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Geographical Conditions Affecting British Trade

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which it should avert are upon us, and then it will be too late to make provisions which now could be done cheaply, easily, and effectively.

A Proposed Remedy.

The few attempts which have been made in this country to promote the study of geography or to diminish the discouragements to geographical research have had but slight success. Much has been done to improve geographical teaching by the Royal Geographical Society, the Royal Scottish Geographical Society, the Geographical Association, this Section of the British Association, and other bodies; but that is not my theme. I refer to the little that has been done towards the elaboration of a geographical theory and the elucidation of geographical processes. Amongst the not inconsiderable number of teachers of geography in the universities and colleges of Great Britain there is not one man who receives a salary on which he can live in decent comfort so as to devote all his time, or a substantial part of it, to geographical research; and the same is true of every official of all the geographical societies. Not one is paid a salary sufficient to enable him to devote the time not occupied by mechanical routine to any other purpose than supplementing his income by outside work—writing text-books, correcting examination papers, perhaps even practising journalism. If by an effort and the sacrifice of some of the comforts considered necessary by most people of the professional classes he devotes a few odd hours now and then to some original research, he finds very few to consider it seriously; some friendly expressions of opinion possibly, but scarcely a reader; and it counts for nothing, save, perhaps, in enhancing the reputation of his country in other lands where scientific work, no matter in what department, is valued in a due degree. All this must be changed before much progress can be made. No doubt a giant of genius would ignore all obstacles and pursue his work regardless of recognition; but such giants are not to be looked for many times in a century. It should be made possible for a man of fair abilities to receive as much opportunity, encouragement, recognition and reward for good work in geography as for good work, let us say, in chemistry or electricity. That is all that can reasonably be asked, and that is what is freely accorded in other countries where the status of the man of science is higher than it is with us. It is here that help may be hoped for from the Scottish Universities in the strength of their new endowments. If a Chair of Geography were instituted with the purpose of promoting research first and teaching afterwards, properly equipped with books, maps, and apparatus, and held on the understanding that no outside work was to be undertaken, something might yet be done to restore our country to the position it held a century and a half ago, when a text-book of geography was published without a thought of sarcasm, containing a frontispiece representing “Britannia instructing Europe, Asia, Africa, and America in the Science of Geography.”

GEOGRAPHICAL CONDITIONS AFFECTING BRITISH TRADE.*

By GEORGE G. CHISHOLM, M.A., B.Sc.

I HAVE often been led to think that foreigners who endeavour to arrive at a knowledge of English ideas from a perusal of our periodical literature, must be greatly struck by what seems to be the Englishman's delight in self-depreciation. This spirit would appear to be conspicuously manifest in connection with British

* Paper read at the Glasgow Meeting of the British Association, September, 1901.

trade. Leader-writers, contributors to magazines, British consuls, popular authors of jeremiads and ichabodiads write on this subject, if not with unanimity, at least, for the most part, with a harmony that must be, and in fact is, very comforting to our competitors, but far from cheering to the representatives of British trade and industry. So much does the spirit to which I refer prevail, and so completely does it carry with it to the British public its own evidence, that it absolves those who are properly animated with it from the necessity of any laborious inquiry into facts. Like all luminous ideas, it gives to the possessor a preternatural power of insight, which enables him to penetrate with swift incisiveness to the true cause of phenomena which might otherwise be hard to explain. If figures show that in a particular period, or even in a particular year, British trade with some part of the world has been declining, or even has not been advancing so rapidly as that of some other country, that is promptly accounted for. Somehow or other it must be due to our own negligence. "At present our supremacy [in trade] . . . is seriously threatened. . . . Without inquiring too closely how far this relative inferiority [in rate of expansion] is due to the diminished efficiency of our workmen, or the want of initiative and enterprise on the part of the masters and their staff, we may take it as self-evident that we are bound to neglect no means of improving, to the utmost, our processes of production and our machinery of distribution."* The words I have just quoted are from a leading organ of public opinion, and I think they will be readily recognized as a typical comment on the apparent tendencies of English trade.

But in this current of opinion I am not able to join, and the reason is that, however much British trade may be affected by the backwardness or enlightened enterprise, slackness or energy of those concerned in British commerce and manufactures, there are also important geographical conditions to be taken into account. And with regard to these I find myself in the same unfortunate position as I have been in before in addressing a meeting of the British Association—that of having nothing to say but what is obvious, and my only excuse is that, however obvious and large the facts may be, people won't look at them.

Of the influence of geographical conditions on trade and industry, we could have no better illustration than in the history of the great city in which we are now met. Throughout the period in which Scotland had a separate history from that of England, Glasgow was notoriously a quite unimportant town. Its population was ascertained in 1708, the year after the union of the English and Scottish parliaments, and was then found to be under 13,000. At the present time, disregarding municipal boundaries, with which geographers have little or nothing to do except to express a natural irritation at the way in which they are misled by them, and taking in the contiguous places which form along with the so-called Glasgow one industrial and commercial aggregate, we find that the total population exceeds 900,000; and Glasgow is known all over the world as one of the greatest industrial and commercial centres of the globe. Now, is there any one who would ascribe this difference solely to the superior enterprise and ability of the people of Glasgow at the present time as compared with those of past centuries? The true cause of this difference is, in fact, well understood. The geographical and economic situation of the Glasgow of the past cannot be more comprehensively and compactly described than in the words of one of your own citizens. "The city was planted on the western limits of civilization. . . . It was remote from the great lines of mediæval intercourse from which the commercial grandeur of Venice, Antwerp, and other wealthy cities had been acquired. It was a poor little town,

* *Standard*, January 18, 1901.

planted in a very poor and thinly peopled country, within reach of a small river which, flowing towards a highland region peopled by wild and lawless races, fell into a trackless and unexplored ocean. Thus, with indifferently fertile land, with a variable and rigorous climate, with no natural wealth nor valuable products calculated at that time to excite the cupidity of commercial communities, . . . individual enterprise and commercial expansion were not to be looked for."*

A change took place at the union of the English and Scottish parliaments. The Scotch everywhere grumbled, lamented, and profited, just as the English might have done in similar circumstances. By this time the trackless western ocean was explored. Markets had begun to grow up on the other side of it. These markets were largely in English hands, but the union opened them also to the Scotch, and of this Glasgow promptly took advantage. Now here, in order to explain the comparatively rapid rise that then took place in the fortunes of Glasgow, we have to notice one geographical fact of great importance. It is that the physical configuration and outline of Scotland give to Glasgow, as its hinderland in relation to this western or transoceanic trade, not merely the small and "indifferently fertile" basin of the Clyde, but the whole of the eastern lowlands of Scotland from the Grampians to the Cheviots, which under former conditions were infinitely more favoured by nature than the western side of the country. Glasgow had long seen the desirability of improving the Clyde navigation. It was concerned with other towns on the Clyde in making efforts in that direction as far back as the middle of the sixteenth century; but these first and other subsequent efforts in the following century were futile. Not till after events had brought the great hinderland just mentioned in relation to profitable markets in the west was it really remunerative to carry out the great and almost uninterrupted series of improvements which justify your local saying, "Glasgow made the Clyde—the Clyde made Glasgow." Not till the latter part of the eighteenth century could Glasgow be reached by boats of more than five tons. It hardly needs to be pointed out how enormously the local advantages of Glasgow have been increased by the great invention of one of your own citizens, which gave a totally new value to the deposits of coal and excellent iron ore in the immediate neighbourhood of your city.

Glasgow, however, I take merely as an illustration of my main thesis, the importance of attending to geographical considerations. It is now time to turn our attention to the special subject of the present paper, the geographical conditions affecting the commerce of the United Kingdom. For the purpose of our present investigation it will be well to distinguish between conditions affecting commerce and those affecting industry, even though these are inter-related, and act and react on one another.

The advantages of the United Kingdom for a widespread commerce are universally recognized, but it is important to note at the outset that the merely commercial advantages of this country exist solely in relation to those parts of the world that are most easily reached from the seaboard. That, of course, is saying a great deal, and the importance of this consideration is seen to be all the greater when we consider the facts a little more narrowly. It cannot, indeed, be contended that this country has any special advantages arising from its situation in relation to commerce with the East. Italy, which for a long period in the past successfully turned to account its special advantages in relation to this commerce, may perhaps some time in the future come to benefit once more in a marked degree in the same way. England, however, has undoubtedly special advantages of situation in

* 'Glasgow: Its Municipal Organization and Administration,' by Sir James Bell, Bart., and James Paton (1896), p. 4.

relation to commerce with Europe and America, and when we consider the climatic and other conditions likely to affect the development of industry in these parts of the world in the future, so far as we now have the means of making any forecast, it may, I think, be contended that the merely commercial advantages of England are unparalleled, and are likely to remain without a parallel, in any other part of the globe of equal extent.

The extent of this advantage is, it seems to me, strikingly illustrated by the great magnitude and remarkable constancy of the *entrepôt* trade of the United Kingdom, that is, the trade in commodities collected from all parts of the world, and afterwards dispersed unchanged over other parts of the world. Taking the average of five years, we find that the value of foreign and colonial merchandise, exclusive of transshipments, exported from the United Kingdom has been uniformly about one-fifth of the total value of the exports from the period 1866-70 down to the latest period 1896-1900. It has not, in any of these successive periods, been two per cent. either above or below the proportion stated, notwithstanding all the fluctuations that the total commerce of the country has meanwhile undergone. This is all the more striking when we consider that there have been great variations in the mode in which the total *entrepôt* trade is made up. In the beginning of the period now considered, cotton was the most important item in this trade; for a long time cotton has been displaced by wool. Raw silk was at one time an important item; it has now sunk to absolute insignificance. Rubber was formerly unimportant; it is now steadily rising to a more prominent place in the list. The important point to note in the present connection, however, is, not the details, but the fact that so far losses under this head in one direction have been made good by gains in another.

Now, such a trade as this necessarily involves and therefore illustrates advantages of commercial situation, but it would be a gross and obvious mistake to put it down solely to such advantages. This trade is pre-eminently an illustration of the law that to him that hath shall be given. It is in a large measure due to the special advantages which this country enjoys for carrying on a large export and a much larger import trade based on its own resources.

Perhaps an even more striking illustration of the merely commercial advantages of this country is to be found in the history of the cotton trade. It cannot be contended that the industrial advantages promoting the cotton manufacture in this country are as great as those in favour of the woollen industry. We have no home supply of raw cotton, but we have a large local supply of raw wool of special value for certain purposes, which not only furnishes material for a great part of our manufacturing industry, but leaves a surplus for export larger than the estimated amount exported when English wool was of such high value in the middle ages. Yet the English woollen industry never attained that extraordinary pre-eminence which was very speedily acquired by that of cotton after the introduction of steam-driven textile machinery, and which it still retains. According to the latest statistics, all branches of the woollen industry in the United Kingdom, namely, woollen in the special sense, worsted, and shoddy, occupied not much more than half as many persons as the cotton industry,* which now engages more employees than any other industry in the country except agriculture and coal-mining. But there is one great commercial difference between the two industries. The great markets for woollens are the most highly developed industrial countries. The markets for cottons are everywhere; some of the most important in tropical and

* In 1896, number of persons engaged in the cotton industry, 532,920; in the three branches of the woollen industry, 284,441.

sub-tropical countries industrially backward. From any one producing country the bulk of these markets must be reached from the seaboard, and hence in relation to this trade England has had from its origin a very important commercial advantage.

Now, if the general thesis may be accepted that the United Kingdom has pre-eminent commercial advantages with respect to markets approached from the seaboard, there are a few corollaries which should be borne in mind. It follows that the improvements in ocean navigation tend in the aggregate more to the commercial advantage of this country than any other. Some of these improvements have tended peculiarly to the advantage of this country. Among those may be mentioned the change from wood to iron and steel as ship-building materials, and still more the change from wind to steam as a means of propulsion. The possession of the field of the best steam-coal in the world, in a position so convenient as that in which it lies in South Wales, is an enormous benefit to this country. There are other improvements the advantage of which is more general—the enlargement of ships, the various improvements in marine engines to which your city has so largely contributed, the enlargement and improvement of harbours all over the globe, and the improvements in the means of communication between the seaboard and the interior. All these improvements tend more or less to the advantage of all maritime countries, even to that of some that are not maritime. Some individual improvements tend more to the advantage of other individual countries than England; but, on the whole, the United Kingdom is more benefited by such changes than any other single country.

If an improvement in the means of communication between the seaboard and the interior is to be looked upon as a circumstance specially favourable to British trade, still more favourable must be any important extension of the seaboard into the interior. Now, this is practically what is getting tested at present in the region of the great lakes of North America. If it turns out that ocean ships can really be economically used on the improved canals of the St. Lawrence (in which there is now a minimum depth of 14 feet), that means that a great addition is made to the seaboard (though not, it must be remembered, an easily accessible seaboard) in one of the most important commercial regions of the globe. So, too, a true insight into the situation is shown, at least in one respect, by the offer of a British syndicate to the Canadian route to open up this seaboard by the construction along a still shorter route of the long-talked-of Montreal, Ottawa, and Georgian Bay canal. If constructed in adequate dimensions the canal might not pay the syndicate, but it could hardly fail to benefit British commerce.

But in spite of what has been said as to the increasing commercial advantages of the position of England, I don't think it could be contended that all the considerations above adduced would serve to account for the astounding pre-eminence which the United Kingdom enjoys in the ocean carrying trade of the world. One must also take into account what has already been said in connection with an *entrepôt* trade. The country that has most to carry across the ocean for itself is likely on that account to carry all the more for other countries also.

It cannot be denied, however, that there are some developments of recent years that have tended to diminish the proportion of the ocean traffic of the world belonging to this country. The tendency is for more and more of that traffic to be carried by regular liners, and when the traffic of a port, direct or indirect, with any part of the world comes to be large enough to make a line remunerative, the establishment of such a line in connection with any foreign port is certain to affect the British carrying trade adversely and rather suddenly. Such was the case, for example, in consequence of the establishment of the Messageries Maritimes line to Australia in 1883, and those from Bremen and Hamburg respectively in 1887 and 1888. But

when one considers the admirable communications of such ports as Hamburg, Bremen, Rotterdam, Antwerp, and Marseilles with the interior of Europe, one cannot but feel a little surprise that they have been so slow in encroaching on the domains of British commerce. Possibly this encroachment would have been much more rapid if it had been practicable for European countries to throw down some of the fiscal barriers which commerce must leap there.

But if Great Britain has on the whole decided advantages for commerce by sea, it has no such advantages for any extensive commerce by land. Quite the reverse. Any improvement, therefore, in the means of communication between any foreign inland centre of production competing with British centres of production and an inland market is something that tells directly against British commerce. This I propose to illustrate by reference to the commerce of Germany with surrounding parts of Europe, and that of the United States with Mexico and Canada.

Of all the larger countries of the world, Germany is that which has the best position for carrying on a large external trade by land. It lies in the heart of the most populous and the wealthiest part of the mainland of Europe, in communication with more than one of them by admirable inland waterways, and by rail without break of gauge, with all countries on its land frontiers except Russia,* and also through Switzerland and Austria with the rich plains of northern Italy. One of the most instructive illustrations of this advantage is given in an English Foreign Office report. The author of this report, Mr. Mulvany, H.B.M.'s consul at Düsseldorf, mentions that before the Franco-German war the Paris gasworks obtained their coal from his district, and that after the war the trade was promptly revived, and points out that there is, of course, an "immense advantage in being able to send the coal direct into the consumer's yard in the trucks loaded at the colliery screens."† When one remembers the amount of international bitterness to which that war gave rise, one perceives all the more clearly how great the advantage must have been in that commerce.

In the third edition of my 'Commercial Geography' I have already mentioned a fact that illustrates, as it seems to me, very plainly the effect of the establishment of one of the means of communication across the Alps just referred to. In 1880 60 per cent. of the total imports into Italy of iron bars, rods, etc., of a thickness of one-fifth of an inch or upwards (the largest head of iron and steel imports generally) was from the United Kingdom, only 2 per cent. from Germany; in 1890 less than 22 per cent. was from the United Kingdom, more than 52 per cent. from Germany. Now, the Italian statistics enable us to distinguish the imports (and exports) by sea from those by land, and hence we learn that more than nine-tenths of the German total came by land, whereas all the English import was by sea. That means that the great bulk of the German import came through the St. Gothard tunnel, which forms a very direct communication between Italy and the great iron and steel working districts of the Rhine basin. But in 1880 there was no St. Gothard tunnel, and that fact would seem quite sufficiently to account for the difference. If so, we have here a case of loss of English trade entirely due to a geographical cause, and not involving the supposition of "diminished efficiency" on the part of our workmen, or "the want of initiative and enterprise" on the part of English masters and their staff. And later figures on this point are also instructive. Taking those for 1897 (the latest that happened to be available at the time), I found that practically the same percentage of

* Russia has a 5-foot gauge; the other countries have the normal English gauge of 4 feet 8½ inches.

† Foreign Office Report, Miscellaneous Series, No. 454, p. 8.

the same class of goods was imported from Germany as in 1890, but that the British percentage had grown from 22 to 34·6. Apparently Germany had taken full advantage of the St. Gothard tunnel by 1890, and was not able to encroach further in the direction indicated on British trade.

And it must not be assumed that all imports from the United Kingdom into Italy come by sea. In the case of some goods that mode of carriage does not pay. The bulk of English cotton yarns, for example, that reach Italy enter that country by land. In such trade, therefore, England is obviously at an even greater disadvantage commercially, as compared with continental centres of production. How important for German commerce with Italy the land connections are may be guessed from the fact that, while in 1899 the quantity of goods exported from Germany to Italy was 242,095 metric tons, the total tonnage of ships cleared with cargo from German ports in the same year to Italy and Malta was only 42,537. I say "guessed," for we cannot tell what quantity of goods may have been sent from Germany to Italy in that same year by sea from foreign ports (Rotterdam or Antwerp).

Let us turn now to similar relations between the United States and its neighbours on the land frontiers. There was no railway connection between Mexico and the United States till 1884, in which year the Central Railway was opened connecting the city of Mexico with the United States railway system at El Paso, about the middle of the frontier. There are now three other railway connections between the two countries, two of them connecting the city of Mexico with the United States at other points, and one connecting the Southern Pacific railway with the Mexican port of Guaymas. The effect on the destination of the exports from Mexico was apparently very speedy and very marked. Here at least are the figures:—

VALUE OF EXPORTS FROM MEXICO IN THOUSANDS OF POUNDS.

	1883-4.	1884-5.	1888-9.	1899.
To United States ...	4546	5385	8510	11,068
„ United Kingdom ...	4026	3201	2611	987

These results are by no means surprising when we consider that the great bulk of the exports from Mexico consists of silver ore, silver, and partially refined silver, all commodities easily capable of standing the cost of long railway transit, and a great deal going to the smelting and refining centres of Colorado, with which the first railway to the United States established a very direct connection.

The import figures are also interesting, though, I believe, there are no returns on this head so early as 1884-5.

VALUE OF IMPORTS INTO MEXICO IN THOUSANDS OF POUNDS.

			1888-9.	1899.
From United States	4722	5509
„ United Kingdom	1320	2072

Under this head, it will be observed, the United Kingdom holds its own much better than under that of exports. The imports, chiefly manufactured goods, are largely of a kind that come from the eastern parts of the United States, parts

that naturally make use of ocean carriage. On the whole, however, the competition between the two countries in Mexico is one between land and sea transport, and as the people of the United States find their interest in improving the railway connections between their interiors, so the English find their interest, in accordance with what has been already said in general terms, in the improvement of the ports of Vera Cruz and Tampico, and of the connections between these ports and the interior.

Canada, with its enormous land-frontier bringing into connection at many points some of the more populous parts of the Dominion and its neighbour, not, as in Mexico, through a uniformly sparsely peopled region, is in some respects an even more striking illustration of the importance of land connections than Mexico. These connections are constantly becoming more intimate, with unmistakable effects on the commercial relations of Canada with the United States and the United Kingdom respectively, though, from the difference of the circumstances, these effects are of a somewhat different nature. Canada has some exports of a similar nature to the leading exports of Mexico, and these go largely, if not chiefly, to the United States for the same reasons as those of Mexico. Under this head may be included nickel matte as well as silver and gold ores. But these do not form the bulk of Canadian exports. Most of the exports from Canada are similar to those which are produced in abundance, if not in excess, by the contiguous parts of the United States, and such as have a special value are to a large extent kept out of the United States by heavy fiscal duties. Hence the Canadian exports go in increasing proportion to Europe, principally to the mother country. But it is otherwise with Canadian imports. These are largely of a kind in which the United States and the United Kingdom compete with one another, and the United States have obvious local advantages in the competition.

First, it must be remembered that English goods are landed at furthest at Montreal, and that only during the summer months. Now, more than half the population of Canada is found to the west of Montreal. However cheap, therefore, carriage in bulk by sea may be, there is an addition to the cost of transport arising out of the break of bulk and a longer or shorter railway journey over and above. In the case of Toronto, the great distributing centre for Ontario, the length of the railway journey is 338 miles. Now, Toronto is within a much shorter distance of several producing centres in the United States without break of bulk. And if this is an important consideration with respect to the central and some parts of the eastern districts of Canada, it is obviously of still greater importance in the case of the western provinces in relation to such producing or jobbing centres in the United States as Chicago and St. Paul.

That, moreover, is by no means the only way in which the United States competition is favoured by the intimacy of the railway connections with Canada. It is hardly needful to remind you of the important part played by commercial travellers in promoting trade. There is nothing that our consuls so frequently remind us of, and it is often pointed out that commercial travellers from the United States are much more numerous in Canada than those from England. Very true, no doubt; but how can it be otherwise? However much transport may have been cheapened, man still remains an expensive commodity to carry, especially when you take into account the loss of interest on capital during the period of transit, that is, the loss of the traveller's time. Now, I do not suppose that the numerous commercial travellers in Canada, representing firms of the United States, come from New Orleans, San Diego, and such outlying parts. A good many of them, no doubt, come from Detroit and Buffalo, where the travellers have only to cross the border to get into Canada. One can imagine a commercial traveller

saying to his wife in the morning, "I shall not be back to dinner to-day; I am going to London," meaning London, Ont., or a Buffalo traveller making the same explanation with regard to Hamilton. Montreal is not so far from New York as Glasgow or Edinburgh is from London, and can be reached in a short night journey. London, Ont., is only 114 miles, or $4\frac{1}{2}$ hours from Detroit, and Toronto 229 miles, or $7\frac{1}{4}$ hours. Hamilton is only about 70, and Toronto little more than 100 miles from Buffalo.

Obviously, too, contiguity favours trade between the United States and Canada in perishable commodities, such as either cannot be conveyed at all between Canada and Europe, or only at extra cost.

Further, imports from the United States into Canada are favoured by another geographical condition, which does not necessarily result from contiguity, but is due to the fact that these two countries, or at least the adjacent portions of them, have a similar climate, and have grown up under similar economic conditions. Agricultural settlement is rapidly taking place in both, and the cultivated areas are similar in surface features, in climate, and in economic requirements. The same kind of agricultural machinery is used in both, and more largely used in the United States than anywhere else in the world. Now, production can always be carried on more cheaply on a large scale than a small one, and hence it is natural, one might say inevitable, that the United States should manufacture this machinery for Canada.

The similarity of the winter climate causes the use of the same means of guarding against it in both countries. The method of domestic heating suitable enough for the mild and uncertain winters in England, is altogether unsuited for the regular and severe winters of Canada and the United States. In both these countries the same kind of stoves and the same kind of fuel are used domestically. Large manufactures of such stoves are carried on at Detroit, and without the slightest doubt the manufacturers of these stoves find an immense market in the adjacent parts of Canada as well as in the adjacent parts of the country to which they belong.

With all these conditions favouring the commerce of the United States, it is not, therefore, to be wondered at that the percentage value of the imports of the Dominion of Canada from the United Kingdom, reckoned on the total value of the imports, has declined from about 51 in the year 1867-8 to about 24 in 1898-9, while that of the imports from the United States has gone up in the same period from about $36\frac{1}{2}$ to $62\frac{1}{2}$; and that these movements have scarcely been arrested by the recent preferential tariff in favour of the products of the United Kingdom. This last circumstance is indeed the less surprising when we consider that the Canadian free list includes anthracite (the Pennsylvanian fuel required for domestic purposes), coke, various kinds of timber, hides, cotton, wool, and other important commodities, to which the favouring conditions indicated above apply in their full force.

We must now proceed to consider the industrial position of the United Kingdom and her rivals. The industrial pre-eminence of England may be said to have been first attained in the early part of the eighteenth century. It was then largely based on the possession by England of a great abundance of excellent wool, combined with the advantages of her commercial situation. Her industrial advantages were, of course, enormously enhanced by the inventions which, towards the close of the eighteenth century, gave an entirely new value to her extraordinary wealth in coal and iron ore in remarkably convenient situations. Directly or indirectly, these inventions have led to an increase in the production of coal in the United Kingdom from an estimated total of about 10,000,000 tons in 1800 to one of 225,000,000 tons in 1900.

If England had been the only country possessing these advantages, then the relative position of this country in manufacturing industry might perhaps have been maintained for an indefinite period, and even increased; but it does not follow that this country would have been so rich as it now is. But of course this country is not the sole possessor of such wealth, and although, owing to historical circumstances, this country was the first to turn such wealth to account, other countries possessing it were sure to do so in time, and it was mathematically certain that as they did so the relative position of England would be lowered. England may have still, probably indeed has, greater industrial advantages than any other area in the globe of equal extent, but they are not greater in the same degree as they once were.

This is so obvious that it does not need to be enforced in general terms; still, a few details are worthy of attention. One country on the mainland of Europe, far advanced in its general economic development, is well known to be very rich in coal, and that coal also is, to a large extent, very conveniently situated. The country to which I refer is, of course, Germany. One of the two largest coalfields of this country, that of the Ruhr basin, is contiguous to the Rhine, and is throughout its length of 60 miles in water-communication with that river, a river whose valley has been a highway of commerce from north to south in that part of Europe, and hence a means of attracting and condensing population, from pre-historic times downwards. The coalfield has many easily worked seams. Within 150 or 160 miles of that coalfield are two of the most important groups of iron-ore deposits on the mainland of Europe. One of these groups lies about 70 to 90 miles south-east of the Ruhr basin, in the hilly country where the Prussian provinces of the Rhine, Westphalia, and Hesse-Nassau meet. This group produces ore of three or four times the value of the ores of the other group, which is situated partly in and partly on the borders of the grand-duchy of Luxemburg (part of the German Customs Union, it will be remembered), at the distance of 150 to 160 miles from the coalfield. The ores of this group, though less valuable, are much more easily worked, and hence form about two-thirds of the quantity of the total iron-ore production of the German Customs Union.

Now, in these circumstances it is surely not to be wondered at that the coal and iron fields mentioned should come to be opened up, and that there should follow a considerable development of the various industries that have been fostered by the wealth of coal and iron. Indeed, when all the facts are considered, what does seem to demand explanation is, not that Germany should have come to be a competitor with this country, but that she should have been so long about it. It does seem surprising that the first coke blast-furnace in the Ruhr basin should have been blown in only early in the forties of last century, that the first railway of this region, from Cologne to Minden, should have been opened only in 1846; that as late as 1860 the total production of coal within the territory of the present German Empire (which has several other well-placed coalfields) should have been under 12½ million tons. Since 1860, however, the production has increased apace, and with it have grown all kinds of industries. Our own country has thus inevitably been placed in a lower relative position industrially, but surely the facts just stated are enough to indicate that this does not necessarily imply either "diminished efficiency of our workmen or the want of initiative and enterprise on the part of the masters and their staff." That, in fact, it is not always so, that in some branches of industry we still enjoy a confessed superiority, is sometimes made plain enough by the testimony of our rivals. A writer in a Leipzig periodical connected with the textile industry complains that the finer and very fine cotton yarns "have remained insufficiently protected against the overpowering competition

of Great Britain and Switzerland, with the result that the spinning of fine yarns has not progressed, and is only able to develop slowly and at a sacrifice." He goes on to point out that "the German cotton-spinning industry is unfortunately obliged to import almost the whole of its machinery from the United Kingdom," and adds that it does not redound to the credit of German engineers that, since the establishment of the German Empire, practically nothing has been done to render the German spinning mills independent of the British machinery builders. "The reproach that the German finer yarn spinning industry has not progressed to the extent expected by consumers of these yarns may be laid at the door of these latter themselves, and demonstrates their ignorance of the unfortunate history of this branch of the cotton industry. The finer yarn spinning industry has been continually disturbed. In 1878 it was granted a moderate duty; early in the eighties the question of customs drawbacks was brought forward; then, in 1893, the protective duty was reduced in the way of treaties; and likewise since that time the industry has not been left in peace—agitated from all sides and defended by none. Could it, under such conditions, be seriously expected to progress?"

In all this there is nothing to the discredit of British industry, but very much the reverse; but perhaps after all the most interesting thing in this quotation is the illustration it affords of the keen business-like sense, not without parallels in our own country, of the injury done to trade by the selfishness of other people.

On the other side of the Atlantic there has, meantime, been growing up another keen competitor, which it is utterly absurd to suppose that this country can permanently rival in the magnitude of its foreign commerce. The difference in magnitude and the extent of the natural resources will in time make the comparison altogether out of the question. These resources include fields of coal, and probably also of iron, of greater extent not merely than those of the British Isles, but those of all the countries of Europe together. And in this case there is no reason to speak of any tardiness in their development. They have been opened up and worked with as much rapidity and energy as there was any reason to anticipate. It is true that none of the coalfields of the United States are so conveniently situated with respect to the seaboard as those of Great Britain; but, as above indicated, this fact places them and the industries dependent on them at no disadvantage, as compared with competing industries of the United Kingdom, in relation to the great bulk of the local markets. These markets are for the most part inland, not so easily reached from the seaboard as from inland centres of production.

Thus, then, a vast change is brought about in the relative industrial position of the United States not ascribable to any negligence on the part of British manufacturers or merchants.

Then there is another point to consider. Our mines have been longer worked than those of any other country, except perhaps Belgium. An inevitable consequence is that the seams most easily reached and worked are to a large extent worked out. We are compelled to work our thinner seams, or to reach thicker seams by deeper shafts and more extensive tunnelling. On the other hand, the American mines are still worked for the most part only to a comparatively small depth, in many cases by means of level-workings opening on hillsides (as in the case of a few of our Welsh mines). Coal, too, has been cheapened in America, in many cases by increasing demand favouring the economies due to working mines on a large instead of a small scale, as well as by a large amount of immigration of miners from parts of Europe in which a lower standard of living prevails. In these ways the average price of coal in America, and especially in certain parts of America, has been on the whole gradually lowered, while that in

our own country, and in other European countries, has remained fairly stationary or risen. This is shown by the following table, in which, besides averages for entire countries as given in the Coal Tables annually issued as a parliamentary paper, I have also inserted, in order to give more definiteness to the comparison, for some years the averages of certain states of the United States and certain districts of Great Britain and Germany:—

AVERAGE PRICE OF COAL PER TON AT THE MINES.

Year.	United Kingdom.	United States.	German Empire.*	West Glamorgan-shire.	Pennsylvania. Anthracite.	East and West Riding, Yorkshire.	North and East Lancashire.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1883 ...	5 7½	6 5½	5 4	—	—	—	—
1884 ...	5 4½	5 7½	5 3½	—	—	—	—
1885 ...	5 2	6 8½	5 3½	—	—	—	—
1886 ...	4 10	6 4¾	5 3¼	—	—	—	—
1887 ...	4 9¾	6 6¾	5 2¾	5 4	8 3½	4 9	5 3
1888 ...	5 0¾	6 0	5 3½	5 10	9 1	5 1½	5 6
1889 ...	6 4½	5 3½	5 9½	8 3	6 8½	6 3	6 8
1890 ...	8 3	5 2¾	5 9½	10 9	7 4½	8 9	8 1
1891 ...	8 0	5 3½	8 1½	10 10	6 9	8 3	8 3
1892 ...	7 3½	5 4¾	7 6	9 3	8 0	7 9	7 6½
1893 ...	6 9½	5 4	6 10	7 9	8 0¾	7 2	7 10
1894 ...	6 8	5 1	6 8½	7 9	7 2½	7 4	7 4½
1895 ...	6 0½	4 9½	6 11	7 4	7 2½	6 5	6 7½
1896 ...	5 10½	4 9½	7 0	6 10	—	6 5	6 3½
1897 ...	5 11	4 7½	7 3	6 9	—	6 5	6 3½
1898 ...	6 4½	4 5	7 6	6 10	7 2½	7 0	6 4½
1899 ...	7 7	4 8½	7 11	7 8	7 11½	7 8	7 6¾
1900 ...	10 9¾	5 5½	9 0	—	—	—	—

Year.	Northumberland.	Pennsylvania. Bituminous.	Illinois.	Alabama.	Dortmund. Steam and coking coal.*	Dortmund. Puddling and good steam coal.*	Upper Silesian gas coal.*
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1887 ...	4 7	4 2½	—	6 0¾	5 8	4 6	6 0
1888 ...	4 4	4 5	5 3	5 5	6 1½	5 7	6 0
1889 ...	5 5	3 7	4 6½	5 2	8 7½	7 6½	7 1½
1890 ...	7 7¾	3 9	4 6	5 2	10 11	10 0	9 8
1891 ...	7 4	4 0¾	4 3	5 0	10 0	8 1½	9 4
1892 ...	6 6½	3 7½	4 8½	4 8	8 7½	7 5	9 3
1893 ...	5 11½	3 1¾	4 5½	4 5½	7 5½	6 7	9 2
1894 ...	6 7	3 3½	4 2½	4 2½	8 1½	7 0	9 2
1895 ...	5 6¾	3 3¾	4 3½	4 2½	8 1½	7 6½	9 2
1896 ...	5 0¾	—	—	—	8 4½	8 0	9 1
1897 ...	5 3	—	—	—	—	—	—
1898 ...	6 1½	2 9½	3 7½	3 11½	—	—	—
1899 ...	7 0¾	3 8	3 7½	4 8	—	—	—

The very considerable fall in the price of Alabama coal must have afforded a

* In these columns the values given are not in the original sources, but are altered so as to correspond to a ton of 2240 lbs. instead of the metric ton of 2205 lbs.

great stimulus to the development of the iron and steel industry in that state, where coal, excellent iron ore, and limestone are all found close together at the southern end of the Appalachian system. It is from that district that most of the iron and steel recently exported from the United States to various European countries, including the United Kingdom, is derived.

The northern iron and steel working centres have not the advantage of obtaining coal and iron ore near one another; but that is compensated by the fact that these centres can be supplied with any amount of excellent iron ore well adapted for steel-making by the Bessemer and open-hearth processes from deposits worked with extraordinary facility in various hill ranges, the Marquette, Menominee, Gogebic, Mesabi, and others, round the head of Lake Superior, in the states of Michigan, Wisconsin, and Minnesota. Some of these deposits were discovered quite recently, those of the Gogebic range in 1884, those of the Mesabi range in 1892. The production of the Gogebic range rose from about 1000 tons in 1884 to upwards of 1,285,000 tons in 1887. Such discoveries must obviously have exerted a great and rapid influence on the development of the iron and steel of the States. The ore is quarried in the open air, and, after a short haul to a lake-port, is transported with extraordinary cheapness in whaleback steamers to Chicago, Lorain, Cleveland, Ashtabula, Conneaut, or some other lake-port, in some of which iron and steel works already exist, though the bulk of it is carried further on to older iron-working centres in the interior. All these ranges round the head of Lake Superior now yield considerably more than two-thirds of the total production of iron ore in the States.

And these are not all the natural advantages of the States with respect to this one industry. Fuel is available not only in the form of coking coal, but also in those of petroleum and natural gas, both in great abundance. Moreover, the market of the States is unique in the world as regards extent and value combined. There is no other population in anything like the same economic condition offering so large a market absolutely unimpeded by fiscal barriers. This last condition favours in a peculiar degree that colossal production centralized in a few places for which the States are remarkable, and this circumstance again favours the maintenance of remarkably low railway rates for the carriage of large quantities of goods long distances between certain points.

With all these advantages, one would hardly have imagined that fiscal barriers around this great market would have been necessary to prevent competition within it; and it is at least not surprising that the United States has surpassed this country in the production of pig iron and steel since 1890.*

The distance from the seaboard of both the coal and iron of the United States has hindered that country so far from becoming a serious competitor with the United Kingdom outside of America except in the case of the more expensive finished products, such as machinery. But there are other parts of North America more favoured. Canada has coal on the seaboard both in the east and west; and with the coal and limestone deposits of Sydney, Cape Breton, and the iron ores of Belle Island, Newfoundland, blast furnaces have now been started at the former place with the view of producing iron and steel for sale on both sides of the Atlantic.

A still greater alteration in the relative industrial advantages of Great Britain may be brought about by the increasing application of water-power. Formerly the benefits to be derived from this source of power were restricted by the fact that it could be used only at the place where it existed, and in such circumstances it was

* The years 1894 and 1896 excepted in the case of pig iron.

in many cases not practicable to use it at all; but now the employment of electricity as a means of transmitting this source of power to places in which it can be conveniently made use of is rendering it much more freely available, both for the working of stationary and locomotive engines, and also for the development of heat.

Now, it is notorious that this course of development must turn out much more to the advantage of the industries of some other countries—Switzerland, Italy, Norway, Canada, the United States—than our own; but there is all the less need for any enlarging on this topic since it was only a few weeks ago dwelt on at some length by the President of the Society of Chemical Industry at its annual meeting in this city. I will only direct a little attention to the electrical employment of water-power in Italy, where, it seems to me, there is a point of special geographical interest in connection with this enterprise.

Italy has a peculiarly honourable place in the history both of electrical science and its practical applications. The very name bears witness to the fact that Italy was the birthplace of Voltaic electricity. To an Italian physicist, Pacinotti, was due the first idea of a dynamo-electric machine (invented in 1860, and first described in the *Nuovo Cimento* in 1867). It was in Italy, at Milan, that the first central station for electric lighting was established on the mainland of Europe (1883). It is to Italians that we owe the recent development of wireless telegraphy. Now Italy, as is well known, has been dealt with by nature in a rather niggardly fashion in the matter of coal. On the other hand, it is rich in water-power. The amount of such force already utilized is as much as 300,000 horse-power, and the amount not as yet utilized, but capable of being conveniently turned to account, is estimated from official sources at 2,800,000 horse-power in round numbers, a total accordingly exceeding three millions of horse-power, calculated, if used day and night, to represent, at the prices of coal in Italy in 1900, an annual value of about 800 millions of lire (say £30,000,000).*

Water-power is already utilized electrically in Italy, not merely for the purpose of lighting and locomotion, but also for the production of hydrogen and oxygen by the electrolysis of water and the manufacture of carbide of calcium, and works are in progress for utilizing the same power in the same way for the refining of copper (at Leghorn), the smelting of iron ore (at Darfo on Lake Iseo), and the manufacture of caustic soda (on the Pescara). An enormous stimulus was naturally given to the application of Italian water-power by the discovery of the processes by means of which it may be transmitted to great distances. To enable Italy entirely to dispense with the use of English coal, it would be necessary for the force developed in the mountains by falling water to be conveyed distances of from 100 to 125 miles. With the use of high tension electricity the transmission of power for even a greater distance has been found practicable elsewhere; and steps are now being taken, if they have not already been carried out, for the transmission of 11,000 horse-power from the torrent of Cellina to Venice, a distance of 56 miles, at a tension of 25,000 volts.

Italy is now looking forward to a great industrial development through the application of her inexhaustible water-power, and the point of special geographical interest to which I would call attention in connection with that is this. Italy occupies, in some respects, a peculiarly advantageous geographical position. That

* These and other particulars relating to the use of water-power in Italy are taken from a paper by Giuseppe Colombo in the *Atti della R. Accademia dei Lincei*, Anno ccxvii. (1900), pp. 478-489.

was made abundantly manifest throughout the history of the middle ages. Though the advantages of that situation were, to a large extent, lost through the discovery of the sea-way to India, they have been in some degree restored by the cutting of the Suez Canal. Nevertheless, these advantages have not yet been greatly turned to account since that date. We must remember, however, the great law of commerce to which I have already referred, "to him that hath shall be given." If Italy, through the development of a great manufacturing industry by means of her water-power, is able to build up a great external commerce based on her own resources, all the more likely is she to add to that trade a great *entrepôt* trade, possibly, and indeed probably, to the prejudice of our own. One thing wanting for this is a great port in a suitable situation. Venice is not adapted to modern conditions. It is too cramped for further growth. But I have often thought that if local conditions allowed of the creation of a great port at Rimini, there might there grow up a new Venice, which might come to outrival in wealth and in commerce, though never in glory, the Venice of the past.

In conclusion, I will venture on one practical remark with regard to our own country. If it is the case that there are some geographical conditions acting in some respects adversely to the development of our commerce, in addition to the keen and enlightened competition of growing rivals, that only adds force to one remark that I have quoted from the *Standard*—"that we are bound to neglect no means of improving, to the utmost, our processes of production and our machinery of distribution." One means of attaining this end, I do not doubt, will be a wise system of education. But I trust that in planning the framework of a system of education with this end in view, it will not be forgotten that all trade is not external (foreign or colonial) trade. There is nothing unpatriotic in expressing the opinion that there would be no cause for dissatisfaction if in the future more of the produce of our industry found markets in Lincolnshire and Norfolk, Lothian and Meath, even if on that account less were sold in Argentina and Peru.

THE MONTHLY RECORD.

EUROPE.

Distribution of Population in the Rhine Province.—One of the careful and elaborate studies of the distribution of population as affected by geographical causes which find special favour among German students, appears in the *Forschungen zur Deutschen Landes- und Volkskunde* (vol. 13, part 3), from the pen of Dr. Ernst Ambrosius. The district selected for study is that on either side of the lower Rhine from Ürdingen and Duisberg in the south to Elten in the north. Taken as a whole this district is marked by comparatively slight variations of level, and the influence of this factor on the movement of population is therefore not so well marked as it often is. Still, Dr. Ambrosius points out, the district may be divided, geographically, into five parallel zones, on the basis of its general relief, and these are taken as its fundamental divisions for the purposes of the study. They are: (1) the line of heights bordering the district on the east; (2) the Rhine valley, including that of the Issel; (3) the groups of hills on the left of the Rhine; (4) the valley of the Niers; (5) the western heights and moors. As a general rule the soil of the river-valleys is composed of rich loam and clay, while on the higher grounds sand and gravel predominate. As might be expected, the population is less dense in the higher zones, where the average per square kilometre varies from