

sider that I am warranted in assigning to these strata a devonian age. Our auriferous quartzites and argillites over-lie the granite of uncertain age, and, as I have already observed in the Gay's River Gold Field, the argillite is overlaid unconformably with the lower carboniferous conglomerate. So that the age of argillite, &c., cannot be determined by interposition.

The stratified rocks of our gold fields have marked peculiarities, by which they are easily distinguishable from the stratified rocks of the interior of whatever age; and no one can hesitate on leaving the one and entering upon the other—in maintaining that the formations are altogether different. I have already at considerable length, directed attention to these formations as they exist in Antigonish county, and I consider that an insertion of the Arisaig silurian series and the Lochaber division is sufficient to fill up the breach in succession between the lower silurian argillite and the lower carboniferous conglomerate.

ART. X. THE COAL TRADE OF THE NEW DOMINION. BY
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the Nova Scotia Coal-Owners' Association.*

ON glancing at the map of the world, the eye rests on three points as peculiarly adapted to be the great centres of commercial and maritime activity. The first is situated on the eastern, and the second on the western shores of the Atlantic, and the third is to be found on the Pacific coast of America. All of them lying sufficiently far from the tropics to be the homes of a healthy and industrious race, form portions of the British Empire. England, placed between the German ocean and the Atlantic, seems to guard the highway of commerce from the North of Europe with the rest of the world. Nova Scotia, standing far out into the ocean, looks like some vast pier which nature has raised up to intercept the trade of the New and of the Old World, while Vancouver's Island more nearly recalls to us, by its climate and its insular position, the geographical features of the mother country. Yet valuable as a favourable position is to enable a country to lead the van of commerce, there are other scarcely less important elements of national

greatness. A people possessing abundance of coal and iron must in time become a capitalist among nations; but combine geographical advantages such as I have described with the possession of these essential elements of national wealth, and you constitute a country whose greatness is simply a question of time, and is inevitable.

All of these peculiar advantages we find combined in Great Britain and in Nova Scotia and Vancouver's Island.* Along the shores of the Atlantic, from the Orkneys to the Cape of Good Hope, there is only one country, Great Britain, which possesses extensive coal fields that are adjacent to the seaboard. Spain has a large carboniferous tract, but it is undeveloped, and its capabilities are still unknown. On the western shores of the Atlantic, from Cape North to Cape Horn, the only accessible coal fields of any importance are those of Nova Scotia; while on the Pacific coast, from Behring Straits to the Straits of Magellan, there is nothing to compete with Vancouver's Island, which, with its coal seams cropping out on the shores of excellent harbours, is destined to be the future coal depot for the steam fleets of the Atlantic, and the home of manufactures and commerce. That the eastern and western portals of British America should be so favoured by nature, augurs well for the New Dominion, which possessing a vast tract of magnificent agricultural country between these extreme limits, only requires an energetic, self-reliant people, worthy of such a home, to raise it to a high position among nations. Nova Scotia and Vancouver's Island, however, find to their cost that these advantages, great as they are, require the aid of capital and labour, while Great Britain has discovered to her dismay that her coal fields, like all things earthly, must have an end, and are liable to exhaustion. The theory advanced with great ability by Mr. Jevons in his well known work on the coal question, that within a century this truth will be sensibly felt by Great Britain, has excited much interest and no little alarm. Mr. Hull, a previous writer, remarks:—"I can conceive the coal fields of this country so far exhausted that the daughter in her maturity shall be

*I am not aware whether iron mines exist in Vancouver's Island, but we may infer that this is the case, judging by the other coal fields of North America.

able to pay back to her mother more than she herself received. May we not look forward to a time when those ‘ water lanes ’ which both dissever and unite the old and new world, shall be trod by keels laden with the coal produce of America for the ports of Britain ?” By the term exhaustion is meant, not the working out of all the coal in Britain, but of that portion which is at such a moderate depth that it can be worked profitably and can compete with the product of foreign coal fields. The *Quarterly Journal of Science* for October, 1866, has an interesting article on the subject, which while opposing Mr. Jevons’ theory to a certain extent, admits that the price of British coal must, before many years elapse, increase to such an amount as to render the exportation of coal for ballast no longer practicable, and to transfer the smelting of iron and the heavier branches of iron manufacture to foreign countries ; and it points to Pennsylvania as the future inheritor of the present profitable branches of industry connected with the coal fields of Great Britain. It supposes that the lighter and more elaborate manufactures requiring little fuel will engross her industrial energies, and supply the loss that the supposed advantages enjoyed by American coal and iron will entail on her. A map of the coal fields of the world, that accompanies the article in question* suggests some important views as to the future of Nova Scotia, and may lead us to hope that the mantle of British industrial wealth connected with the use of cheap iron and coal will descend, not upon our American cousins, but upon Nova Scotia. In point of position her mines compare favourably with those of Britain. The Belgian and French coal fields are not very far removed from the sea coast, and might, if not exhausted as soon as those of Britain, compete with her collieries at some future day when the price of British coal increases as has been anticipated. But Nova Scotia need fear no competition on this side of the Atlantic. No ingenuity can overcome the difficulty of a long land transport. Railways are expensive luxuries. The freight over every mile of railway represents so much outlay actually lost to the nation—so much deducted from the value of its products. The manufactures of

*The map accompanying this paper is, with some slight additions, copied from portions of the map in question.

New England are dependent for their existence on obtaining cheap coal, either from England or Nova Scotia. The former is a supply contingent on the other branches of trade, for English coal unless sent as ballast could not possibly compete with Nova Scotian coal on the Atlantic seaboard. The imposition of a heavy duty on imported coal is as clearly fatal to manufactures in Massachusetts as draining the life blood is fatal to vitality. This might not be so if there were no coal mines in the interior; but with the vast coal and iron regions of Pennsylvania to invite manufacturers to their vicinity, it is clear that every cent paid by the New England manufacturer for railway freight on his coal brought from Pennsylvania is a tax on his industry and a protection to the Pennsylvania manufacturer. But if the heavy freight on coal from Pennsylvania prevents its coming into competition with Nova Scotian coal on the sea board, unless protected by a prohibitory tariff, if the Americans cannot place their coal on the wharves at Boston and New York as cheaply as we can, it is manifest that American coal can never fulfil one of the main ends to which the export of coal has so eminently conduced in Great Britain. Mr. Jevons has shown in his very interesting and valuable work that the commerce of England is immensely benefited by one branch, and that the smallest department of the coal trade—the export as ballast to foreign countries. By this means the outward voyage, if it brings no profit, though this it often does, is not a dead loss to the shipper, to be made up by increased freight of the raw materials brought back on the return voyage, and by the enhanced cost of the article imported to be paid by the manufacturer, and ultimately by the consumer.

If Nova Scotia were part of the United States, the manufactures of Massachusetts would be compelled to emigrate to this province, for it would be impossible for them to compete with the productions of Nova Scotian industry, protected as they would be by that tariff which no legislature can repeal, which nature itself has favoured us with, and which consists in having our coal and iron near good harbours, and in our possessing what tradesmen so well appreciate the value of, “a good stand for business.” If the day should ever come when the two



MAP
OF THE
COAL FIELDS
— OF —
EUROPE AND AMERICA.

C. & A. CLARKE, LITH'S
Halifax,
N.S.

REFERENCE.

- | | |
|-------------------------|--|
| 1. England & Wales | 10. Spain & Portugal |
| 2. Scotland | 11. East ⁿ & West ⁿ Russia |
| 3. Ireland | 12. Central Russia |
| 4. France & Belgium | 13. Southern . . . Denetz |
| 5. Saarbrück Prussia | 14. Brit. Pos. N. America |
| 6. Hanover & Westphalia | 15. United States |
| 7. Bohemia & Silesia | 16. Vancouver Isd. |
| 8. Poland | 17. Brazil |
| 9. Turkey | 18. Africa |

Extension of Coal Deposits
Lignite

Routes of Steamers

great families of the Anglo-Saxon race in the New World should find it to their interest to abolish the formidable barriers of hostile tariffs which are growing up between them, to level the frowning fortifications which scowl defiance at each other, and which even in peace give us a “lively sense of benefits to come” in the shape of towns burned down, commerce paralyzed and valuable lives destroyed, the most prosperous portion of the republic, and of the new world will be that which combines everything to make it the entrepot of trade and commerce. That day is farther distant than philanthropists might hope. The heavy taxes in the United States, the violent party storms that threaten to uproot what even the whirlwind of civil war has left standing, Fenian raids, and the incessant abuse of England, put off the day when our ministers of war will be useless luxuries, and when a union of North America under one government will be hoped for, or desirable. Although such a union would in six years quadruple the value of mineral property in this province, at present it would be a ruinous or at best a hazardous experiment. It will take years before peace can efface from the sword the stains of a bloody contest, and we are not likely to wish to tread upon the ashes that conceal the burning embers of civil war. Let us then look at what is practicable, not at what may be a question for our children and for posterity.

Within the past year the map of the world has been altered to admit a new Dominion among the nations, and a large portion of the continent has changed its name, if not its destinies. We cannot shut our eyes to the fact that its position is, to say the least, inconvenient. The Americans through accident and our bungling diplomacy seem, at first glance, to have monopolized all except the outskirts of the cultivable portions of the continent, and to have left us not much more than the selvage of an empire, and the casual observer might infer that England having long ago entailed the bulk of her possessions in America upon her first born, could only spare us the limited allowance of a younger son. Scant and attenuated as it may seem, however, when compared with the compactness and immensity of the United States, it is vast enough to be the home of a great people, if they are only united by national feeling, and by the bonds of

commerce and trade. Neither of these yet exist, nor is it easy to create them suddenly in the face of geographical barriers. True it is that we might imitate our neighbours and “make history,” by having some of our towns burned by an enemy and our people cut off on the battle-field, and our minister of war might in time become a famous personage; but it is far better with our small population, that we should reap oats rather than glory, and it is probable that, until we have a surplus population, our people can be more profitably employed in cultivating than in fertilizing the soil. Our bond of union, then, must depend on a community of interests, on an interchange of commodities between the East and West. How is this to be attained? We must not shut our eyes to the fact that our commercial system must be adapted to the geographical difficulties of the Dominion. Nature would seem to have intended Ontario to trade with New York, Ohio and Vermont, and has placed Nova Scotia and New Brunswick at the doors of Massachusetts, that intercourse might spring up between us. But the natural course of events has been retarded by artificial obstructions. A hostile tariff cuts off the eastern part of the Dominion from the natural outlet for its productions, and the question arises whether this very policy on the part of our neighbours may not be turned to good account in a national point of view, and be made the means of building up an intercolonial trade, and of uniting these provinces by common interests.

When the repeal of the reciprocity treaty was notified to our Government, Mr. Buchanan, in an able pamphlet, showed that immediate steps must be taken to open up the Lower Provinces as a home market for the flour of Western Canada, for even a limited mart near at hand is far more profitable than a more distant one however extensive, and he gave some curious statistics to show how, previous to the treaty, a barrel of flour was worth one-fifth more on the American, than on the Canadian side of Niagara. The American had his home market to fall back on, as well as his foreign market; whereas the Canadian wheat grower, having only a distant market open to him, found his wheat depreciated in value. With these facts Mr. Buchanan argued, that unless this home market could be

added to the foreign market for flour, the Canadian grain growers would be “starved into annexation.” He says:—

“To me it seems self-evident that now we must either be drifted by industrial necessity into Annexation, even in the absence of any disloyalty in these provinces, or must find markets for our industry, and an outlet for our trade through means of an intimate and indissoluble union of all the provinces comprising British North America.

“I believe, let me repeat, that the Provinces of British America have within them the elements of independent greatness and prosperity, but that these can only be reduced from chaos by a certain most energetic policy immediately gone into, in respect to our Provincial industry. Such a policy, I believe, would have the effect of saving to British America the advantages of the continuance of the Reciprocity Treaty with the United States, in the only way this can be done, viz:—by rendering us independent of it. Such a policy would at all events save these North American Provinces to Britain; while, without a homely and patriotic policy, the loss of them to the Empire will be more than likely, especially if the Reciprocity Treaty with the United States is withdrawn. My great object, therefore, is to impress others with my own strong convictions that *it is Vital that the Canadian Farmer should immediately have in the Markets of the Maritime Provinces a substitute for the Markets we may lose in the United States; and that it is equally vital that the Maritime Provinces should immediately have in the Canadas a substitute for the Trade they are now carrying on with the United States, under the Reciprocity Treaty.*”

A home market has been opened up in New Brunswick, and Nova Scotia, which imposed a duty on American flour, so as to create a trade with Ontario and Quebec. But the same ordeal, or rather a more serious one, is awaiting Nova Scotia as respects its staple product—*Coal*; for we have hitherto had no home market, and have had even our foreign market suddenly restricted. So far the pressure has been borne without a murmur; but this cannot last forever, nor is there any reason why it should. The Canadian wheat-grower's loyalty has been preserved by us from the test of starvation, and the time for “reciprocated duties” has arrived.

“Under no circumstances,” says Mr. Buchanan, “can I anticipate any great disagreement of views among the parties who are to form the British American Confederacy. That they

have a common interest, will very soon come to be understood. And in the meantime I have no doubt that the other sections will join it with the same determination as Canadians do, to respect the views and experience of their new friends, a sentiment well expressed in the old lines :

“ Who seeks a friend must come disposed,
T’ exhibit, in full bloom disclosed,
The graces and the beauties
That form the character he seeks,
For ’tis a union that bespeaks
Reciprocated duties ”

While Nova Scotia, which shipped coal and fish to the United States and received flour in return, had every reason to hesitate in taxing American flour for the purpose of buying it from Canadians who wanted none of our productions, the people of Ontario and Quebec now stand in a very different position from what we then did. Our trade is theirs; our resources add to the general revenue. Every ton of coal sent back to the lakes is so much freight saved on the flour exported. Hence the grain grower, by a peculiar feature in the coal trade, consisting in its being the feeder and the complement of other branches of commerce, is jointly interested with the Nova Scotian coal owner in the return cargo of coal. Nor should the market be regarded as a limited one. Every barrel of flour used in the West Indies should come from western Canada to Nova Scotia, the Canadian ship returning from this province with a cargo of coal and West Indian produce, while the flour could be forwarded from Halifax with other articles to its destination, the Halifax merchant procuring West Indian produce in return. This is a natural and profitable channel of trade, which if developed and opened up, must become an important outlet for our respective staples.

Nor would the exports from Nova Scotia to the western portions of the Dominion be limited to coal. Salt and pottery, being bulky in their nature, in some British ports supply outward freights from England, and occupy the place which is generally assigned to coal. Salt works have been already commenced here with every prospect of success, and the existence in Pictou county (for my own personal experience of

the Nova Scotian coal fields is mainly confined to them) of superior clays for fire brick and pottery, immediately underlying workable seams of coal, point to a period when "the Black Country" of the New Dominion will centre in the neighbourhood of our coal mines, and the potteries of Staffordshire will find a colonial rival in Nova Scotia. The quality of the clays has been pronounced by parties in Staffordshire unsurpassed by anything that has been discovered in the mother country.* The enormous amount of coal used in the potteries of Staffordshire will give us some idea of the home consumption that may be created hereafter for our coal. But in addition to all these sources of demand for coal, we have our iron near excellent limestone within a few miles of the collieries now opened. What its quality is can be best judged by referring to Fairburn's eulogistic notice of it in his work on the manufacture of iron.

Along the northern and southern flanks of the Cobequid mountains, which seem to form the backbone of the country, we have immense deposits of hematite and specular ores. At East River a large bed of remarkably good hematite has been found, and on the line of railway I have discovered and tested a workable deposit of very rich specular ore, such as is imported at a large price into England from Sweden for certain purposes, for which very pure and refractory ores are required. Little doubt can exist that it would pay handsomely, if we were to compete with our Swedish rivals. The Acadia Charcoal Iron Works in Colchester county turn out an article equal to the best Swedish brands, but as they are far from the coal mines, they are unable to produce anything except the most expensive iron, for which the demand, even in England, is somewhat limited. But we may look forward to the day when the vicinity of cheap coal to abundant ore of excellent quality in Pictou county, will give rise to extensive iron works which will consume a large

*The *Eastern Chronicle* of New Glasgow shortly before the publication of the Transactions, made the following statement in a notice of the Crown Brick and Pottery works:—"There is abundance of suitable clay for the purposes on the spot, while the coal for burning purposes is within fifty yards of the kiln. There is also an extensive seam of fire clay alongside the coal pit, which has been pronounced to be of a very superior quality. We have been shown a small dish made from a quantity of the clay sent home to Britain, which takes a polish as fine as porcelain."

amount of our coal. What will be the growth of our coal trade in the next twenty years it is difficult to foresee. As respects the capabilities for supplying an extensive demand, Nova Scotian collieries now opened or in preparation, would raise in five years five or six millions of tons annually, and the supply could be gradually increased to meet any demand, however great.

That our coal trade will be very large, unless it is paralyzed by foreign legislation or domestic differences, is perfectly clear. In a few years not less than two millions of tons will be required for domestic purposes alone in British America, for even in the mild climate of Britain a ton per head is consumed for household purposes, and our long winters will render at least three times as much necessary. Every day "the wood age" is becoming a thing of the past, like the "stone age" of archaeologists. Wood suitable for fuel gradually becomes more remote from roads and ports, and rises in price, so that even in Toronto coal is used for household purposes. In parts of the lower provinces the forests have been so wastefully and so effectually destroyed, that the farmers have to use coal for house purposes; and the scarcity of wood and the demand for coal are daily rapidly increasing. Mr. McCulloch estimated the yield of coal in Great Britain in 1840 to be thirty millions of tons; last year the consumption was *one hundred millions of tons*. As this progress has upset the calculations even of the most careful and experienced judges, how can we suppose that the future will not dwarf the present by the enormous development of manufacturing and commercial industry that is destined to take place. But the British American coal trade has elements of development which do not exist in Britain. We have the increase of population through immigration to count upon, and the increase of the domestic consumption of coal through our rapidly passing out of "the wood age." It will be a bold man who will venture to predict the limits of our coal trade in a few years, if it is encouraged in its infancy by wise legislation, and is developed by capital and industry. At present the mines of Nova Scotia are gradually passing into the hands of the Americans, there being more Nova Scotia coal stock owned in New

York and Boston than in the whole province of Nova Scotia. English capitalists will go to Mexico, South America, heaven only knows where, to risk their money in mines that, at the best, are but a lottery, while a province, the nearest part of America to England, with excellent harbours, a healthy climate, and unlimited mines of gold, coal, and iron, is left neglected, to become the property of American capitalists.

English capital, it is true, has found its way here, but the causes which led to this flattering result, are somewhat like those to which Prince Edward's Island is indebted for a solitary Irish emigrant having selected it as his home. He was shipwrecked on the Island, and never could earn money enough to enable him to leave it. The Duke of York having become deeply in debt to his jewellers, was saved from their importunities by the liberality of the British Government, which generously made them a present of our mines and minerals, the lease of which issued to the Duke, and was by him assigned to them. Our 'black diamonds' proved, however, a somewhat puzzling windfall to his Grace's jewellers, who sold them to the General Mining Association of London, an enterprising and wealthy English Company which had sunk a large amount of capital in foreign mines. The striking fact that the Nova Scotian mines, in spite of the heavy outlay necessary to develop them, and of the funds that were sunk in foreign mines, have at least quadrupled the value of the Association's shares, is a sufficient proof of the importance of these vast mineral resources which the British Government so recklessly threw away on a spendthrift and his favourites. This monopoly, which was partially restricted by an act of the Legislature, expires in 1886, when every trace of its exclusive rights will no doubt be swept away for ever. In the meantime large tracts are tied up by the lease. That so large an amount of valuable mineral property is now held by other companies, is due, not to the generosity of the General Mining Association, but to their fortunate ignorance of the extent of the resources which they had so long monopolized. The extensive areas reserved at Sydney, Lingan, Bridgeport, the Albion Mines, Springhill, and the Joggins, were supposed by them to include all the mines

that were worth having. Since then new carboniferous districts have been discovered in Cape Breton and in Nova Scotia, while in Pictou a far more valuable coal field than that reserved by the Association, has been found near Middle River. These new mines have been explored and are being opened up by foreigners, for though there is abundance of capital here, there is a slight want of enterprise among us. If, however, mining rights are only carefully preserved from being endangered by changes of Government, and by the claims of political partizans, we may rely upon strangers for the speedy development of our mines. In a material point of view it may matter little from whence capital comes, so long as our mines are opened up. But as the Americans are daily becoming the owners of our gold and coal mines, the political effect must in time be apparent. If we are to form part of the British Empire, it is desirable that we should be connected with it by something more than hereditary ties, and the grateful reminiscences of history. If the most important sources of provincial wealth are owned and developed by foreigners, the people must in time learn to look up with a filial feeling to those, whoever they may be, to whom they are indebted for the welfare and prosperity of the province. Fortunately, however, the capitalists of Ontario and Quebec are slowly turning their attention to our mines, and we may look forward to the day when, within the Dominion, we shall find the enterprise and the capital which alone are required. A future of manufacturing and mineral wealth is simply a question of time, and must necessarily result from the position and resources of Nova Scotia.

Of all the numerous Colonies of Britain, Nova Scotia, the oldest, the nearest, and the most neglected, presents the strongest family likeness to its mother country, in the singular variety and excellence of its resources, combined with its being near the markets of the world. A province, which ranks as one of the first fruit growing countries in the world, which has such a genial climate* that its grapes grown in the open air can rival

* No country can hope to be a centre of manufacturing or commercial activity, which possesses a rigorous or unhealthy climate. The following extracts may serve to remove some wide-spread prejudices as to the climate of Nova Scotia. The *Gardener's Chronicle* says, "Our readers and the visitors to the Fruit Shows of the Royal Horticul-

those of Italy, which possesses iron equal to that of Sweden, and gold which excels that of Australia and California in purity, which has unequalled fisheries, safe harbours, extensive coal fields near the water's edge, and above all a position almost midway on the very highway of nations between the Old and the New World, may hope, at some future day, to inherit a full share of that greatness, which Britain must, in her old age, resign to her children or to strangers.

ART. XI. EXPLORATIONS IN THE PICTOU COAL FIELD.
BY R. G. HALIBURTON, F. S. A., F. R. S. N. A.

FROM the discovery by Mr. French, in 1865, of the Albion Mines main seam several miles further west than it was supposed to exist, I was led to take up extensive mining rights in the vicinity of the Pictou Coal Mines. Mr. French, to whom this province is under great obligations, had proved that comparatively little was known of the extent of the productive measures, and that similar discoveries must soon be made in other directions. The explorations, which are the subject of this paper, were personally superintended by myself, and were conducted by the aid of a mining engineer on the following properties:—No. 1., situated on the south western side of the coal basin, on an area known as “the Culton property,” and adjoining the colliery of the Intercolonial Company; No. 2, on the south eastern extremity of the basin, on the west flank of McLennan's Mountain. No. 3, at the eastern end of the basin near the waters of Merigomish, on a property called the St. Lawrence area. No. 4, on a property on the northern side of the basin purchased from Messrs. McDonald, McKay and

tural Society cannot have forgotten the surpassing beauty and equal excellence of the apples communicated by the great Colony of Nova Scotia. *Certainly nothing like them had been previously seen at any Public Exhibition in this country.* “What gives this collection especial interest is the example it affords of the excellence of the climate of a Colony which half the world believes to be dismally dreary.” The *London Times* also says, “The beauty of the apple beats anything we have ever seen;” and the Royal Horticultural Society, in its proceedings, states, “The only other country except Turin, which exhibited grapes grown in the open air, was Nova Scotia, and several of these were of the same kinds as those from Lombardy, but *they seemed to have agreed better with this new habitat on the other side of the Atlantic, and to have beaten their old country-cousins both in size and flavour.*” The explanation for this may be found in the fact that Nova Scotia is situated in the same latitude as Nice, and that its autumns are prolonged by its proximity to the Gulf stream.