy, and in no other way, and by no other means whatever, and each one who desires to bring this about must begin at home, must do the duties which lie nearest to him, must seek out and endeavour to fulfil the purposes for which God has placed him in this world, and resolve, that the blame of being one of a spiritless, indolent, extravagant, and poverty-stricken people, shall not lie at his door. Let such a spirit but be diffused amongst us, and with our fertile soil, healthy climate, and vast natural resources, we are prepared to run a race with the best nation on the face of the earth.

But increased production will create markets: and in this way—as soon as a surplus of provisions is afforded, the farmer, who was before his own blacksmith, shoemaker, weaver, tailor, doctor and minister, finding out the advantages of a division of labour, exchanges his for the labour of others. Centres of those thus employed, or towns and villages, are gradually formed as supply and demand increase. Machinery is called in to aid, and then come the large manufacturing towns.

We are at about the end of the first, and beginning of the second, period. Villages are becoming visible in every direction—at Hampton, the Bend, Dorchester, Sackville, Sheffield, Woodstock, &c.

Some think, and perhaps they are right, that by a certain course of legislation, called "protection to home industry," the progress towards prosperity can be much hastened; others, that trade should be left to seek out and follow its natural channels, and that Government cannot interfere with the industry of one class, but at the expense and to the injury of others. As an agricultural society, we discard politics, and cannot, therefore, properly express our opinion on either side; whatever way, however, is taken, a speedy progress to prosperity can only follow an increase of enterprize and intelligent industry.

In inquiring into the causes of the backward state of agriculture, the small amount of accumulated capital, in proportion to the business done, and the want of energy and enterprise in the people, it is obvious that, like rich men's sons, we have had so many advantages bestowed upon us, that our energies have been cramped. Our forests have been to us like the gold mines to Spain—they brought money so easily, that not knowing the value of it, we let it go as it came.

The gambling nature of the trade in timber operated also to seduce people from the more slow but sure modes of making a living. The profits of farming—nay, in too many cases, the farms themselves have been sacrificed to the insatiable craving for an easy and quick way of making money which this trade seemed to offer.

From the ease with which the timber growing upon every farm could be converted into money, the population have also acquired a taste for certain descriptions of food, not in themselves more nutritious or agreeable to the taste than the grains and other produce of the country, but which habit

has rendered so essential that their use is persisted in, now even when the timber is gone, so that the farmer, from whom we ought to expect not only all our provisions and clothing, but articles of export to pay for the few foreign luxuries we require, and cannot produce, are themselves the chief consumers of imports, without furnishing a single export in return.

It may be profitable to us to compare notes with our friends across the lines—they have no advantage over us in soil or climate, and we are all of the same blood. In former times, like us, they attended to lumbering, to the neglect of their farms.

Some thirty years ago they were very much in our circumstances; the lands worn out, no markets, and unable to compete with the produce of the new and fertile western country. The western fever seized them, and an almost general desertion of the farming population took place. We have read accounts of the northern States at that period, which might be applied word for word to our own country at this day. In process of time, numbers of the emigrants returned, in impaired health, having found out that a fertile soil and mild climate (competition and cost of transport rendering money-making out of the question) were dearly bought at the price of health. A new stimulus was given to agricultural pursuits, better modes of culture were adopted, improved stock imported, a sound education made accessible to all, and they are now a prosperous and happy people.

Let us compare their present state with ours—perhaps we may profit by taking a leaf out of their book. While they are furnishing a surplus of butter, cheese, beef and pork, as an export to the English market, we, with equal facilities, do not produce enough for ourselves. While we are grumbling over our long winters, wasting our time in junketing, lounging about taverns or law courts, or what is as bad, cutting logs which will require the best part of the summer to get to market, and in the end run us in debt; their young men and maidens, taking the advantage of every water-power, and daily inventing new machinery, are making palm-leaf hats, pails, brooms, rakes, and axes, which they hand over to us in exchange for our dollars. While we are pampering ourselves on Genesee flour and Yankee pork, the very people who furnish us with these articles pride themselves in living on corn, rye, and buckwheat. While they willingly tax themselves to support a school system which surpasses all that the world has ever seen, and by which every child may obtain the education of a gentleman, we dole out such miserable pittance that no teacher who has strength to be a labourer will stay with us. While they give all honour and respect to the intelligent workers of all classes—while their farmers take pride in their occupation, and keep their scorn for the loafers who seek to live on the labour of others—we despise the horny hand and homespun coat, and those only who are fit for nothing else become farmers. While they love their country and the wise institutions which their own manly exertions have founded, and stir up their national pride by bragging about themselves and

all that belongs to them, we, with natural advantages quite equal to theirs, with institutions such as we are pleased to make them, and which are inferior to theirs only through our own lethargy and stupidity, are contented to grovel on year after year, in servile submission to those evils which are the effects of our own spiritless and short-sighted selfishness, without the power to make that vigorous and united effort which alone is required to place us in a position quite equal to theirs, in the meantime, grumbling at and disparaging a country, a climate, and a soil, which are but too good for such thankless ingrates.

THE ENGLISH AGRICULTURAL SOCIETIES.

From the reports we have seen of the autumnal meetings of these societies, the complaints of the depressed condition of the agricultural interest, arising from the extreme low prices caused by excessive foreign importations, appear to have been both loud and general. The same is true of Scotland. As to Ireland, the depreciation in the value of produce, combined, no doubt, with other causes, has already diminished the circulating medium of the whole kingdom more than one-third; which circumstance is alone sufficient to account for much of the distress and misery of that unhappy land. As it might naturally be expected, the depressed condition of agriculture was mainly ascribed by the generality of the speakers at these meetings, to the effects of the free-trade policy. Here and there a solitary voice was to be heard expressing a hope "that better times are coming," and that British industry, capital and skill must ultimately triumph over all difficulties. This may be so, but how many thousands will be ruined in the meanwhile! One thing is certain, that the repeal of the corn-laws has raised the value of money just in proportion to the depreciation of all kinds of farming produce—that is to say, from twenty-five to thirty per cent. The British farmer must now raise 130 bushels of grain, to meet a given money amount of rent, taxes, and interest on borrowed capital, which, two years ago, when most or all of these imposts had been contracted, would have been met by one hundred bushels. The same remark holds good with all kinds of live stock, and tenants' property in general. Free trade, if persisted in, must produce eventually great fiscal changes in the mother country, and will put to the severest test the connection of many of her colonies. This great, and, as it has appeared to many, hazardous experiment, is yet very far from being completed. Canada is now placed in a most anomalous and disadvantageous position, as an integrant portion of the British empire; and if we should not succeed in our attempts for reciprocity with the United States, we shall have most clearly an indisputable right to protection in the home market. We have only to use our best exertions, and wait patiently, though it be most anxiously, the result.

Next we should be accused of taking a one-sided view of this great question, we here insert some observations of Mr. Brown, one of the members

for South Lancashire, at a recent meeting of the Liverpool and Manchester Agricultural Society. Mr. Brown is a zealous and consistent free-trader, but we cannot vouch for the perfect accuracy of all his data. The reader must think and judge for himself:—

Mr. Brown, M.P., in responding to the toast of the county members, said he was not a practical farmer, and therefore it would be bad taste in him to endeavour to enlighten them on farming subjects; but as he had been met with enquiries from both landlords and tenants as to the effect which free trade might have upon rents, perhaps it would be well if he quoted some statistics to show as far as possible the competition which might be expected from abroad. Austria, which was a corn-growing country, produced 13 bushels to the acre, France 14 bushels, America 18 bushels, Poland 20 bushels (but that had to go to Dantzic for shipment), and England was estimated to produce from 28 to 30 bushels to the acre; so that it would be seen we were a match for any of them on that ground. Then as to the prices at which these countries could afford to supply our market. He had brought with him a memorandum, which showed the average of wheat in the United States since 1785. The averages were those of ten years, and the prices those of the Philadelphia markets.

From 1785 to 1794.....	£1 17 0	per qr.
“ 1795 to 1804.....	3 2 0	“
“ 1805 to 1814.....	2 15 6	“
“ 1815 to 1824.....	2 10 4	“
“ 1825 to 1834.....	1 15 4	“
“ 1835 to 1844.....	1 19 8	“

That gave an average of 49s. 8d. a quarter for the lowest period, and to this must be added 8s. to 10s. for freight, charged to profits. Now he thought they could meet that. But whatever might be said in regard to grain, foreigners certainly could not compete with us in the green crops. As to the quantity of live stock which they could send, it was hardly worth naming. Kane, in his "Industrial Resources of Ireland," had shown the vast extent of our home supply. Now, with respect to Russia, fears had been expressed that we would get large supplies of wheat from Odessa. With respect to that, we had nothing to fear; her agriculture was on the lowest scale of all, and very little wheat found its way through the Straits of Gibraltar, unless the prices were remunerative here. The poor Russian boor brought his corn to market on a miserable cart, drawn by oxen: if he could get a pittance to pay his rent, it was all he wanted. There was no capital there applied to agriculture. Under all these circumstances, he thought, with our good roads—with the immense capital which we could apply to the cultivation of the soil—with the Saxon energy which we possessed—with the intelligence that he saw in that room (for he had just been telling the president that he saw a great many intellectual faces around him), with our knowledge of chemistry, and with the various other advantages that we had, he should not be surprised to see us, instead of being an importing country, if we put our shoulders to the wheel, become once more an exporting country.

At a meeting of the Saffron Walden Society, in Essex, Lord Braybrooke in the chair, the Rev. Dr. Buckland, the eminent geologist, spoke as follows:—

In the Midland districts of England, where the spirit of improvement had travelled to the banks of the Trent, in that fine manly country where God and nature had done so much, there man had done the least. Let them look to the country between Birmingham and Derby, and see the state of the fields; to the Vale of Taunton Dean, where he saw lands that would produce forty-six

bushels an acre, if drained, but they were undrained, and did not produce more than twenty-three, for the farmers were as stupid as their oxen. He was not disposed to take a gloomy view. They had before them the means of increasing, by the application of science, the produce of the land;—for if they could get forty bushels an acre instead of twenty, that must tend to relieve their difficulties. If they looked at the geological map of England, they would find that one third of the whole was made up of clay, and there was not a single acre of that land, the produce of which, if properly drained, would not after five years be doubled. He had bought a farm of 200 acres, and instead of acting like a foolish squire, and attempting to lay wilderness to wilderness, he had spent £600 on it in drainage in six weeks; before it only produced nine or ten ricks of corn, and now it produces twenty or thirty. The parts that were drained produce double the quantity produced on the land not drained, although they were only separated by a thorn hedge, put up for an enclosure. This was not to be sneered at as theory, it was real practice. This was better than keeping the money in their breeches pockets, and saying they could not employ the labourers. If they had not the money in their pockets for drainage, it was their own fault, because £200,000 had been voted by Parliament, to be lent for that purpose, at reasonable interest, and to be repaid in twenty years. If by good management in these matters, drainage and skilful farming, they got better crops, that would tend to relieve the agricultural distress, which undoubtedly prevailed in this country.

At a large meeting of the Agriculturists of the County of Essex, Mr. Disraeli explained in detail the principles of his plan for relieving the farming interest from its present depressed condition, and thereby promoting the general prosperity of the country. By financial retrenchment in all government departments, and a fixed import duty on the productions of foreign countries, (the colonies we imagine to be excepted of course,) a large sinking fund was to be created, which would have the effect of rendering money cheap, thereby enabling the farmer to obtain the amount of capital necessary for agricultural improvement at a lower rate of interest. The equalization of taxation forms likewise a prominent feature of the scheme. Mr. Disraeli concluded his address with the eloquence for which he is remarkable, in the following words:

There must, if there be a *bona fide* sinking fund—there must result a gradual but a certain, and every year a diminishing amount of burdens on the country. It will not be the commercial section of the community, or even, perhaps, some one commercial house, that will gain the advantage of this measure; but every class in the community will, by the action of the sinking fund, obtain relief. The next effect it will have is on the price of capital—the interest of money—a subject of great importance to the industrial classes: Now these advantages you will obtain; you will have capital abundant—you will have every class feeling their burdens diminishing. How are you to do it? Why, by making the foreigner pay a toll on his commodities. (Loud cheers.) Now, am I right in supposing that the yeomen of Essex will adopt these principles? (Loud cries of "Yes, yes.") But, am I right in supposing that the yeomen of Essex mean to act upon them? (Tremendous cries of "Yes, yes.") Because we live in times when cheers round a convivial board will not save the country. In old days we assembled to commemorate the victories we had won and the tocs we had baffled.—But we meet now in the hour of difficulty and danger;

and we must meet to no use, unless we can devise some plan which we shall follow up with a confirmed resolution to conquer. If you resolve to act upon these principles, permit me to tell you, not as a mole, for you do not require such an incentive, but rather as an instructive hint, what we have done in the county in which I live. Impressed with the two great principles—first, that taxation should be equalised; and secondly, that public credit should be maintained, we have formed a society for the relief of real property, feeling convinced that real property never will be relieved except on the policy of these two principles which I have laid down. I ask you to do the same. From your society petition the House of Commons for equal taxation, to which you are entitled—a justice which no one denies; call upon Parliament to cease tampering with the fiscal fortunes of England, which has been too long indulged in—make up your mind to pay your debts—establish the same rule of morality for a nation which exists for individuals—and the certain and inevitable consequence will be, that you will not only introduce a principle of fiscal morality, which has been too long absent from the counsels of the Legislature; you will not only make capital abundant to those classes who require it, and who have a right to ask for it—and to no other class do I refer—but you will do more than this, you will place your ancient and noble industry in a just and legitimate position. I have been told that the agricultural interest don't know what they want—that they have no motto upon their banners. Write on your banners "Justice and Honesty," and depend upon it the nation will sympathise with you. It will rally round such professions, backed by such practices as you counsel and recommend. I feel persuaded that if the county of Essex shall act with spirit, and drive home these two points—if they demand from the Legislature equal taxation, which now, so far as reason and argument are concerned, is a settled question,—if they will counsel in an admonitory voice imperial morality, that the first and greatest principle of finance is the diminution of the national burdens, and that the only legitimate mode of doing this is by diminishing the public debt, and that the easiest, the most obvious, the justest course to do that would be that the untaxed foreigner should contribute his quota—I am convinced that that is a policy which must govern the country; if, indeed, the country be worth redemption. I have treated this subject economically, because the opinion of the times is inclined to economy, and because that way of treating it is rather endured by us in our forlorn position in consequence of the legislation which we have had in the present day. But I never can consent that this great question of the land of England shall be argued on such narrow and limited considerations. In this age of perfidy and cowardice I am not ashamed to say that I am prepared to uphold and maintain the constitutional preponderance of the land of England. I do so because I recognise all the institutions which have made our country so eminent as having their root and origin in the land—that immemorial throne which reconciles the majesty of the law with the freedom of the subject—the sacred spires of that patriot church that has at all times guarded the popular privileges and formed the national character—the brave front of these high spirited Parliaments that have educated the people of England in a comprehensive and practically enlightened freedom; because I recognise in the territorial principle the real and only source of stability in the state; because in the laws, the customs, the manners, the influence, the traditions connected with the land, I see the origin of that noble and indefatigable ambition that prevades all classes of the community—the true aristocratic principle that has taught every Englishman—at the plough or at the loom—in the guided saloon or in the ermined senate—that it is his privilege to aspire and his

duty to excel. (The hon. member resumed his seat amidst prolonged cheering.)”

PROVINCIAL AGRICULTURAL ASSOCIATION.

To the Editors of the Agriculturist.

GENTLEMEN,—I shall be obliged to you to insert, in the December number of your valuable journal, the enclosed Resolutions which I intend to propose at the February meeting, as Amendments to the Constitution of the Provincial Agricultural Association.

In taking this step I have but one object;—to define as accurately as possible the respective duties of the Board of Directors, and of the Local Committee, with a view to the adoption of a better and more uniform system of management.

In publishing these Resolutions so long before the February meeting, the Directors and Members of the Society will have ample time to examine them, and I shall be willing to adopt any amendments that may be considered better calculated to effect the desired object.

It will be admitted, I believe, by every gentleman who has taken part in the management of the previous Exhibitions, that the present system has not worked well, and that it places both the Directors and the Members of the Local Committee in an unfair position before the public.

In drawing up these Resolutions, I have followed as closely as possible the system of management adopted by the Royal Agricultural Society of England, the details of which were kindly furnished me by Professor Johnston of the University of Durham; Professor Johnston assured me that, in Great Britain, the Royal Society's system of management is considered much superior to that adopted by any other Society.

In clause 20 I have provided that no Member of the Board of Directors, or of the Local Committee, shall be concerned in any contract, &c. This valuable clause I have copied from the proposed Bye-Law of our worthy Vice-President, Mr. Marks.

I am Gentlemen,
Your obedient Servant,
JOHN WETENHALL.

Toronto, Nov. 30, 1849.

AMENDMENTS TO THE CONSTITUTION OF THE PROVINCIAL ASSOCIATION, TO BE PROPOSED AT THE MEETING IN FEBRUARY, BY J. WETENHALL, ESQ., PRESIDENT FOR 1850.

1. Be it enacted, That the Board of Directors, or a committee thereof, shall meet daily during the Exhibition, and shall transact all the business connected therewith which shall not have been previously entrusted to others, and that all questions of importance which shall arise during the Exhibition shall be submitted to the said Board, whose decision shall be final.

2. Be it enacted, That the Ex-Presidents of the association shall be ex-officio members of the Board of Directors.

3. Be it enacted, That the Secretary shall if necessary make frequent visits previous to the show to the place selected, and if required shall remain there two or three weeks before the Exhibition takes place.

4. Be it enacted, That the Secretary shall be a member of the Local Committee as well as of every sub-Committee thereof.

5. Be it enacted, That the Secretary shall (subject to approval by the Board of Directors) prepare the necessary account books, superintend the entering of articles for exhibition, the preparation of the Judges' books, and the pay lists, the issuing of badges and tickets of entrance into the show grounds, and all other matters

connected with the management of the show which are not of a local character.

6. Be it enacted, That the Secretary shall have charge of all account books and other documents relating to, and being the property of, the Society.

7. Be it enacted, That the Secretary shall (subject to approval as aforesaid) engage the services of competent persons to act under him as heads of departments: one to take charge of the ticket office, another of the office for general entries, &c., and in making his selections the Secretary shall have in view the probability of obtaining the services of the same parties at future Shows, in order to establish as far as practicable a uniform system of management.

8. Be it enacted, That the Board of Directors shall appoint an Acting Treasurer, who shall attend at the Show-ground during the Exhibition, and for as many days before and after that time as the Board of Directors or Committee thereof may require.

9. Be it enacted, That the said Acting Treasurer shall give such security for the due performance of his duties, and shall receive such remuneration as shall be respectively decided upon by the Board of Directors.

10. Be it enacted, That it shall be the duty of the Acting Treasurer to take charge of all monies collected by the Society previously to the day of Exhibition (excepting such monies as are collected by the Local Committee for local purposes); to take charge of monies collected at the gates of the Show-ground as well as of monies paid for badges, subscriptions of members, tickets for stock, &c.

11. Be it enacted, That the Acting Treasurer shall pay the premiums at the time appointed by the Board of Directors, and shall pay such premiums in accordance with the pay lists to be furnished him by the Secretary.

12. Be it enacted, That the Acting Treasurer shall, at as early a day as practicable after the Exhibition make out a full and fair statement of all monies received and disbursed by him, (audited as the Board shall direct) and shall deliver the same to the Secretary of the Association; and shall deposit the balance of monies received, if any, in the Bank of Upper Canada, to the credit of the Association.

13. Be it enacted, That for the purpose of assisting the Directors in making the necessary arrangements before and during the Exhibition, a Local Committee shall be appointed, to consist of not more than _____ nor less than _____ which Committee shall be appointed by the Board of Directors at the February meeting, unless previously elected at the general meeting.

14. Be it enacted, That the President and Vice Presidents for the year, as well as the Ex-Presidents, shall be ex-officio members of the Local Committee, in addition to those appointed by authority of the preceding clause.

15. Be it enacted, That the Local Committee shall have power to appoint sub-committees to superintend the several arrangements devolving on them.

16. Be it enacted, That the Local Committee shall appoint a local Secretary and a local Treasurer, and shall require from the said Treasurer suitable securities for the due performance of his duties.

17. Be it enacted, That the local Committee and its officers and agents shall have power to collect subscriptions for the purpose of paying the local expenses, and shall pay all monies so collected to the local Treasurer.

18. Be it enacted, That the Local Committee shall select the ground for the Exhibition, and contract for the fencing in of the same, as well as for the erection of the necessary Buildings, Booths and Pens, and provide provender for Stock, and make such other arrangements as may be necessary for the safe keeping of all articles exhibited.

19. Be it enacted, That the Local Committee shall make arrangements with steam-boat Proprietors and

rail-road Directors, in order to facilitate access to the exhibition: and shall make similar arrangements with hotel Keepers and other Individuals, so as to have good accommodation provided for visitors at the usual rates of charge.

20. Be it enacted, That no member of the Board of Directors or of the Local Committee shall be concerned in any contract or work of profit directly or indirectly, as surety or otherwise, ordered to be performed for the use of the Association.

AGRICULTURAL ASSOCIATION OF UPPER CANADA.

NOTICE IS HEREBY GIVEN, that a meeting of the Agricultural Association of Upper Canada will be held on Wednesday the 20th day of February next, at 10 o'clock in the forenoon, at the Court House, in the city of Toronto, for the purpose of considering certain amendments to the Constitution of said Society to be then and there submitted.

By order.

GEO. BUCKLAND, *Secretary.*

Toronto, Nov. 28, 1849.

STEAM APPLIED TO AGRICULTURE.—The following remarks on points that we deem worthy of more attention from Agriculturists than they generally receive, were made by Lord Brougham, at an agricultural meeting lately held at Penrith:—

He had been very much delighted to see so good a show of valuable engines, some of them most ingenious and very reasonable in price, for churning, hoeing, threshing, and so forth. A friend of his, a practical Agriculturist, informed him that a very important step had been taken for the purpose of saving labour, and thereby economising the expense of production, an object which, with care and judicious mechanical contrivances, was always in our power even when we could not increase the fertility of the soil. The most valuable experiments had been made in the application of steam on a small scale. People were apt to suppose that steam could only be employed on a gigantic scale, for locomotion on railways, or in great manufactories of various kinds; and of course in proportion to the size of the engine was its expense both in first cost and in working it by means of fuel. But in the town of Glasgow a person had been able to have a steam engine not larger than a tea-kettle—he had seen such an one himself; in one instance he had heard of one not larger than a teapot, which was quite capable of driving a small turning-lathe on which a cutler could work. Still it might be said this power had only been employed in manufactures; but it might with the greatest possible advantage in saving labour be introduced into agriculture as well as manufactures. Threshing machines, straw-cutting machines, and various other engines, might be worked most advantageously by the application of steam; and he had the most confident, sanguine hope, that he should live to see this new and most valuable extension of the application of steam. What reason had they to doubt that the same wonderful engine which Watt shewed applicable to pump up water from the bowels of the earth, split rocks in pieces, or manufacture the machinery of a watch, shall be applied to something between the two—to some of the agricultural works which could now only be executed by dint of well-paid human labour! He could not help thinking the suggestion well worth the attention of Farmers, that a better system of keeping their accounts, as tending to economy above all, and to regularity, a great source of wealth in itself, should be more generally adopted. He hardly ever knew a great good Farmer on a considerable scale, or one on a moderate

scale, who did not to a certain degree perform the office of his own accountant, keeping a regular set of books, as tradesmen were accustomed to do. It was as necessary for the Farmer, the manufacturer of corn, as it was for the manufacturer of cotton twist or steel blades, to keep accounts of all the details of his business. He never could tell exactly what state he was in—what was his expenditure, what were his gains or losses, without regular and systematic book-keeping. He therefore strongly recommended his agricultural friends, although they might not be so well educated as those he now addressed, and started back from pen and ink, to adopt a good system of accounts.

CONGELATION OF WATER.—Gardeners may learn many useful things by taking a lesson now and then from Natural Philosophy: for instance, it teaches us that in general liquids expand and contract in proportion as they are heated and cooled; but to this law there is a remarkable and anomalous exception in regard to water. When a large thermometer tube is filled with water of the temperature of 60 degrees and placed in a cold situation, or in a freezing mixture of ice and salt, the water goes on shrinking in the tube till it has attained the temperature of about 40 degrees, and then, instead of continuing till it freezes, as is the case with other liquids, it slowly expands, and actually rises in the tube till it congeals. In this case the expansion above 40 degrees and below 40 degrees seems to be equal, so that water will be at the same bulk at 48 degrees and at 32 degrees. This anomalous expansion of water by cold is productive of some important consequences considered as a natural operation; for if water, like other fluids, went on increasing in density till it froze, the consequence would be that large bodies of water, instead of being only superficially frozen in winter, would be converted throughout into solid masses of ice. Let us take a fresh water lake as an example:—The earth being in winter warmer than the air, the heat is withdrawn from the surface of the water by the cold breezes that blow over it, and the whole body of water has its temperature lowered to 40 degrees, which is the point most congenial to fishes and other aquatic animals. The cold now continues to operate upon the surface of the water, but instead of diminishing its bulk, and therefore rendering it heavier than the warmer water beneath, it expands it and renders it lighter, so that, under these circumstances, a stratum of ice-cold water at 32 degrees will be found lying upon the mass of warmer water beneath it at 40 degrees. The influence of the cold continuing, the surface of the lake will soon freeze, but the water immediately under the superficial covering of the ice will be found comparatively warm, and as water is almost a non-conductor of heat, it will be a long time before the ice attains any thickness, and the whole body of water, if of any depth, can never freeze throughout. Indeed, it will be obvious, that the retardation of freezing will be proportional to the depth of water which has to be cooled, and hence some very deep basins or lakes are scarcely ever even covered by ice.—*Scottish Farmer.*

THE evils of the world will continue until philosophers become kings, or kings become philosophers.—*Plato.*

GOODNESS OF HEART is man's best treasure, his brightest honour, and noblest acquisition. It is that ray of the Divinity which dignifies humanity.

PEOPLE who endeavour to attract that attention by dress which they cannot obtain by their intrinsic worth, resemble the soap balloons blown by children; the thinnest bubbles are invested with the brightest colours.

Horticulture.

DOUBLE CRIMSON CURRANT.

This is a new and beautiful shrub, and being easily propagated and of a hardy nature, it deserves the attention of amateurs who desire to possess in their collections the choice and the rare. This shrub is more ornamental than useful, but the same may be said of a thousand of nature's lovely productions, the absence of which would make the earth waste and dreary in the eye of the most intelligent admirers of the beautiful, or even the most determined stickler for utility.

We copy the following description from the *Horticulturist*, an American work of high repute:—

This new and charming variety of the Crimson Flowering Currant, is a seedling, raised in Scotland, from *R. sanguineum*, by Mr. David Dick, gardener to the Earl of Selkirk. It is but just introduced into this country; but since, like all the currant genus, it is very easily propagated by cuttings, we hope speedily to see it in every good collection of shrubs.

The blossoms are larger than those of the single variety, the racemes from three to six inches in length, and the effect of the shrub, when laden, in spring, with these fine pendant blossoms, is very rich and striking. Its flowers open, according to *Paeton's Magazine*, about three weeks later than the parent species.

Ribes sanguineum, north of New York, should be planted in a somewhat shaded situation—on the north side of walls or buildings, or in places where it is partially shaded by evergreens. In such sites, it is perfectly hardy. It is quite likely that this double variety, being a Scotch seedling, will prove perfectly hardy with us in any situation.



devoted to the consideration of a "rejected list" of fruits, such as were thought unsuitable for general cultivation. This important duty appears to have been performed with proper care, and after much deliberation. As the subject of fruit is one of annually increasing importance in Canada, and the demand for fruit trees, we are told, is already much beyond our means of supply from our own nurseries, we insert for the benefit of our readers the list of fruits adopted, as also the one rejected, by this association:—

LIST OF FRUITS FOR GENERAL CULTIVATION.

AMERICAN POMOLOGICAL CONGRESS.

We stated in our last that the two fruit conventions, in the United States, had merged into one, under the above title. We learn from the November number of the *Horticulturist*, that the late meeting in New York was numerously attended by delegates from almost every section of the Union. Considering the unfavourable character of the past season, the exhibition of fruit exceeded the most sanguine expectations. A new general fruit committee was formed for the whole country, consisting of the chairmen of the committees of the different horticultural and pomological societies throughout the United States and Canada. Much time was

- Pears.**
 - Rostlezer,
 - Andrews,
 - Fondante d'Automne,
 - Fulton,
 - Urbaniste,
 - Vicar of Winkfield;
 - Uvedale's St. Germain, or Pound,
 - Louis Bonne de Jersey,
 - Uvedale's St. Germain, for baking.
- Apples.**
 - Swaar,
 - Porter,
 - Fameuse,
 - Vandevere,
 - Hubbardston Nonsuch,
 - Danver's Winter Sweet,
 - Bullock's Pipkin,
 - White Seek-no-further,
 - Winesap,
 - Lady Apple,
 - Wine Apple,
 - Red Astrachan.
- Appricots.**
 - Large Early,
 - Breda,
 - Moorpark.

Nectarines.

Downton,
Elruge,

Early Violet.

Grapes,

*(for culture under glass.)*Black Hamburg, White Frontignan,
Black Prince, White Muscat of Alexandria,
Black Frontignan, Chasselas of Fontainebleau,
Grizzly Frontignan,*(for open culture)*

Isabella,

Catawba.

Currants.

Red Dutch, May's Victoria,
White Dutch, White Grape,
Black Naples,

Gooseberries.

Houghton's Seedling, Laurel,
Woodward's Whitesmith, Ironmonger,
Crown Bob, Early Sulphur,
Red Champagne, Green Gage,
Warrington, Green Walnut.

Raspberries.

Red Antwerp, Fastolf,
Knevett's Giant, Yellow Antwerp.

Strawberries.

Large Early Scarlet, Hovey's Seedling,
Boston Pine,

The following list was adopted by the convention as new varieties, which "give promise of being worthy of being added to the list for general cultivation":—

Plums.

River's Favorite, McLaughlin,
St. Martin's Quetsche,

Pears.

Beurre d'Ajoux, Paradise d'Automne,
Doyenne Boussock, Van Assene,
Manning's Elizabeth, Jalouise de Fontenay Vendee,
Doyenne d'Ete, Chancelor,
Striped Madeleine, Ananas d'Ete,
Duchess d'Orleans, Brandywine,
Pratt, Ott.

Strawberries.

Barr's New Pine, Jenny's Seedling.

Apples.

Early Harvest, Rhode Island Greening,
Large Yellow Bough, Baldwin,
American Summer Pearmain, Roxbury Russet,
Summer Rose, *And for particular localities—*
Early Strawberry, Yellow Bellefleur,
Gravenstein, Esopus Spitzenberg,
Fall Pippin, Newtown Pippin.

Pears.

Madeleine, Seckel,
Dearborn's Seedling, Flemish Beauty,
Bloodgood, Beurre Rose,
Tyson, Winter Nellis,
Golden Beurre of Bilboa, Beurre d'Arenberg,
Bartlett, *And for particular localities—*
Williams's Bon Chretien, or White Doyenne,
Bartlett, Gray Doyenne.

Peaches.

Grosse Mignonne, Cooledge's Favorite,
George IV, Bergen's Yellow,
Early York, *scratted*, Crawford's Late,
Large Early York, *And for particular localities—*
Morris White, Heath Cling,
Oldmixon Freestone,

Plums.

Jefferson, Cox's Golden Drop,
Green Gage, Frost Gage,
Washington, Purple Gage,
Purple Favorite, *And for particular localities—*
Bleecker Gage, Imperial Gage.

Cherries.

May Duke, Knight's Early Black,
Black Tartarian, Downer's Late,
Black Eagle, Elton,
Bigarreau, Downton.

LECTURE ON BOTANY.

On Monday evening week, Mr. Just delivered his lecture in the Royal Institution, Manchester, before a numerous audience. Having briefly referred to the leading topics of a previous lecture, he noticed the three principles which seemed to rule over all vegetable productions, namely, germination, vegetation, and fructification. Each germ took in, from the influences of such conditions that surrounded it, a material which stimulated vitality, so as to enable this vitality to react upon the material, and give it an organised development. The conditions which called forth such developments were few, while the number of germs was almost limitless both in the sea, in the air, and on land. Germination was the primary and essential principle; replete, however, as the air and water were with germs, the earth was more within the scope of our observation. From what had sprung the verdure of England—her grassy meadows, her golden harvests, her unrivalled fences, and her magnificent forest trees? Seeds which were not flying or floating, but fixed germs, were supplied within themselves with all the requisites for their germination: and were not like the other kind of production, dependent upon external supplies for stimuli to their development. Still the germination of seeds was not irrespective of external conditions. To induce the germs within the seeds to act, three special conditions were necessary: a proper degree of temperature, a free access of air, and shelter from the direct light, with a sufficiency of moisture.

Having entered into a description of the process of germination, the lecturer proceeded to define the process of vegetation. It was distinct from, yet accessory to, germination. It required a different kind of aliment, and thereby built up a different kind of structure; it developed the true axis of growth—downward into the soil, and upward into the air. It comprehended roots, with their appendages in the soil, and stems with their appendages in the air; and consequently it embraced a whole class of organs, running through an indefinite number of modifications, according to the nature of their several species and the different localities in which they were situated. The principle of vegetation continued active for an indefinite period; at first, growth is rapid, and the young plant shoots up apace; by-and-by, a check comes on in the annual shoots, the buds yield less and less developments, and another change takes place in the vegetable system. Fructification, the third and last principle, now ensues, either completing its functions, and exhausting the natural supply of nutriment in one season, as among annuals; or, during the second season of growth, exhausting the accumulation of the first, as among biennials; or otherwise, keeping up a constant supply by drawing annually upon the stores within the plants, and annually replacing them. In the annual plants, the true vegetation was of very short duration, and that of fructification of longer continuance. The whole supply of fecula was exhausted, however, by this last event, and there being no vegetation to supply more, the annual died of pure inanition. With biennials, during the first season, each plant vegetated alone; and during the second, each fructified alone; but during the second year, the store of nutriment being exhausted, the biennial also died of pure inanition; and so also with the perennial, when fructification had exhausted its stock of fecula. Fructification, though dependent upon vegetation, as the latter was upon germination, must have its appropriate organs and developments. Whether of the lowest or most elevated kind, it consisted always of two classes of organs, and two classes of development: fertilization and fecundation must first ensue ere the fruit can set, or maturation take place. The fertilizing organs were

found in the flowers, while the fruit itself was the terminating organ of the fructifying axis.

Having entered into an explanation of the processes of fertilization, fecundation, and maturation, the lecturer completed his outline of the whole round of the system. Reproduction was the great and grand law of nature: multiplication of life, and the increase of vital enjoyment, the aim of all organization. Death was no evil; it was but the end of an existence assigned to us for which we had no claim, no right of inheritance, beyond the boon of a leasehold from the great Lord of creation. Whatever means multiplied life, extended goodness and increased enjoyment. In natural situations, the causes which influenced the condition of plants seldom varied: occasionally the form and colour of the leaf or of the petals, were found to differ in plants of the same species; but in a few generations, most, if not all the plants produced, reverted again to the type of the species. The influence of conditions upon plants was best seen in those that man cultivated: our monstrous dahlias, our painted pansies, our pencilled carnations and pinks, and other splendid varieties, owed their peculiarities to the care of man; and so it was, also, with vegetables of the kitchen garden, and the green crops on arable land. By constant attention to the conditions requisite for such active developments, our cultivated varieties of cabbage weighed more pounds than the wild natives weighed ounces. The same, also might be said of our carrots, turnips, &c., by constantly encouraging the growth of the best varieties, and by feeding such varieties to the full with aliment proper for increasing their dimensions, we made such plants serviceable and profitable productions for man and beast. In such cultivation there doubtless was a limit; for while we almost entirely suppressed certain properties in plants cultivated, and encouraged others to grow to excess, we impaired the vigour of the plants' constitution, and thereby rendered them liable to disease. This was seen in the most valuable of all esculents at the present time. The potatoe had been awfully affected with a gangrenous disease, which had baffled the powers of the most acute physiologists to account for. At different periods of its growth, and under certain conditions of the atmosphere—chiefly when it was wet and warm for a few days' continuance—this malady made its appearance in black specks, which soon spread over the whole plant, particularly if the moisture and warmth continued, till whole crops had the same blackened appearance as if they had been cut down by frost. The tubers were attacked; gangrenous blotches appeared on the cuticle and epidermis, and, whether in the earth or in the store, the disease went on, until, sooner or later, it had completely destroyed the whole tubers. The disease, however, appeared in no season before the plants had attained their full growth, and the maturation of the tubers had commenced. The only crops which escaped this pestilence were those grown within pure bog-soil, the conservative nature of which seemed not only to preserve the tubers when growing, and within it, but also to communicate to them the power of withstanding its attack afterwards. One lesson we might draw from this fact, namely, that where we had not pure bog-soil in which to plant our potatoes, we should surround them with such dressing and tillage as most assimilated to it in conservative properties. Last year he (the lecturer) placed twelve seedling potatoe plants in pots containing the same kind of soil, but each treated with different kinds of tillage; other seedlings he likewise planted in the ground. On taking up the tubers, at the latter end of the summer, he found every plant more or less infected with disease, except one, which had been liberally treated with fine particles of coal ashes. From this plant he had gathered twelve small well-defined tubers, which he preserved over winter, and

planted last spring in a drill manured with riddled coal-ashes as before. About ten days ago, the crop had been gathered, and though, at that time, more than one-half of the common crop of potatoes close to which the seedlings had grown were diseased, not a blotch was observable upon one single seedling tuber. Strange to say, he counted from one plant 46 well-defined tubers, and though the potatoes in the cellar gathered before the blight came on, and which were free from all taint when gathered, were now to a great extent infected, the seedling store, which was kept close by them, had withstood the attack, and most likely would continue to do so. He intended to plant again next spring, in the same way: using the same seed, in order to discover if a like result would follow. He was aware that coal-ashes, with cinders, &c., were used extensively for tillage in potatoe crops, and that they, like the rest, failed; but then, such ashes were mixed up with night soil, and other refuse, abounding with ammoniacal compounds; whereas the ashes which he had used were select and pure. For healthy growth, the potatoe required a modicum of potass: ammonia pushed the plants to excess, and thereby injured them. Ammonia, within due limits, excited and promoted vegetation; giving a more extended axis of growth, with more numerous and enlarged vegetating organs; but ammonia, in all proportions, retarded germination, and in excess, wholly destroyed it. Further, with regard to manures, it was melancholy to witness, almost everywhere, gross breaches of the natural laws, in their application to tillage on farms and cultivated grounds. We saw guano applied to white crops, while the best farm-yard manure, with its charge of silica, was spread over the ground for green and hay crops.—*Manchester Examiner*.

ON THE DIFFICULTIES AND NICETIES IN THE CONSTRUCTION OF LORD ROSSE'S TELESCOPE.—Dr. Robinson, at a recent meeting in Birmingham of the Society for the advancement of Science, gave a rapid sketch of the steps by which Lord Rosse was led to the construction of his instruments, the difficulties he met with in producing large speculæ of that most intractable and yet beautiful material speculum metal; which while it is as hard as steel, is yet so brittle that a slight blow would shiver it to atoms, and so sensitive to changes of temperature, that the affusion of a little warm water over its surface, not too warm to be disagreeable to the touch, would crack it in every direction. He then gave a sketch of the contrivances by which the leading difficulties were overcome. When describing the mould used, with its metallic bottom of packed hoop iron, he stated, that the plan proposed by Mr. Potter, and now claimed in no measured terms, as originating the entire improvements, had been tried and found utterly unfit for producing the proper surface. Dr. Robinson then gave a sketch of the process of grinding and polishing, and of the adjustments and mechanical suspension of the instruments; and he stated that a deviation of the speculum from the parabolic form at its outside circumference which should amount to the 1-100,000th part of an inch would render it optically imperfect, and that a deviation from the proper focal length of any part to the amount of the 1-1,000,000th part of an inch could be detected. He also stated that Sirius, when seen in it through the light was utterly insupportable to the unprotected eye, so that a person might as well attempt to look at it directly as at the concentrated light of the charcoal points produced by the action of Mr. Gasiot's battery; and the attempt made on one or two occasions by him was followed for several hours by a spot of light varying from intense red to blue, being constantly before his eye; yet, when properly viewed, it was a beautiful sharp bead of intense light.

Mechanics and General Science.

BRITISH SCIENTIFIC ASSOCIATION.

The nineteenth annual meeting of the British Association for the advancement of Science took place in Birmingham in September last. The following is the concluding portion of the President's address—the Rev. T. ROMNEY ROBINSON, of the University of Dublin.

I have left myself but little space to consider how far we have fulfilled the third of our objects,—“to obtain a greater degree of national attention to the objects of Science.” Most assuredly it was needful; for nowhere in the civilized world is less honour paid by a nation to science, though nowhere is national prosperity more connected with its progress, nowhere are heavier penalties paid for its neglect. I do not now refer to the remarkable fact that in Britain only men whose scientific fame fills all Europe were seldom thought worthy of any honorary distinction by their Government. As it relates to themselves, this is of no importance; but it is of deep concern to the honour of this country. The true votary of science loves it for itself: in its possession he has a higher honour, a nobler decoration than man can give. *He* does not require to be bribed to follow it by titles or ribbons,—the baits for meaner spirits, the lure to lower achievements. But he knows that though *he* despises such gauds, those who bestow them hold them precious; and they serve him as a scale by which he finds that great men once placed a Herschel or a Brewster nearly on a level with a third-rate soldier or the annual magistrate of some town that might be honoured with a Royal visit. Nor do I refer to the miserable economy which permitted such men as Ivory and Dalton (to speak only of the dead) to waste, in the drudgery of earning a precarious subsistence, the years, the powers, the hopes which could have borne light into the remotest and darkest recesses of the realms of inquiry; though it does contrast painfully with the munificent provision which republican France and despotic Russia heap on such men when they can find them. Both these spring from the same root;—the gross ignorance in this province of the intellect which up to the beginning of this Association, and long afterwards, prevailed in the land. The industrial classes of our countrymen were wont to rely in their pursuits on the unenlightened dexterity and empirical success which resulted from experience, and to scoff at the idea of learning anything useful from a mere theorist; those whom wealth and independence permitted to choose seldom sought employment or pleasure in this unfashionable region,—their education, though the best then current, having given them very little cognizance of what it might contain. And to ascend still higher, even to the executive and legislative bodies, they “cared still less for science; the tension of political life engrossed all their faculties: they disliked philosophers as meddlers, or despised them as dreamers. The head of a great military department once

said that he *hated* scientific officers! Any one of his engineers might have told him that more money had been wasted and lives lost in that department from sheer ignorance of science than any one could think of without shame and sorrow. The question which I know to have been asked by another in “high places,” though milder in expression, was not less scornful—“Of what use is science?” He who asked it ought to have known better. Whatever tends to raise man above low and sensual pursuits,—whatever to lead him from the partial and present to the general and the future,—whatever to exalt in his mind the dominion of order and the supremacy of truth,—that must be useful to the individual, useful to the nation. Even had he been incapable of rising above the gross measure of pecuniary value; he ought to have been able to give a mighty answer to his own inquiry. There is not a single element of our commercial prosperity in which the vivifying power of science might not be felt, in which the loss arising from want of that certainty of action which mere unenlightened practice can never attain, does not reach an amount which, if stated in figures, would astound the most thoughtless. For instance, the causes which in our great cities hasten the death and debase and embitter the life of so many, have at last been forced by chemists and physiologists on the notice of the public. Look at Dr. Smith's report on the Air and Water of Towns, in this volume; and when we think that the victims of the deadly influences which are there revealed are chiefly found among the people whose industry is the foundation of our greatness,—that every year cut off from the life of each of these is so much subtracted from national wealth,—even were all moral sense or religious feeling dead in us, we must confess that the knowledge which is capable of averting them “is of use.” The ships that bear the treasures produced by this industry through the world are lost to a fearful amount,—nearly *three* daily. What are they worth,—ship, cargo, men?—and most of them perish from want of nautical science or from unscientific construction. How many men have been ruined by searching for minerals, when the merest smattering of geology would have dispelled their delusion? On the other hand, the agricultural produce of our islands might be doubled by a more perfect application of the principles of botany and chemistry. The manufacture of iron has been augmented six-fold by the use of the puddling furnace and the hot-blast,—both gifts of theory. How gigantic a result is this, without reference to the increase in the thousand arts of which this immense supply of that most precious of metals is the exponent. The splendid machinery in which we excel, the world owes its present perfection to mechanicians who are conspicuous in *our* Sections, to impulses given by philosophers like Willis or Babbage. Nay, the steam-engine itself, your immortal town's-man's great conquest,—that earthly Fate to which now seems to be committed the weaving of the world's destiny,—that itself was a pure induction of science:—and beyond *that* I need not go. But we live in better times; for no statesman

now would be so imprudent as to ask such a question, even were there any so unfortunate as to think it,—which I trust there are not. And this change we, the British Association, have in no small degree helped to produce. We have carried far and wide through the land the light which before beamed only from a few scattered points; if our meteor-like presence be short, it is also bright,—and as the meteor is remembered when the stationary lamp is unheeded, so I trust that of the tens of thousands who have felt our influence few will forget the impression which it made on them, and fewer fail to feel that this impression ennobled and exalted their understanding. It is evident that science now has a far more powerful hold on public opinion than when we began our course. No other proof is needed of this than the fact that many new branches of it are finding their way into the course of University instruction. Without referring to the recent changes in those of this island, I rejoice to say that in my own—that of Dublin—within the last year, Chemistry, Thermotics, Electro-Magnetism, and others, have been made a portion of the under-graduate course; while one of our own valued members has introduced into primary schools a manual of Zoology, of which the spirit is as good as the substance is attractive. But there is another evidence, not less satisfactory, in reference to this our third object, and I name it with pleasure,—the prompt and liberal attention which our Government now pays to the requests of the Association. It is true that we have never applied to it except for matters of paramount importance and unquestionable usefulness; but in times past it would have been no easy matter to force a conviction of this on the guardians of the Treasury; and we may therefore feel assured, not only that they personally take an interest in what we bring before them, but also that the whole nation sympathizes with us;—for some of these concessions are of no ordinary magnitude. The completion of the Ordnance survey of Scotland—the enlarging the scale of part, perhaps all, of that of England—and the adding lines of level to that of Ireland after it was apparently completed—are very formidable items in a budget. At our demands the Observatories from which such splendid additions have been made to our knowledge of Magnetics and Meteorology have been established far and wide throughout our dominions:—a precious gift, not only for itself, but for what it has produced. The example was followed, on their usual princely scale, at four stations by the East India Company, (always, be it said, munificent patrons of science,) and still more extensively by Russia—with what success must be fresh in the memory of those who were present at the Magnetic Congress. We obtained the Antarctic Expedition of Ross, so fertile in its geographic fruit—so invaluable for the wide extension which it gave to the domain of terrestrial magnetism. We procured the expenditure of large sums for the reduction of the Greenwich lunar observations, and for publishing the Catalogues of Lacaille and Lalande,—and much more which I need not recite. Yet,—and we well may reckon it a sign of progress,—not a single voice has been

raised in opposition to these grants. It seems as if our country recognized in us its scientific representatives,—as if we were like the Saxon prototype of its great council: its *Witena-Gemot*—its assembly of the Wise.

And may we deserve that name; for let me remind you that science is not necessarily wisdom. To know, is not the sole nor even the highest office of the intellect; and it loses all its glory unless it act in furtherance of the great end of man's life. That end is, as both Reason and Revelation unite in telling us, to acquire the feelings and habits that will lead us to love and seek what is Good in all its forms, and guide us by following its traces to the First Great Cause of all, where only we find it pure and unclouded. If science be cultivated in congruity with this, it is the most precious possession we can have—the most divine endowment. But if it be perverted to minister to any wicked or ignoble purpose—if it even be permitted to take too absolute a hold of the mind, or overshadow that which should be paramount over all, the sense of duty, the perception of right—if it does not increase in us the consciousness of an Almighty and All-beneficent presence,—it lowers instead of raising us in the great scale of existence. This, however, it can never do but by our fault. All its tendencies are heavenward;—every new fact which it reveals is a ray from the origin of Light, which leads us to its source. If any think otherwise, their knowledge is imperfect or their understanding warped or darkened by their passions. The Book of Nature is, like that of Revelation, written by God, and therefore cannot contradict; both we cannot read through all their extent, and therefore should neither wonder nor be alarmed if at times we miss the pages which reconcile any seeming inconsistency. In both, too, we may fail to interpret rightly that which is recorded; but be assured, if we search them in quest of truth alone, each will bear witness to the other,—and physical knowledge, instead of being hostile to religion, will be found its most powerful ally, its most useful servant. Many, I know, think otherwise; and because attempts have occasionally been made to draw from Astronomy, from Geology, from the modes of the growth and formation of animals and plants, arguments against the divine origin of the Sacred Scriptures, or even to substitute for the creative will of an intelligent First Cause the blind and casual evolution of some agency of a material system, they would reject their study as fraught with danger. In this I must express my deep conviction that they do injury to that very cause which they think they are serving.

Time will not let me touch further on the cavils and errors in question; and besides, they have been often fully answered. I will only say, that I am here surrounded by many matchless in the sciences which are supposed so dangerous, and not less conspicuous for truth and piety. If they find no discord between faith and knowledge, why should you or any suppose it to exist? On the contrary, they cannot be well separated. We must know that God is, before we can confess them;—we must know that He is wise and powerful before

we can trust in Him,—that He is good before we can love Him. All these attributes, the study of His works had made known before He gave that more perfect knowledge of himself with which we are blessed. Among the Semitic tribes his names betoken exalted nature and resistless power; among the Hellenic races they denote his wisdom; but that which we inherit from our Northern ancestors denotes his goodness. All these the more perfect researches of modern science bring out in ever-increasing splendour; and I cannot conceive anything that more effectually brings home to the mind the absolute omnipresence of the Deity than high physical knowledge. I fear I have too long trespassed on your patience, yet let me point out to you a few examples. What can fill us with an overwhelming sense of His infinite wisdom like the telescope? As you sound with it the fathomless abyss of stars, till all measure of distances seems to fail and imagination alone gauges the distance; yet even there as here is the same divine harmony of forces, the same perfect conservation of systems, which the being able to trace in the pages of Newton or Laplace makes us feel as if we were more than men. If it is such a triumph of intellect to trace this law of the universe, how transcendent must that Greatest over all be in which it, and many like it, have their existence! That instrument tells us that our globe and we are but a speck, the existence of which cannot be perceived beyond our system. Can we then hope that in this immensity of worlds we shall not be overlooked? The microscope will answer. If the telescope lead to one verge of infinity, it brings us to the other; and shows us that down in the very twilight of visibility the living points which it discloses are fashioned with the most finished perfection,—that the most marvellous contrivances minister to their preservation and their enjoyment,—that as nothing is too vast for the Creator's control, so nothing is too minute or trifling for His care. At every turn the philosopher meets facts which show that man's Creator is also his Father,—things which seem to contain a special provision for his use and his happiness:—but I will take only two, from their special relation to this very district. Is it possible to consider the properties which distinguish iron from other metals, without a conviction that those qualities were given to it that it might be useful to man, whatever other purposes might be answered by them? That it should be ductile and plastic while influenced by heat, capable of being welded, and yet by a slight chemical change capable of adamantine hardness,—and that the metal which alone possesses properties so precious should be the most abundant of all,—must seem, as it is, a miracle of bounty. And not less marvellous is the prescient kindness which stored up in your coal-fields the exuberant vegetation of the ancient world, under circumstances which preserved this precious magazine of wealth and power, not merely till He had placed on earth beings who would use it, but even to a late period of their existence, lest the element that was to develop to the utmost their civilization and energy might be wasted or abused. But I must conclude with this summary of

all, which I would wish to impress on your minds—that, the more we know His works the nearer we are to Him. Such knowledge pleases Him; it is bright and holy, it is our purest happiness here, and will assuredly follow us into another life if rightly sought in this. May He guide us in its pursuit; and in particular, may this meeting which I have attempted to open in His name, be successful and prosperous,—so that in future years they who follow me in this high office may refer to it as one to be remembered with unmixed satisfaction!

IMPORTANCE OF SCIENTIFIC KNOWLEDGE TO PRACTICAL MEN, AND OF PRACTICAL KNOWLEDGE TO SCIENTIFIC MEN, BEING THE SUBSTANCE OF A LECTURE DELIVERED LAST WINTER BEFORE THE MECHANICS' INSTITUTE IN TORONTO, BY J. HURLBURT, M. A.

(Concluded from page 273.)

We are placed in a world where a vast multitude of objects—animate and inanimate—arrest our attention. Whether we walk abroad upon the surface of the earth amidst its mountains and valleys, its forests and plains, or penetrate into its bowels, or examine its oceans and rivers, or turn our eyes to the surrounding atmosphere and the vault of the starry heavens,—we are overwhelmed by the contemplation of the immensity of the works of the Almighty, differing not more in their number than in their variety, from the atom to ponderous worlds, from the insect sporting in a drop of water through all the gradations of animate life up to man and to angels. Science is a knowledge of the laws which govern the material and immaterial worlds. These laws can be ascertained only by the discovery of a vast number of facts; from observations, comparisons and deductions, by observers placed in various circumstances and positions. All science, indeed, may be reduced to facts, and, therefore, every man whose organs of sensation are in a sound state, is capable of observing the elements of science. That one man excels another in the discovery of truth, is chiefly owing to his mind being more particularly directed to the contemplation of certain objects and relations. Many important scientific facts require only a certain combination of circumstances. If at the time of the observance of a fact, the attention has been directed to subjects connected with that fact, it may lead to important discoveries. All facts occur in accordance with some established law of nature; such fact is, therefore, an illustration of that law, and may lead to its discovery. An accidental experiment of a boy led to the invention of the telescope. The observance of the fact that water could rise to only 32 feet in a vacuum—led to the discovery of the weight of the air, the construction of the barometer, and the true principles of the pump. The swinging of a chandelier attracting the attention of Galileo at a time when his thoughts were directed to similar subjects, resulted in the discovery of the principles of the pendulum. The falling of an apple at a favourable moment, directed Newton's thoughts to the laws of gravity, and the mo-

tions of the heavenly bodies. But these and similar facts had been observed from the creation millions of times. Why not with the same result? Water had risen in vacuums: bodies had vibrated in the air; apples had fallen from the plucking of the fatal one in Paradise till the fall of the fortunate one which awakened the "patient thought" of the Great Philosopher. The facts had been witnessed, but the causes which produced them had not been sought after.

How often, indeed, do we tread upon the very threshold of the *arcana* of nature, the most important discoveries, or the richest mines of intellectual wealth, without being conscious of our proximity to them. Like the rich mines of our vast Continent, which have for ages, been trodden under the foot of the untaught aborigines, undiscovered, or when disclosed, their value unknown; but when sought for by the patient intelligent observer, they are found. As the explorers multiply, new mines of increased wealth are brought to light, until the discovery of a gold mine excites no more astonishment than the passing events of the day. Let the observers of nature be multiplied from a few to thousands or millions, and who could predict the glorious result. Let the continents and the islands, the water and the land, on their surface and in their depth, be filled with anxious inquirers into the secrets of nature; let them question her closely, and she will reveal ten thousand wonders more marvellous than those already known. An ample field for discovery still remains. The sciences are as yet far removed from perfection; they are but in their infancy; many of them have but just begun their progress; the elements of others are still uncertain or undiscovered. The researches of ages may be necessary to give them symmetry and beauty. Of this we have an illustration in the history of science. In those ages when only a few solitary individuals directed their attention to such pursuits, little or no progress was made in the various departments of science. But when the human mind arose from its slumber and burst its fetters, and the number of rational investigators began to increase, science and art were accelerated in their progress. When the Academy of Sciences in Paris, and the Royal Society of London were established, some of the sciences of the present day had no existence in name. Similar societies soon sprang up in different parts of Christendom under the name of "Literary Associations," "Society of Arts," "Mechanics' Institutes," &c. These have brought together the scattered fragments, the facts, the elements of truth, and consolidated them into the form of well arranged sciences.

Nor let it be objected that the great bulk of mankind are incapable either from want of time or ability, of making discoveries. All have the same senses and the same powers of reasoning; and the great book of the universe, from which all discoveries have been made, is equally open to all, from the peasant to the king. We cannot open our eyes, we cannot step, or breathe, without being surrounded with mysteries more mysterious, and truths more profound, than those which have ever

yet been revealed to the mind of mortal from the volume of nature.

Let inquirers go forth; let men engaged in the practical pursuits of life be conversant with science, and let scientific men become students of nature, and a new and vigorous impulse will be given to every department of science. The vast universe has never yet been thoroughly explored; we have but commenced the search; we are only sporting with the pebbles upon the shore of the boundless ocean of undiscovered truth. We have carelessly examined a few grains of sand upon the surface of our globe, but its depths remain unexplored; we have caught a glimpse of the nearest of the heavenly bodies, but the vast wilderness of worlds lie beyond the reach of the most powerful glasses. Descending to the manifold and diversified creatures which swarm the earth, how little is known of their nature and relations, and how imperfect that little. Of things animate and inanimate, too minute or too remote for the eye or for glasses, all are inwrapped in impenetrable mystery; and of things visible how imperfect our knowledge beyond the declaration of Holy Writ, that God is their Author. That Author—the Infinite Perfection—how immeasurably beyond our comprehension!

Till the universe in all its aspects, so far as it lies within the range of human inspection, be more thoroughly explored, uncertainty will continue to rest upon many interesting departments of knowledge, and many of our most specious theories in the sciences must be considered as being built upon slender and unstable foundations. The propensity to theorize without facts, has led to all the errors and conflicting hypotheses with regard to both mind and matter. The observance of fact is too slow a process; the formation of theories is more in accordance with our impatience. Consequently theory has been reared upon theory, and system upon system; each obtaining its admirers and period of applause, till subsequent discoveries have swept them away as a dream or vision of the night. The crystalline spheres with which Ptolemy had enclosed the heavens, are dashed to pieces; the vortices of DesCartes have long since ceased their whirling; the earth which Tycho—the Danish astronomer—placed in the centre of the universe is now in rapid motion through the skies; the abyss of water with which Burnett filled the centre of the earth, is now converted into a mass denser than the solid rock; the subtle ether which formerly accounted for so many phenomena, has become electricity and heat; the four elements of the ancients have multiplied into sixty; and the sparkling diamonds in the heavens, have become ponderous worlds or centres of systems. Such will be the fate of all theories not founded upon fact. They will perish by their own intrinsic infirmity. The human mind, too impatient to collect facts, leaps at the conclusion by some bold theory. The period has not yet arrived when any material portion of the human family devote their attention even partially to science; the great body of mankind still suffer their faculties to lie in a state of languor and inactivity, and those who are more vigorous, are too much

engrossed in commercial speculations, in grasping at power and opulence, or in the indulgence of sensual gratifications, to think of attending to the interests of science, and the progress of the human mind. Much, however, might be accomplished by various classes of society, without interfering with their ordinary avocations, if their attention were directed to such pursuits. Miners, in descending through the crust of the earth, might learn much of its structure and the strata through which they pass. Sailors, in traversing the ocean, and ascending the streams of the various portions of the globe, have excellent opportunities for observing the phenomena of the waters, the atmosphere, the heavens, the animals, the plants, and the inhabitants peculiar to the climates and countries which they visit. But thousands of such persons can sail "twice from Indus to the frozen pole, as ignorant as their log and stubborn as their compass," without making any scientific discovery. The observations made during one voyage across the Atlantic by a single intelligent observer—Humboldt—are of more value to the scientific world than the observations of ten thousand others, who for thousands of years, have traversed the same oceans. Yet these possessed the same sentient organs, the same intellectual powers, and the same opportunities for collecting facts as that distinguished philosopher. And did such observations make Humboldt a worse member of society? Did they make him less active, less intelligent, less virtuous, less humane, less happy? Nay, instead of disqualifying the mind for official duties, such observations would tend to invigorate it, and prevent that languor and *ennui* which result from mental inactivity, while they furnish a source of intellectual enjoyment amidst the heaviest cares of life.

Mind and matter are the subjects of all our knowledge. The observation of facts is the only true path to such knowledge. The course pursued by children is our safest guide in the study of nature, whether in the phenomena of the external creation, or in the powers and operations of the human mind. That course is the observation of fact—which is the food of thought. This does not exclude the judicious use of books containing a record of the observations and discoveries of others. They are, indeed, not the necessary but the most useful instruments to guide the steps of the student. But books can be no guide to the unexplored regions of the vast domain of God. The "Traveller's Guide" may serve us as far as the author himself has gone. But the object of our search may be the unknown and unseen, where there can be no "guide." What then is to direct us in our inquiries? It is the patient study of the works of nature—of mind and matter. What guide could Columbus find to direct his course to an unknown world? What "traveller's guide" had Cook over the widely extended waters of the Pacific? What guide had Pythagoras, Copernicus, Kepler, Galileo, and Newton in their travels through the skies? What guide directed Bacon to the true method of Philosophy? What guided Locke into the mysterious labyrinths of the human mind? What has ever guided to any new

discoveries? It was the study of nature as displayed by Infinite Wisdom, above, around and beneath us, and in that inner world in our own bosoms. Facts are the materials with which the temple of Science has been erected—not upon the sands and shoals of a purely ideal theory or hypothesis, but upon the rock of well established facts. But these facts collected from the various parts of the works of God, must be the subjects of patient thought, to ascertain their influence upon each other, their relations, and the consequences to be deduced therefrom. The purpose which food well digested serves in nourishing and expanding the corporeal system, facts *well digested* by reflection serve in invigorating and enlarging the system of science. The rude materials must be incorporated into—*assimilated to*—the old system, thus making all our symmetrical whole without destroying the identity of the system of science. Truth, like its Author suffers no change: it is "the same yesterday to-day and forever." The laws of nature are but the established means through which God manifests himself, or in other words, carries on his works; and as their Author is without "variable-ness or shadow of turning," so his laws, which are his attributes in action, are immutable. In those laws there may be variety beyond our highest powers to compute, as the Wisdom of their Author is infinite; but there is no incongruity, no want of symmetry, no jarring sound throughout the infinitude of his works; they are but the channels for the outflowing of that Divine plenitude, and the streams must partake of the nature of the fountain whence they flow. As the laws of nature so called, are but God in action, we have the highest assurance that every occurrence is a necessary part of the whole, a link in the chain, and may lead to undiscovered truth, or unascertained laws. And the part yet explored is but as the drop compared with the ocean. There are subjects of inquiry diversified enough for every variety of taste, adapted to every order of intellect, and profound enough for the most comprehensive understanding, in the infinite extent and undiscovered phenomena of the heavens, in every part of the visible creation teeming with life, in the unsolved problems of the material world, in the undeveloped and unapplied powers of the magnet, of electricity, of galvanism, of light and heat, of steam and mechanics, and, in short, in the attributes of mind, in the realm of morals, and in the deep and varied passions of the human soul. Here the most ardent thirst for knowledge may be allayed from the never failing fountains of nature. The philosopher never looks forward to the period when he is to see all that is to be seen, and know all that is to be known, and possess all that is to be acquired. He cannot, like Alexander, weep for more worlds to conquer. The realms yet unsubdued, the mysteries unconquered, enclose him on all sides, inviting him to peaceful yet delightful triumphs. As the student of nature stands at the base of the hill of science, his horizon is circumscribed, but as he ascends, the field enlarges, until the mind, in its widest excursions, can catch a glimpse of the undiscovered land, a ray from off the wished-for shore.

The unchangeable character of their Author is stamped upon all his works. That uniformity, that resemblance to itself which exists in the works of nature through all times, climates and circumstances, must excite the most agreeable emotions of astonishment in every reflecting mind. The bee is the emblem of industry and skill now as it was thousands of years ago; the ant of prudence; the dove and the lamb of innocence; the eagle is still noted for its lofty flight and carnivorous habits; the lion and tiger for ferocity; the ox, the horse, the cow and the sheep, serve the same purposes still for man; the germination and growth of the plant is still the same; day and night; seed time and harvest; the earth for thousands of years teeming with the same animate existences and with food for their support; the unchanging aspect of the heavens; that divine order and harmony in their revolutions, so perfect that no one body amongst the countless millions of orbs ever impinged upon another; no part of the vast machinery ever goes wrong; the sun for so many ages the source of light and heat to his attendant worlds, rises with the same ruddiness, ascends the heavens with the same majesty, and shines with the same brilliancy, as upon that morn when "God said let there be light," "and the morning stars sang together and the sons of God shouted for joy." Every truth already known, every observed fact, may lead to undiscovered truth, and to principles having the most important bearing upon the destinies of man.

The influence of sciences upon morals remains to be briefly considered. If the comparative influence of knowledge and ignorance upon morals and religion, were subjects admitting of discussion, they would give rise to questions of the weightiest importance. For if ignorance be favourable to virtue, then, the grosser the ignorance, the more powerful the virtuous influence; if ignorance be favourable to virtue or promotes it, then it is unfortunate that man is created with a thirst for knowledge, and powers capable of knowing and understanding the works of his Creator; it is unfortunate that from the cradle to the grave his knowledge must increase; then truly God's ways are not equal" in so constituting us that we must necessarily grow wiser; better that we are doomed to be idiots. But this supposition is absurd and leads to absurd consequences. There can be no virtue or religion without knowledge. Virtue, in its highest sense, is an intelligent observance of the divine law. Virtue is not passive but active; it is not a blind or unconscious performance of the right. There must be a knowledge of the way; knowledge of the relations between man and man, and between man and his Maker, and of the obligations arising out of such relations.

It is nevertheless true that there is not always a fixed proportion between intellectual and moral growth. Distinguished talents and high attainments are sometimes connected with obliquity of character. The intellectual powers may be unduly developed to the neglect of the moral; but the strengthening of some faculties does not weaken those which lie dormant. The whole being would be fully and equally developed—mental,

moral and physical,—and each would exercise a favourable influence over the others. The opinion that learning is unfavourable to morals and religion, or from the character of the French philosophers. But causes which time would fail to point out, had subverted the foundations of virtue and piety in France; of these the corruption of true religion was the most powerful. But their immorality and infidelity were not produced by their philosophy, but in spite of it. In France there was no general diffusion of knowledge, no correct religious instruction, no wholesome public opinion; the press and the pulpit were corrupt. "Darkness covered the land and gross darkness the people." But we cannot reason from isolated facts. The question concerns general influences and general tendencies. It must be argued from man's constitution and the constitution of the works of God around him; from the nature of virtue and the nature of knowledge; and from the history of individuals and of nations. That learning is unfavourable to morality or religion, none would assert. The question, if any there be, is whether learning exerts a direct influence upon morality and religion, and to what extent. And if that influence be propitious, then the more comprehensive and varied the knowledge, the more powerful the virtuous influence. "A little learning" says Pope "is a dangerous thing;—shallow draughts intoxicate the brain." Pope's poetry is better than his philosophy. No knowledge, however small, of the works and ways of Providence, can be detrimental. Knowledge, it is true, is not virtue, although virtue presupposes knowledge. But they cannot be separated. Both are attributes of the only perfect Being, towards whom his intelligent creatures are designed even to tend. His wisdom, as well as his goodness, is a pattern—a glorious pattern—for our imitation. We can study the Great Architect in every part of the gorgeous and stupendous temple of the universe, as we can study the skill of the architect in St. Paul's or St. Peter's Cathedrals of modern times, or in the Pantheon or Mausoleum, in the temples of Apollo, or Diana, or that of the eternal God at Jerusalem, or the Pyramids of ancient times. God has spread around us subjects of contemplation with all the profusion of infinite wisdom, and when the mind is lost in the contemplation of the distant, the great, the incomprehensible, it can return and contemplate its own frame, curiously and mysteriously wrought in the deep recesses of nature by the hand Divine. Man is not like the beasts that perish. His better part is not to return to the dust. It is a spark of that Divine intelligence, a ray of Divinity, by which and through which he bears a resemblance to the Eternal. Man is formed to think, and reason and will. He can survey God in his primeval works, contemplate him in his Providence, and rejoice with him in his love. Knowledge unseals the book of nature and leads man to an acquaintance with its author. As he turns its pages, every line bears the traces of Infinite Wisdom, Power, and Goodness. In the creation and preservation of the world he beholds the display of Divine power; in every part of it he sees the perfect adaptation of means to the accom-

plishment of the Divine purposes. He who studies the book of nature and the book of revelation, must behold with adoring gratitude, their perfect harmony, their common origin. One generous science leads him through the strata of the earth, and to the rugged mountain, where he studies the fossil remains of monsters of a period beyond the flood, and deluvial deposits, clearly indicating a universal deluge neither more remote nor nearer than the time spoken of in Sacred Writ. Thus the elder Scripture writ by the Divine hand, accords with revelation. The history of man, his condition, traditions of all nations, &c., point to the truth of the great facts recorded in the Mosaic account, the period and circumstances of the creation, the fall, the deluge, the confusion of tongues, the dispersion of the descendants of Noah, the call of Abram and the establishment of the Jewish nation, their destruction, &c.

Turning to the animal and vegetable kingdoms, science leads us to a knowledge of innumerable facts, illustrative of the wisdom, power and goodness of their author. Natural theology—the demonstration of the existence and attributes of their Creator from an investigation of his works,—is the greatest achievement of a finite understanding. In every thing—the great and the small—we behold the skill of the Divine Architect. His impress is left upon all his works. The adaptation of light to the eye; sound to the ear; and the properties of external objects to all the senses; the wonderful mechanism of the hand to execute what the ingenuity of the mind may devise; the fins of the fish; the wings of the bird; and the limbs of land animals, adapted to the elements in which they are furnished to move; the organs of respiration, of speech, and of motion, for the performance of their several functions; these and a multitude of other facts, were pointed out even by heathen philosophers as proofs of the existence of an intelligent first Cause. That same power which causes the leaf and the drop of water to tremble with myriads of animalcula, must be everywhere present throughout infinite space, creating, upholding, and guiding all things to their final end, to the accomplishment of his Divine purposes. Well has it been said—

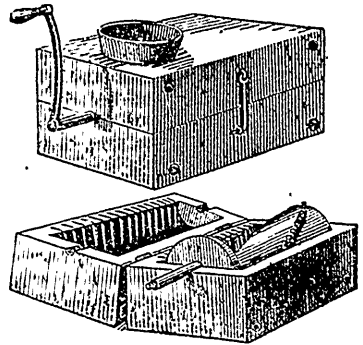
“The undevout philosopher is mad.”

AGRICULTURAL SURVEY OF NEW BRUNSWICK.—Professor Johnston, who is now engaged in making a tour of the Province with the view of ascertaining its agricultural capabilities, accompanied by Professor Robb of King's College, Fredericton, and James Brown, Esq. M.P.P., arrived in town last evening from Sussex Vale. —*St. John's Courier.*

NEW SAUSAGE OR MINCING MACHINE.

The season for making sausages being at hand, we present our readers with a cut and description of a machine for preparing the meat, much used in the New England States. The price is too great to allow of its use becoming general; but where sausages are made for market, it may be

an object to provide a machine of this kind.—They may be had at Rochester, N. Y. We take the following from the *Genesee Farmer* :—



New Sausage or Mincing Machine.

One machine, by the power of a man, is capable of cutting readily from 80 to 100 lbs. of meat per hour—the person turning the crank feeding the machine, thus leaving the mass cut sufficiently fine and uniform.

It is constructed of blocks of hard wood about five inches thick, nine inches wide, and fifteen inches long, connected together by hinges and hasps. The two faces of the blocks are carved or bored out so as to form a hollow cylinder or barrel extending through the length of the blocks, excepting enough at each end to form a head or cap. In this cavity is suspended a wooden cone on an iron shaft, running lengthwise, and one end of the shaft extending through and connecting with a crank outside. In this cone are placed three rows of wood or iron pegs, so arranged spirally as to form a kind of screw, running lengthwise—the pegs being smaller, shorter, and closer together as they approach the large end of the cone—making the mean diameter of the pegs the same at each end of the cone, and just filling the space of the cavity. Each block has a set of triangular knives fixed stationary, and so as to allow the pegs to pass between them.

The process is simply putting in the meat at the small end of the cone, through the kind of hopper or funnel, and by turning the crank the meat is passed round, through and between the knives and forward to the large end of the cone by the combined action of the pegs and knives, and finally discharged through an aperture in the bottom at the large end of the cone or opposite the hopper end—the fineness being gauged by the size of the discharging aperture.

The machine is warranted to cut fit for use from 80 to 150 lbs. per hour, according to the power applied—one man being sufficient to turn it constantly. Several hundred have been sold during the past two years, and given entire satisfaction. A good machine, warranted, can be afforded from \$12 to \$15—and may be obtained at Mr. Emery's warehouse in Albany, or at the depot in Rochester.