

statistics of that year include six months' returns from the new province, amounting to \$254,063 total imports, \$286,337 entered for consumption, and \$15,723.22 duty collected. In 1872 the exports of Manitoba were valued at \$85,541, the imports at \$942,247, and entered for consumption, \$1,020,172, on which \$46,839.90 duty was collected. In the same year the returns for British Columbia appear as follows:—exports, \$1,912,107; imports, \$1,790,352; entered for consumption, \$1,767,068; duty collected, \$342,400.48. In 1874 the returns of Prince Edward Island give the following additional elements to swell the aggregate amount:—exports \$722,129; imports, \$1,908,522; entered for consumption, \$1,913,696; duty collected \$219,458.07. Deducting those sums and values from the years named, there remains abundant evidence of a steady and rapid increase in the commerce of the four older provinces up to the year 1874, when the depression prevailing in the United States, in part due to reaction resulting from the effects of the southern war, began to be felt in Canada as well as in other countries. The great

Province	Year 1873-4.			Year 1874-5.		
	Exports. Value.	Entered for Consumption.		Exports. Value.	Entered for Consumption.	
		Value.	Duty.		Value.	Duty.
Nova Scotia	\$7,656,547	\$10,875,140	\$1,409,094	\$6,968,139	\$10,688,213	\$1,490,543.77
New Brunswick.....	6,503,934	10,321,492	1,399,930.75	6,542,329	9,855,533	1,370,611.42
Prince Edward Island.....	722,129	1,913,696	219,458.07	1,307,590	1,984,278	316,976.49
Quebec.....	46,393,845	51,981,127	6,613,509.50	39,801,041	50,618,588	6,772,303.90
Ontario.....	25,157,087	48,375,522	4,361,236.06	20,016,101	42,781,076	4,808,074
Manitoba.....	794,762	1,853,659	67,471.97	588,958	1,227,890	171,430.86
British Columbia.....	2,120,624	2,048,336	336,494.47	2,824,712	2,487,293	413,991.50
Total.....	\$89,351,928	\$127,368,972	\$14,407,194.82	\$78,048,870	\$119,622,871	\$15,343,931.94
Export Duty.....	14,564.90	7,231.86
			\$14,421,759.72			\$15,351,163.80

Administration of Justice.—So long as Canada consisted of the two provinces of Upper and Lower Canada, even when united for legislative purposes they retained their diverse laws and distinct judicial systems, while the Privy Council of Great Britain constituted the final court of appeal for both. In the province of Quebec the old French law, which was introduced under Louis XIV., is still the basis of the law of property. There the tenure of property remained strictly feudal, until the settlement of the claims of the seigniories by the Act of 1854 brought the old system to an end. But before that was effected new townships had been surveyed, and land disposed of to settlers to be held in free and common socage. The commercial law is regulated partly by the old French code, but modified by the English customs, and by later Canadian legislation. The criminal laws of England, and the right of trial by jury, were introduced by 14th Geo. III c. 83. Since then all additions to the criminal law, or modifications of the statutes, have depended on the Acts of the colonial legislature. The religion, laws, language, and customs of the French population were all guaranteed to them at the time of the cession of Canada to England; and the rights and privileges pertaining to the Roman Catholic Church, among a population regarding its creed as their national religion, help to perpetuate essential differences, by maintaining what is still practically an established if not a state church.

By the constitution of the Dominion, as embodied in the British North American Act of 1867, the criminal law, with the establishment, maintenance, and management of penitentiaries; all laws relating to bankruptcy and solvency, marriage and divorce, naturalization, aliens, Indians, and Indian reserves; and generally, all subjects not expressly assigned to the provincial legislatures, pertain to the Dominion parliament. The judges in all the provinces are

appointed by the general Government; and the pardoning power is vested in the governor-general *per se*, whilst his authority in all other respects is exercised under the advice of his privy council, or ministers for the time being. The powers entrusted to the local legislatures include generally all strictly local legislation not affecting in any way the rights of other provinces. The judges by whom the laws are administered must in the case of Quebec be selected from the bar of that province; and the judges of the superior courts in all the provinces hold office during good behaviour, and are removable by the governor-general on address of both houses of Parliament.

Exports and Imports.

1867-68.....	\$131,027,532
1868-69.....	130,889,946
1869-70.....	148,387,829
1870-71.....	170,266,589
1871-72.....	194,070,190
1872-73.....	217,801,203
1873-74.....	217,565,510
1874-75.....	201,116,963

The relative wealth and progress of the different provinces of the Dominion will be illustrated by the following comparative table, showing the last year of nearly unchecked progress, and the first of reaction. It shows the value of the goods exported from, and entered for consumption in the Dominion, during the years ending the 30th June 1874 and 1875:—

The rights and privileges of each province being thus secured by its own parliament and courts of law, the provisions of the Act of Confederation have been completed by the establishment of a Supreme Court and Court of Exchequer at Ottawa, consisting of a chief justice and five other judges, two of whom, including the chief justice, have been selected from the bench of Ontario, two from the bench and bar of Quebec, and one each from the bench or bar of Nova Scotia and New Brunswick. The court thus constituted is the supreme and final court of appeal, from all the courts of law in the various provinces,—with this exception that, while no appeal lies from the Supreme Court at Ottawa to the Privy Council, litigants have still the right of choice between the two as their final court of appeal.

Education.—Almost from the first organization of Upper Canada as a separate province, steps were taken for providing means for the establishment of efficient schools and colleges. So early as 1797 a grant of 500,000 acres of the unoccupied lands of the province was set apart for the purpose of establishing and endowing a university and four royal foundation grammar schools. Of this one half was appropriated as a university endowment and one-fourth

of the remainder was granted to Upper Canada College, which assumed in Canada the functions of the great public schools of England, and still continues to hold its place at the head of the grammar or high schools of the province. In the earlier years of Upper Canada, the "Clergy Reserves," set apart originally for the support of a "Protestant" clergy, were appropriated exclusively by the ministers of the Church of England. Upper Canada became an archdeaconry of the diocese of Quebec; and the venerable Archdeacon Strachan, whose first labours in Canada had been as master of the Cornwall Grammar School, became the leader both in ecclesiastical and educational matters, and ultimately a privy councillor, member of the legislative council, and bishop of the diocese of Toronto. He was a man of great energy and decision of character; and under his guidance the lands set apart for the endowment of a provincial university were appropriated to the purpose, and a royal charter was granted by George IV. establishing at Toronto, or York, as it was then called, "one college, with the style and privileges of an university, for the education and instruction of youth and students in arts and faculties," under the name of King's College. The bishop of the diocese became, *ex officio*, visitor; and when at length the college was organized, it had its divinity faculty, and its professor of divinity, along with its daily religious services according to the use of the Church of England. The special denominational character thus given to the provincial university excited opposition, and led to the establishment of Queen's College, at Kingston, under the control of the Church of Scotland, and of Victoria College, Cobourg, under the Wesleyan Methodist Church. To those have since been added Albert College, Belleville, under the management of the Episcopal Methodist Church; and Ottawa College and Regiopolis College, Kingston, in connection with the Church of Rome. All of those possess university powers, either by Royal Charter, or by Acts of the provincial legislature. By subsequent enactments the constitution of King's College has been greatly modified. Its divinity faculty has been abolished, all denominational restrictions have been removed, and its functions divided between a university proper, modelled after the university of London, with a senate, on which devolves the fixing of the requirements for degrees, the appointment of examiners, and all other university work, as distinct from teaching. The latter is under the conduct and regulation of the professors, who constitute the council, of University College, and undertake all the duties of preparing the under-graduates for the university examinations in arts and science. Other colleges and schools, both in the faculty of arts and in those of law and medicine, are affiliated to the university, and part of the funds at the command of the senate is appropriated for scholarships, to be competed for at the examinations in the different faculties. On the passing of the Act of 1853, by which the divinity faculty and professorship were abolished, a royal charter was obtained for the establishment of Trinity College, in connection with the Church of England, with all the powers of a university.

The system of public instruction for Ontario has hitherto been carried out under the direction of a permanent officer, styled the Chief Superintendent of Education, with the advice of the Council of Public Instruction, originally nominated by the Crown, but latterly including representatives of the universities, of the school inspectors, and the masters of high and public schools. But by a recent Act of the Ontario Legislature, the functions of the Council of Public Instruction have been transferred to a committee of the executive council; and the functions and duties of the chief superintendent are vested in one of its members,

to be designated the Minister of Education. The introduction of the representative element into the Council of Public Instruction was immediately followed by a conflict between that body and the officers of the department in reference to various proposed modifications; and the changes now introduced aim at bringing the administration of the system of education more directly under the control of the people through their representatives. There are two normal schools for the training of teachers, one at Toronto, and one at Ottawa; and it is proposed to establish others at Kingston and London. The high schools are divided into (1) collegiate institutes and (2) high schools for teaching classical and English subjects, and (3) high schools, in which instruction may be limited chiefly to English subjects. Of those there were 103 in all, including 8 collegiate institutes, in 1875, with an attendance of 8437 pupils. The primary schools for junior pupils are styled public schools. The school population, including those between 5 and 16 years of age, was returned in 1874 as numbering 504,869. At the same date there were 4732 schools in full operation, with an attendance of 460,984 pupils. In all the above schools every feature of a denominational character is excluded. The collegiate institutes and high schools are under the control of trustees appointed by the county municipalities, and their maintenance depends on their share of the legislative grant and endowments, supplemented by the annual assessments of the city and county municipalities. The public schools are in like manner supported by legislative grants, and by assessments levied on the requisition of the school trustees in each school section. The essential feature of the whole system is that the people, directly or through their representatives, have the entire control of the schools, including the selection of the teachers, the fixing of their salaries, and the management of the school funds. The one exceptional feature is the Roman Catholic separate schools. Any Roman Catholic can require his school-tax to be paid for the maintenance of the separate schools of his own church; and with this fund, supplemented from other sources, there were, in 1875, 170 separate schools in Ontario, with an average attendance of 11,123 pupils, or of 22,073 on the school rolls. According to the proportion of the Roman Catholic population, this is less than a third of their children of school age. A large proportion of the remainder attend the public schools. Masters of high schools are required to be graduates of universities, and to have had previous experience in teaching. Teachers of public schools must hold a normal school or other recognized certificate of qualification. The principal features of the system of education thus brought into efficient operation have been modelled on those of the states of New York and Massachusetts, and on the normal schools of the Irish National Board of Education. The systems of the other Canadian provinces, with the exception of Quebec, have been framed on this model. In the last-named province, where the great mass of the people are Roman Catholics, the education is in the hands of the clergy, and is avowedly carried on in connection with the Church of Rome. But dissentient or Protestant schools are recognized as a part of the public school system; and the permanency of this state of things is guaranteed by a clause in the Act of Confederation, which excludes it from the interference of the general legislature.

General Remarks.—The position which Canada now occupies as a Dominion formed by a confederation of self-governing provinces, united under a central Government, with its own governor-general, cabinet ministers, senate, parliament, and supreme courts of law,—yet nevertheless remaining an integral part of the British Empire, and

acknowledging the sovereignty of its Queen,—is unique in the history of nations, and strikingly illustrates the adaptability of British institutions to the novel requirements of a free people. The peculiar circumstances resulting from the union of a colony formed under the fostering restraints of French ecclesiastical and civil rule with one of purely English origin, and settled in part by loyalist emigrants from the United States, begot difficulties which were more and more felt as the mother country removed from Canada one after another of the restrictions on self-government. It will form an interesting chapter in the history of Britain in relation to her colonies, to note the freedom with which, when those of British North America had, as it were, attained their majority, they were left to frame a scheme of confederation suited to their circumstances; and when, after free deliberation, it had been matured to the satisfaction of those most directly interested in the results, the Imperial Government received it at their hands, and the British Parliament gave it the force of law. At the very period when this novel experiment in the history of colonization had been carried out to completion, and was open to the test of experience, the vice-regal duties were entrusted to the earl of Dufferin as governor-general of Canada. In the exercise of his duties he has visited many portions of the Dominion; and towards the close of an extensive tour in the summer of 1874, he thus gave expression to the results of his observations:—"Everywhere I have learnt that the people are satisfied,—satisfied with their own individual prospects, and with the prospects of their country; satisfied with their Government, and the institutions under which they prosper; satisfied to be the subjects of the Queen; satisfied to be members of the British Empire. Indeed, I cannot help thinking that, quite apart from the advantage to myself, my early journeys through the provinces will have been of public benefit, as exemplifying with what spontaneous, unconcerned unanimity of language, the entire Dominion has declared its faith in itself, in its destiny, in its connection with the mother

country, and in the well-ordered freedom of a constitutional monarchy. It is this very combination of sentiments, which appears to me so wholesome and satisfactory. Words cannot express what pride I feel as an Englishman in the loyalty of Canada to England. Nevertheless I should be the first to deplore this feeling, if it rendered Canada disloyal to herself,—if it either dwarfed or smothered Canadian patriotism, or generated a sickly spirit of dependence. Such, however, is far from being the case. The legislation of the Parliament of Canada, the attitude of its statesmen, the language of its press, sufficiently show how firmly and intelligently its people are prepared to accept and apply the almost unlimited legislative faculties with which it has been endowed; while the daily growing disposition to extinguish sectional jealousies, and to ignore an obsolete provincialism, proves how strongly the young heart of the confederated commonwealth has begun to throb with the consciousness of its national existence. At this moment not a shilling of British money finds its way to Canada; the interference of the Home Government with the domestic affairs of the Dominion has ceased; while the imperial relations between the two countries are regulated by a spirit of such mutual deference, forbearance, and moderation, as reflects the greatest credit upon the statesmen of both. Yet so far from this gift of autonomy having brought about any divergence of aim or aspiration on either side, every reader of our annals must be aware that the sentiments of Canada towards Great Britain are infinitely more friendly now than in those early days when the political intercourse of the two countries was disturbed and complicated by an excessive and untoward tutelage; that never was Canada more united than at present in sympathy of purpose, and unity of interest with the mother country, more at one with her in social habits and tone of thought, more proud of her claim to share in the heritage of England's past, more ready to accept whatever obligations may be imposed upon her by her partnership in the future fortunes of the empire." (D. W.)

CANAL

NAVIGABLE canals may perhaps be most conveniently treated under two classes, *Barge* or *Boat* Canals, now in many cases almost superseded by railways and *Ship* Canals, which, judging from the stupendous works of this class recently executed and now in contemplation, seem as yet far from having exhausted the important aids they are destined to afford to navigation.

After giving a historical notice of early canals, the following article contains a brief notice of Barge Canals; a digest of general engineering principles applicable to the construction of all canals; an account of Ship Canals recently constructed; and a notice of Ship Canals which have been proposed and are ere long likely to be carried into execution for facilitating ocean navigation.

From the writings of Herodotus, Aristotle, Pliny, and other ancient historians, we learn that canals existed in Egypt before the Christian era; and there is reason to believe that at the same early period artificial inland navigation also existed in China. Almost nothing, however, save their existence has been recorded with reference to these very early works; but soon after the commencement of the Christian era canals were introduced and gradually extended throughout Europe, particularly in Greece, Italy, Spain, Russia, Sweden, Holland, and France.

In speaking, however, of the earliest of these works, it is not to be supposed that they resembled the modern canals now constructed in our own and other countries. Early as inland navigation was introduced, it was not until the

invention of canal-locks, by which boats could be transferred from one level to another, that inland navigation became generally applicable and useful, and it has been truly remarked "that to us, living in an age of steam-engines and daguerreotypes, it might appear strange that an invention so simple in itself as the canal-lock, and founded on properties of fluids little reconde, should have escaped the acuteness of Egypt, Greece, and Rome."¹ Not only, however, had the invention escaped the notice of the ancients, but what is more striking, the several gradations made towards the attainment of that simple but valuable improvement appear to have been so gradual that, like many discoveries of importance, great doubts exist as to the *person* and even the *nation* that was the first to introduce canal-locks. One class of writers attributes the discovery to the Dutch, and Messrs Telford and Nimmo, who wrote the article "Inland Navigation" in Brewster's *Edinburgh Encyclopædia*, adopt the conclusion that locks were used in Holland nearly a century before their application in Italy; while, on the other hand, the invention has been strongly and not unreasonably claimed for engineers of the Italian school, and in particular for Leonardo da Vinci, the celebrated engineer and painter.² Without, however, entering into a discussion of this question, which it is now perhaps impossible to solve, we may safely state that during

¹ *Quarterly Review*, No. cxlvi. p. 281

² *Frisi On Canals*, p. 154.

the 14th century the introduction of locks, whether of Dutch or Italian origin, gave a new character to inland navigation, and laid the basis of its rapid and successful extension. And here it may be proper to remark, that the early canals of China and Egypt, although destitute of locks, do not appear to have been on that account formed on a uniformly level line, unadapted to varying heights. It is very doubtful, indeed, if the use of locks has even yet been introduced into China, intersected as it is by many canals of great antiquity and extent, the imperial canal being about 1000 miles in length. "This canal appears to have been completed in 1289, and is said to extend for a distance of forty days' navigation, and is provided with many sluices, and when vessels arrive at these sluices they are hoisted by means of machinery, whatever be their size, and let down on the other side into the water."¹ Nevertheless the invention of locks was, as has been stated, a most important step in the history of canals; and that mode of surmounting elevations may be said to be almost universally adopted throughout Europe and America. Inclined planes and perpendicular lifts have, it is true, been employed in those countries, as will be noticed hereafter; but the instances of their application are undoubtedly rare.

But without tracing the gradual introduction of canals from country to country, we remark at once that we find the French at the end of the 17th century, in the reign of Louis XIV., forming the Languedoc Canal, designed by Riquet, between the Bay of Biscay and the Mediterranean, a gigantic work, which was finished in 1681. It is 148 miles in length, and the summit level is 600 feet above the sea, while the works on its line embrace upwards of one hundred locks and fifty aqueducts, an undertaking which is a lasting monument of the skill and enterprize of its projectors; and with this work as a model it seems strange that Britain should not, till nearly a century after its execution, have been engaged in vigorously following so laudable an example. This seems the more extraordinary, as the Romans in early times had executed works in England, which, whatever might have been their original use, whether for the purposes of navigation or drainage, were ultimately, and that even at an early period, converted into navigable canals. Of these works we particularly specify the Caer Dyke and Foss Dyke cuts in Lincolnshire, which are by general consent admitted to have been of Roman origin. The former extends from Peterborough to the River Witham near the city of Lincoln, a distance of about 40 miles; and the latter extends from Lincoln to the River Trent, near Torksey, a distance of 11 miles.

Of the Caer Dyke the name only now remains; but the Foss Dyke, though of Roman origin, still exists, and as it is the oldest British canal, the reader may be interested to learn the following facts as to its history. Camden in his *Britannia* states that the Foss Dyke was a cut originally made by the Romans, probably for water supply or drainage, and that it was deepened and rendered in some measure navigable in the year 1121 by Henry I. In 1762 it was reported on by Smeaton and Grundy, who found the depth at that time to be about 2 feet 8 inches.² They, however, discouraged the idea of deepening by excavation. They say they found "the bottom to be either a rotten peat sath, or else a running sand," and that though the deepening of the navigation is in "nature possible," yet it "cannot be effected without removing one of the banks in order to widen the same," which would not only turn out expensive, but would "occasion much loss of time and profit to the proprietor while the work is executing." Nothing

followed on this report; but in 1782 Smeaton was again called in, and deepened the navigation to 3 feet 6 inches, not, however, by widening the canal or dredging, but by raising the water-level 10 inches.³ From that period nothing more was done to enlarge the water-way, or adapt it to increased traffic. Meantime the adjoining Witham navigation having been improved, the defects of old Foss became more apparent, and in 1838 Mr Vignoles was consulted, and made an elaborate report on alternative schemes for increasing the depth to 4 and 6 feet; nothing, however, was done till 1840, when Messrs Stevenson were employed to design works for assimilating the Foss Dyke as far as practicable, both as regards width and depth, to the navigable channel of the Witham. The depth was found to be 3 feet 10 inches, and its breadth in many places was insufficient to admit of two boats passing each other, and for their convenience occasional passing places had been provided. It was resolved to increase the dimensions of the canal, and to repair the whole work. Accordingly it was widened to the *minimum* breadth of 45 feet, and deepened to the extent of 6 feet throughout. The entrance lock communicating with the River Trent at Torksey was renewed, and a pumping engine was erected for supplying water from the Trent during dry seasons, and thus that ancient canal, which is quoted by Telford and Nimmo as "the oldest artificial canal in Britain," was restored to a state of perfect efficiency, at a cost of £40,000, and now forms an important connecting link between the Trent and Witham navigations.

Notwithstanding the existence of this early work, however, and of some others in the country, particularly the Sankey Brook navigation, opened in 1760, it cannot be doubted that the formation of the Bridgewater Canal in Lancashire, the Act for which was obtained in 1759, was the commencement of British Barge Canal Navigation, of which we propose first to treat, and that Francis, duke of Bridgewater, and Brindley the engineer, who were its projectors, were the first to give a practical impulse to a class of works which, under the guidance mainly of Smeaton, Watt, Jessop, Nimmo, Rennie, and Telford, has been very generally adopted throughout the country, and has undoubtedly been of vast importance in promoting its commercial prosperity.⁴

According to Mr Smiles, the barge-canals laid out by Brindley, although not all executed by him, were:⁵—

	Miles.
The Duke's Canal, Longford Bridge to Runcorn.....	24
Worsley to Manchester	10
Grand Trunk, from Wilden Ferry to Preston Brook....	88
Wolverhampton	46
Coventry	36
Birmingham	24
Droitwich	5
Oxford	82
Chesterfield	46

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It is believed that the length of the inland boat navigations constructed in Britain exceeds 4700 miles, and the system has been extensively carried out both in Europe and America. Many of them were made at great cost through hills and over valleys. The Harecastle tunnel on the Grand Trunk Canal, made by Brindley, and afterwards doubled by Telford, is nearly a mile and a half in length, and the Pont-y-Cyssylte aqueduct, on the Ellesmere Canal, over the Dee, constructed by Telford at a cost of £47,000, has nineteen openings 45 feet span, and is elevated 126

¹ Smeaton's Reports, vol. i. p. 74, London, 1812.

² *History of Inland Navigation, particularly those of the Dukes of Bridgewater*, London, 1768; Hughes's *Memoir of Brindley*; Weale's *Quarterly Papers*, London, 1848.

³ Smiles's *Lives of the Engineers*.

⁴ *Travels of Marco Polo*, by Col. Yule, C.B.

⁵ Smeaton's Reports, vol. i. p. 55, London, 1812.