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Thomas McCulloch's Use of Science in Promoting a Liberal Education

ALTHOUGH THERE HAVE BEEN A NUMBER of studies of the Reverend Thomas McCulloch and the influence of his famous seminary, Pictou Academy, on education in Nova Scotia, none have examined in depth McCulloch's attitude toward and use of science in promoting his theory of liberal education.¹ As Jotham Blanchard, one of the Academy's first graduates, argued to Lord Henry Brougham and the British House of Commons in 1830, Pictou Academy was "the only place of learning in the British Provinces to the best of my belief where the physical sciences are taught.... The Pictou Institution...is the only place where a useful and scientific Education [*sic*] can be had and consequently where persons of rational politics can be prepared to meet on general terms with those of contrary principles".² Significantly Blanchard related science to its ideological function. From its inception in the curriculum of Pictou Academy, science was closely allied to a new, more liberal theory of education which was designed to promote both political and social reform.

When he first arrived from Lowland Scotland as a Presbyterian minister in 1803, McCulloch shared with other Protestant clergymen and the oligarchy controlling the Council a respect for literacy, disciplined moderate progress and higher education for the elite governing class. He also shared their anti-Catholicism and, at the request of Bishop Charles Inglis, was persuaded to enter the 1804-10 pamphlet war between Protestants and Catholics in the colony. In his 1808 diatribe, *Popery Condemned by Scripture and the fathers*, against the Reverend Edmund Burke, the Roman Catholic Vicar General in Halifax, McCulloch declared that Protestants believe that the "existence of a Church

1 See Susan Buggey, "Churchmen and Dissenters, religious toleration in Nova Scotia, 1754-1835", M.A. thesis, Dalhousie University, 1981; George A. Campbell, "The Contribution of Thomas McCulloch to the Educational System of Nova Scotia (1803-1843)", B.Ed. thesis, Dalhousie University, 1955; William B. Hamilton, "Education, politics and reform in Nova Scotia 1800-1848", Ph.D. thesis, University of Western Ontario, 1970; D.C. Harvey, "Dr. Thomas McCulloch and Liberal Education", *Dalhousie Review*, 23, 3 (October 1943), pp. 352-62; Claude J. Kedy, "Pictou Academy: from its founding to the present — an important narrative in the History of Education in the Province of Nova Scotia", M.A. thesis, Mount Allison University, 1933; William McCulloch, *The Life and Times of Thomas McCulloch, D.D.* (n.p., 1920); Bruce Francis MacDonald, "Intellectual Forces in Pictou, 1803-1843", M.A. thesis, University of New Brunswick, 1977; George Patterson, *A History of Pictou County Nova Scotia* (Montreal, 1877); J.B. Roald, "Thomas McCulloch and the Pictou Academy Controversy: Man and Events Assessed", *The Journal of Education*, 19 (Spring 1973), pp. 55-62; H.L. Scammell, "The Rise and Fall of the Pictou College", *Pictou Advocate*, 18, 25 May 1928.

2 Jotham Blanchard to Rt. Hon. Brougham and British House, 23 May 1831, MG1, Vol. 553, Item 93, Public Archives of Nova Scotia [PANS].

the passions, and thereby frequently prevent the rash and inconsiderable commission of crime".⁶ Following Lancaster rather than Bell, however, Bromley argued that his institution should instruct children not only in reading and writing but also instil non-sectarian Christian principles. When the Royal Acadian Society was formed shortly thereafter to promote support for the establishment of this school, Alexander Croke, Judge of the Vice Admiralty Court, declined to become vice-president of the society. In a letter published in August, he objected to Bromley's "latitudinarian principles", which he claimed would lead to a "republic of jarring doctrines" and danger to the state. All children should be taught the tenets and forms of the established Church of England, Croke believed, especially in a country with such a variety of religions. This type of education would correct both the eccentricities and excesses to which many other sects had been led and would lessen the corruption of the Church of Rome. It would teach children their duty to God, their neighbours and themselves. Anglicanism was broad enough that all denominations could assent to its tenets.⁷

McCulloch could not let this extreme Tory statement pass unchallenged. In a letter published on 11 September 1813, he stated that it was neither fair nor practical to impose uniformity of religious instruction on the population, nine-tenths of whom were not Anglicans. All Dissenters were owed a "quiet concession of those privileges which the law has sanctioned, as far as these are consistent with the rights of conscience and of civil society". Their allegiance, rather than to an established church, was to the principles of common sense and merit. McCulloch denied that Dissenters were disloyal; "a subject may disapprove of particular laws and institutions of his country, without cherishing a spirit of disaffection to its government".⁸ Nonetheless, McCulloch's opponents became increasingly alarmed over this "artful design to undermine the Church of England and to promote the views of different sectaries".⁹ They gathered their allies and formed an extreme wing of the church and state party whose support became concentrated in the Council.¹⁰ They insisted that church and state were

6 W. Bromley, "On Education", *Acadian Recorder* (Halifax), 3 July 1813.

7 Alexander Croke to W. Bromley in *ibid.*, 14 August 1813. As Judith Fingard notes, the success of Bromley's school finally woke the Church of England clergy to the needs of the poor in Halifax. In 1816 the clergy inaugurated the National school on the approved Anglican (Madras) monitorial plan with the assistance of the Society for the Propagation of the Gospel, which had controlled education for the poor classes in the province since 1751. See Judith Fingard, "Attitudes towards the Education of the Poor in Colonial Halifax", *Acadiensis*, XI, 2 (Spring 1973), p. 17. In Fingard's judgment, the greatest tactical error of the Church was its illiberal attitude towards Secessionist Presbyterians, who early emerged as the most vocal critics of Anglican establishment: see *The Anglican Design in Loyalist Nova Scotia, 1783-1816* (London, 1972), p. 132.

8 Thomas McCulloch to Alexander Croke, *Acadian Recorder*, 11 September 1813.

9 "Vox Clamantis", *ibid.*

10 See Nora Story, "The Church and State Party in Nova Scotia, 1749-1851", *Collections of the Nova Scotia Historical Society*, 27 (1947), pp. 33-57.

presupposes the appointment of certain principles for regulating the faith and practice of its members. For this purpose, he to whom the church belongs has given a revelation of his will in the scriptures; and the revelation Protestants consider as affording a sufficient knowledge of everything to be believed and practised". The Roman Catholic doctrine of infallibility, he concluded, "tends to fetter the minds of men with ignorance and superstition".³ Its oral tradition, which included an array of ceremonial practices, the veneration of relics, the doctrine of transubstantiation, sale of indulgences, and the worship of saints and images, was a "corruption of religion" and designed primarily to promote Popery and deference to priestly authority. In the judgment of McCulloch and many Protestants of his era, this irrational, authoritarian culture had its inevitable denouement in the French Revolution and subsequent Reign of Terror.⁴

The early alliance of McCulloch with the Anglican oligarchy in Halifax, as well as the religious solidarity of Protestants in Nova Scotia, was soon disrupted. Following the model of English Dissenting Deputies, Presbyterian Seceders, led by McCulloch, sought to unite all Protestant Nonconformists in a formal alliance to expand their rights in the province.⁵ The cause of liberal education became a key instrument in this new political strategy. McCulloch first asserted this Nonconformist ideology in a series of newspaper articles defending the initiative of Walter Bromley, a former paymaster of the 23rd regiment, the Welsh Fusiliers, who wished to establish a school in Halifax for the poor based on the British systems developed by Joseph Lancaster and Andrew Bell. Bromley argued in his article, "On Education", in the *Acadian Recorder* of July 1813, that the immediate effects of teaching reading and writing to the lowest class was "to produce a mind for religion and...a degree of reflection from what they read [so that] the mind will gradually acquire a certain control over

3 Thomas McCulloch, *Popery Condemned by Scripture and the fathers: being a refutation of the principal popish doctrines and assertions maintained in remarks on the Rev. Mr. Stanser's examination of the Rev. Mr. Burke's letter of instruction to the Catholic missionaries of Nova Scotia, and in the Reply of the Rev. Mr. Cochran's Fifth and Last Letter to Mr. Burke* (Edinburgh, 1808), pp. 197, 135.

4 Thomas McCulloch, *The Prosperity of the Church in Troublous Times, A Sermon Preached at Pictou, Friday, February 25, 1814* (New Glasgow, 1882).

5 In 1732 the Secession Church was formed in Scotland by evangelicals who objected to the abolition by the Assembly of the Church of Scotland of popular election of ministers. In 1747 the Secession Synod in Scotland itself split into two branches. The Burghers regarded an oath required of burghers in Scottish corporate towns as simply an abdication of Romanism, not as recognition of the Church of Scotland while the Anti-Burghers felt the oath included approval of the Church of Scotland with all its abuses. In 1795 the Presbytery of Pictou was organized by three Anti-Burgher ministers and McCulloch joined their presbytery when he was inducted as minister of Harbour Church, Pictou, in 1804. The schism of the two secessionist groups continued in Nova Scotia, Burghers concentrated at Truro and Anti-Burghers at Pictou, until 1817 when the two groups buried their differences and formed the Presbyterian Church of Nova Scotia.

there is no wonder...the young people in our town be as ignorant as his stots, for the most of their parents have just as little sense: they encourage their children in card-playing and frolicking, and every kind of folly; but where is there one of them that ever bought for them a diverting story book to entice them to read? Saunders further affirms that almost every village in Scotland has its library, and that the thing speaks for itself. Everybody, he says, reads, except ne'er do well vagabonds: and that, not only diverting stories, but the Bible too.¹⁴

Initially, McCulloch had praised the Legislature of Nova Scotia for its enlightened policy regarding education in the province, especially with respect to common and grammar schools. The 1811 Grammar School Act recognized his own grammar school in Pictou and granted him £150 annually from the Legislature. But increasingly he resented the exclusive nature and privileged degree-granting status of King's College, which had been given a royal charter in 1802 and was liberally financed by the imperial and colonial governments. Its faculty and students had to subscribe to the 39 articles of faith as set forth in the Anglican Book of Common Prayer and there were specific rules against students or faculty attending a Roman Catholic or dissenting church. The implication was that dissent was equated with disloyalty. In 1815 McCulloch and his friends therefore launched a subscription appeal in Pictou for an institution of higher learning with by-laws which would set up no religious distinctions and exclude no Christians. Money was subscribed and a memorial requesting incorporation of the Academy forwarded to the Legislature. The memorial clearly stated that the purpose of the subscription was "for providing those means of instruction in those branches of education, which are not taught in the Provincial Grammar Schools, to promote the means of a liberal education for persons of every religious denomination, who wish to improve their minds by literary studies".¹⁵ Thus the Pictou Academy was intended to be a college for Dissenters, in direct competition with King's College.

On 17 February 1816 the Pictou Academy Bill passed unanimously in the House of Assembly, but it ran into opposition from the extreme Tory members of the Council. John Inglis, the acting bishop, was particularly opposed to the Academy because it encroached on the monopoly of King's College to train a local aristocracy for political leadership based on family privilege and membership in the established Church. S.G.W. Archibald, a rising Secessionist lawyer, approached Judge Brenton Halliburton, son-in-law of Bishop Charles Inglis, to find a way to ease the bill through Council. Halliburton guaranteed his support

¹⁴ *Ibid.*, pp. 65, 66.

¹⁵ Memorial of Edward Mortimer, *et al.* to the "Honourable Representatives of Nova Scotia now convened at Halifax", Pictou, 13 February 1815, RG14, School Papers, Vols. 51 & 52, Item 3, PANS.

inseparable and that an attack on the established church was an attack on the constitution. McCulloch's liberal ideology was branded as republican and his political activities with other Nonconformists were seen as fostering revolution rather than reform.

For different reasons McCulloch found it difficult to convince Pictonians about the merits of a liberal education. In a submission to Lieutenant Governor Sir John Sherbrooke for a share of the Arms Fund to create a library in 1815, McCulloch admitted that people from his region at first did not understand the importance of a liberal education for the economic transformation of the colony.¹¹ Although Nova Scotia was just emerging from its pioneer state, he considered it urgent that leaders of society cure "the modes of thinking and habits...[which] imperceptibly enfeeble the community".¹² He was especially concerned with the effect of sudden prosperity and luxury, following the boom years of the Napoleonic Wars, on the average Nova Scotian. In 1821 McCulloch satirized the materialistic mores of his neighbours and their badly educated youngsters in a series of letters written for the *Acadian Recorder*, later published as *The Stepsure Letters*, one of the earliest examples of Canadian humour. In his satire Hob Gosling, a "cute" young man, for instance, aped the genteel respectability of his father by riding races, playing cards or drinking a glass of grog at Mr. Tipple's in order to receive credit from his neighbours for his hard day's labour. Hob's sisters were taught to paint flowers and play upon the pianoforte, but the meat at the Goslings was always ill-cooked and the puddings and pies mere dough. Similarly, the children of Mr. Soakem, left to manage both the farm and their father's tavern while he maintained his reputation of stopping at every tavern on the road, soon began to imitate their father. They gave up farm drudgery and were "always strolling about" visiting their friends. Mr. Soakem's boys eventually became "lazy, drunken vagabonds. His daughters, too, who are really fine looking girls, have become pert, idle hussies, without industry and economy".¹³

Mephibosheth Stepsure, a lame orphan who was adopted by Squire Worthy, illustrated the ideal apprenticeship which McCulloch wished to promote. Because of his lameness, Stepsure was forced to become more efficient in his farming, to keep his tools in their correct places and to stay at home rather than hurry off to his neighbours. His master urged him to learn to read and write. He borrowed books and conversed at length with Widow Scant. As the Reverend Mr. Drone told Stepsure, "an inclination to read is an incalculable gain; that, beside the information and enjoyment which reading affords, it leads to those steady habits which constitute character, and qualify persons for the duties of the social life". Citing his Scottish friend, Saunders Scrantocreesh, Stepsure added:

11 D.C. Harvey, "New Light on Dr. McCulloch", *Journal of Education*, 6 (March 1935), p. 130.

12 "Investigator", *Acadian Recorder*, 24 January 1818.

13 Thomas McCulloch, *The Stepsure Letters* (Toronto, 1960), pp. 31-2.

provided that the Academy was designed for Presbyterians only.¹⁶ His amendment required trustees to declare that they belonged to the Church of England or to subscribe to a declaration professing the Presbyterian Westminster Confession of Faith.¹⁷ Two other Tory leaders of the Council, the Provincial Treasurer Michael Wallace and the Attorney General Richard John Uniacke, offered no opposition to the amendment because they believed that trustees would be limited to members of the Church of England or Church of Scotland and that, since no public funds were requested, the institution would be supported by private subscription. Both mistakenly saw the amendment to the bill as a means of gradually securing the "Anglicans and Kirkmen (Church of Scotland adherents) in a church and state alliance to oppose the challenge of Dissenters more successfully".¹⁸ On 25 March 1816 the House passed an "Act for founding, establishing and maintaining an Academy at Pictou, in this Province".¹⁹

The first trustees of Pictou Academy included McCulloch, S.G.W. Archibald, who was King's Counsel, and the Reverends James MacGregor and Duncan Ross; several of Pictou's leading merchants, Edward Mortimer, Thomas Davison, Robert Lowden and George Smith; Halifax merchant James Foreman; and a number of Presbyterian ministers outside Pictou, the Reverend William Patrick of Merigomish, the Reverends Archibald Gray and James Robson of Halifax. They were charged with the responsibility of drawing up the by-laws and regulations, appointing the officers, hiring teachers, calling executive meetings and administering the business of the Academy. One of their first tasks was to get more subscribers so that land could be purchased and a building erected. They succeeded in gaining the support of a substantial number of other Protestant groups as well as many leading Halifax merchants, including Samuel Cunard, James Fraser, John A. Barry, James Black, James Bain, Joseph Allison, John Young, James Creighton, Thomas Dobson and John Hill, and raised £729 in Halifax alone.²⁰ On 3 July 1817, the two Secessionist branches (Burgher and Anti-Burgher) of the Church of Scotland united to form the Synod of the Presbyterian Church of Nova Scotia and McCulloch was instructed by the Synod to give theological instruction to Pictou Academy graduates who wished to enter the ministry. He was also instructed to chair a ways and means committee of the synod charged with the task of promoting Presbyterianism. In the report of the committee, McCulloch emphasized the importance of the Academy and urged congregations to take out subscriptions on behalf of his

16 Brenton Halliburton to Robert Hay, 2 July 1831, in CO 217/153, ff. 483-559, PANS.

17 Archibald advised McCulloch to accept these changes and have them altered later: MG1, Vol. 554, Item 55, PANS.

18 Brian Cuthbertson, *The Old Attorney General* (Halifax, 1980), p. 90.

19 56 George III, c. 29, "An Act for Founding, Establishing and Maintaining an Academy at Pictou, in this Province".

20 Subscription List for Pictou Academy, March 1818, in Micro, Places, Pictou Academy, Reel 1, Item 14, PANS.

seminary at Pictou. In 1817 the Reverend John MacKinlay, M.A., arrived from Scotland to take McCulloch's place as Principal of the Pictou Grammar School. MacGregor described MacKinlay as "an excellent man, of vigorous mind and hardy body, a good scholar, a fine preacher and a good Christian".²¹ He was to replace McCulloch as the second minister of Harbour Church in 1824 so that McCulloch could devote more time to his Academy.

On 1 January 1817, several Pictou Academy supporters were also involved in the formation one of the first agricultural societies in the rural districts of the province. This was a year before the publication of Agricola's (John Young's) letters promoting agriculture in the *Acadian Recorder* and two years before the incorporation of the Central Board of Agriculture. Twenty-six people joined and the slate of officers included the Reverend Duncan Ross, President, Donald Fraser, Treasurer, and George McDonald, John McLean and Jonathan Blanchard. The society held quarterly meetings at which they discussed a member's written paper on a scientific agricultural topic. In 1818 the first ploughing match in the province was held in Mortimer's field. Through the years the society imported seed grain, agricultural implements and Ayrshire cattle, held cattle shows and gave prizes for the best acre of wheat and other crops. In 1819 its name was changed to the Pictou Agricultural Society and Mortimer was elected President. In 1820 a similar society was formed on the East River and MacGregor appointed Secretary. From an early stage, then, the Pictou Academy supporters were associated with the scientific agricultural campaign of Lowland Scotland.²²

In the fall of 1817 a room was fitted in Peter Crerar's house with plain pine desks, McCulloch was chosen as first President of the Academy and teaching began. In a letter to his friend Dr. John Mitchell, Professor of Biblical Literature at the United Secessionist Theological Hall in Scotland, McCulloch noted that he had already put in an order for £120 worth of books with Mortimer's Scottish partner, William Liddell. He now asked Mitchell to undertake this responsibility. McCulloch also requested Mitchell to fill up the order if short with books on logic, rhetoric, "and particularly the different branches of moral philosophy". He asked that a number of Greek and Latin texts be ordered, a Hebrew Grammar and Bibles, and a number of works by the Scottish common-sense philosophers, Reid, Stewart, Blair, Kames, Allison, Hutcheson and Hume, as well as by the French Enlightenment and English philosophers, Fenelon, Burke, Butler, Locke and Paley.²³ From this list one can see that McCulloch was not opposed to studying the classics, although he wished to broaden the curriculum.

21 James MacGregor quoted in George Patterson, *Memoir of the Rev. James MacGregor, D.D.* (Philadelphia, 1859), p. 412.

22 Patterson, *A History of the County of Pictou*, pp. 297-8.

23 Thomas McCulloch to Rev. Dr. Mitchell, Pictou, 22 June 1818, MG1, Vol. 553, Item 6, pp. 1 & 2, PANS.

His major objection to the program at King's College was its undue preoccupation with classical literature, its Oxford University model. Following the example of Scottish universities, McCulloch suggested in a series of letters written in 1818 to the *Acadian Recorder* under the pseudonym "Investigator" that "a system of education adapted to the present state of this province, would be that whose principal force was directed to bear on the active purposes of life. ...Every scholar should possess a moderate knowledge of [classical] languages. But after all, they are merely the bricks, and mortar of education: after they have been provided, the fabric must be reared". The fabric consisted of knowledge about students' duties in the community. This knowledge could be attained by the well-known Scottish common-sense curriculum: "give them an accurate acquaintance with the operations of their own minds,...teach them to classify their knowledge, and communicate their sentiments, and...furnish them with those just views of the various social relations and duties, and that knowledge of mathematical and physical science, which would be every day useful to the community and honourable to themselves".²⁴ Scottish universities stressed the integral relation between the program of studies and the everyday world. McCulloch therefore frequently deplored the "monkish" boarding school practices of King's, which he judged to be harmful for the character of its students. He also believed that, although professors in a liberal college should be men of learning and respectability, they should live exactly as a member of the community should live. Professors should not be specialists: "If the leading principles of science be instilled into the minds of youth, as the basis of their subsequent improvement in life, it is all that this Province will be able to do for a long time to come".²⁵ In this type of seminary, open to all members of the community regardless of their religious principles, competition and an incentive to improve would be instilled into the future leaders of society to the benefit of the whole community. These principles were embodied in the Scottish system of education, which McCulloch believed to be superior to the English system and more suitable for the majority of the population of Nova Scotia.

McCulloch elaborated on his concept of liberal education in his inaugural address, "The Nature and Uses of a Liberal Education", at the opening of the new Pictou Academy building in November 1818. In typical Scottish common-sense fashion McCulloch began with an analysis of the human mind.²⁶ The principle of curiosity was its prominent and characteristic feature. Thus the human mind was designed for intellectual and moral improvement. In nature

24 "Investigator", *Acadian Recorder*, 28 February 1818.

25 *Ibid.* McCulloch pressed his attack on the exclusivist charter and literary curriculum of King's in a subsequent article: "Investigator", *ibid.*, 25 April 1818.

26 McCulloch's whole curriculum closely followed that of George Jardine, Professor of Logic at the University of Glasgow between 1774 and 1827, who may have taught McCulloch when he attended the university. Jardine signed McCulloch's 1826 petition on behalf of Pictou Academy. Jardine's textbook, *Outlines of a Philosophical Education* (1818 and republished in 1825), McCulloch later ordered for his classes.

man was surrounded by a multitude of objects which could excite his curiosity and lead him to knowledge and social action.²⁷ These endeavours, in turn, helped to form his character. Although pitfalls stood in the way of this natural rational progress towards self-improvement and enlargement of man's intelligence, education was an essential need of every man. McCulloch's outline of the stages of education also mirrored the dynamic historical approach to society of the Scottish philosophers. Man, as an active being, had the capacity to improve his faculties and direct the development of society from a state of barbarism to one of refinement. In the early stages of society, McCulloch noted, education was restricted to a few general principles of conduct merely to cultivate hardy virtues. With the spread of letters and the art of printing more information bombarded civilized society. Protestants welcomed this greater diffusion of knowledge and believed it had a "strong influence upon the intellectual and moral character of man",²⁸ but they recognized that teachers had to become better educated and more skilled at communicating general principles of knowledge to others in a civilized society.

McCulloch relegated those who did not share his progressive outlook almost to a state of barbarism; they were low in the scale of intelligence, often strangers to learning and unable to appreciate its benefits. They lacked a philosophical outlook. With a liberal education the rational principle of curiosity latent in all human beings would be developed. Students would learn to reduce history and natural phenomena to a few general principles. McCulloch, like the Scottish realists, argued that philosophical studies, which encompassed political economy, economics and moral values, should be given top priority in order to cultivate an integrated outlook and an optimistic attitude towards progress. McCulloch mirrored this teleological approach in his section on the nature of man:

Man must be viewed as an intelligent being; and not only possessing powers of knowledge, but placed amid the works of creation, that by exercising their powers, he may increase his knowledge and intellectual excellence. We must consider him as he exists in society, having property, social relations, and an interest in the general prosperity: And we must view society itself, merely as a link in the chain of existence, and equally connected with the past and future ages.²⁹

27 McCulloch never discussed the formal higher education of women. His writings depicted women being educated at home or in dame schools as a preparation for their domestic and child-rearing duties.

28 Thomas McCulloch, *The Nature and Uses of a Liberal Education* (Halifax, 1819), pp. 5 and 6.

29 *Ibid.*, p. 7. This sense of continuity was a prevalent notion in the eighteenth century: see Arthur O. Lovejoy, *The Great Chain of Being, A Study of the History of an Idea* (Cambridge, 1948), ch. VI.

But man could not make apt judgments about the appropriate actions he should take without a wide, general knowledge of such modern concepts as the division of labour or the degree of excellence which could be achieved by specialization, ideas which McCulloch had learned from the writings of Adam Smith.³⁰

As in his previous articles for the *Acadian Recorder*, McCulloch stressed the importance of a liberal education for the training of those entering the learned professions. He now added further Scottish common-sense arguments: good laws were needed to protect life and property and to promote public utility; the complexity and diversity of modern society required equity in law enforcement; the health of society required a distinct office and an appropriate training for surgeons; qualified clerics needed a thorough education and ability to communicate knowledge. McCulloch included a characteristic Presbyterian emphasis on discipline and church government in his concept of liberal education: "In every place where the apostles preached the gospel with success, they introduced the order of the church...they ordained elders and enjoined that established rules should be in future observed; so that the only call to preach the gospel is the call of the church...a connexion of means and ends pervades the whole christian [*sic*] system".³¹ Thus, even in the early church, knowledge and training were emphasized rather than supernatural revelation and enthusiasm. McCulloch believed that if liberal education were more widespread among the population of Nova Scotia, illiterate clergymen would have less appeal and more respect and status would be accorded to the middle class and to professionals like himself.

Throughout their writings McCulloch and his Scottish common-sense forebears gave the teaching of science and the scientific method a high priority. Influenced by the method of introspection of John Locke and the social philosophy of Anthony Ashley Cooper, Third Earl of Shaftesbury, they admired the highly systematic and integrated approach of the scientific method, which they proceeded to apply to society. For McCulloch, the object of education was not merely knowledge, but science. From individual objects and circumstances, man first induced the materials of knowledge (*genus*) and then proceeded to a knowledge of an abstract truth or principle (*species*): "These principles are the primary objects of science", McCulloch wrote, "which, in its various parts, constitutes the materials of a learned education.... A general principle applies equally to what passes within our own observation and to every other case of the same nature".³² Facility in ordering the flux of human experience as well as natural phenomena into general principles of understanding, classification or social action, became the characteristic mark of a liberally educated person. It was valued by the Scots because it complemented their own Presbyterian

30 Further ideas derived from Adam Smith's writings on political economy can be found in another "Investigator" article written by McCulloch in 1821 for the *Halifax Journal*: see MSS in MG1, Vol. 554, Item 12, PANS.

31 McCulloch, *The Nature of Liberal Education*, p. 13.

32 *Ibid.*, p. 16.

theology, which stressed both good order in Church and State and an integrated approach to all aspects of society.

McCulloch also held out the public utility and opportunity for advancement offered to middle-class Dissidents by means of this new educational program. Their newly developed

intelligence, by enlarging the sphere of usefulness, amplifies also the pleasure of doing good. Besides, education communicates a dignity of the human character, which neither rank nor wealth is sufficient to purchase; and it may be further observed, that, in this province, it presents prospects well calculated to concentrate the energies of your minds upon literary studies. The present state of the learned professions affords extensive scope to men of talents and literature.... this province now exhibits many proofs of a desire for literary improvement: and very soon, in this as in other countries, ignorance will find its own station; and natural abilities cultivated by literary studies, raise their possessors to the first rank in society and to the principal offices of honour and profit.³³

But in concluding his address to his students, McCulloch emphasized that at the root of his conception of liberal and scientific education was a moral outlook which he hoped would instil “goodness of heart and rectitude of conduct. There is also a higher tribunal at which your character must soon be weighed; and there the heart purified by the wisdom from above, and full of mercy and good fruits, alone is approved”.³⁴

One of the students who must have listened attentively to McCulloch’s words was Archibald Patterson, described by his classmate, Robert Patterson, as “among the most promising of all the students”.³⁵ Fortunately seven of Arch Patterson’s essays from McCulloch’s philosophy class of 1819-20 survive. They include two essays on scientific subjects: “Essay 1st on the General Qualities of Matter”, and “Essay 2. on Gravitation”. They both reflect McCulloch’s goals for his scientific lectures, the importance of classification and the understanding of general scientific principles. But these essays are mere introductions to the subject and do not suggest the use of any scientific equipment, even though McCulloch began purchasing his philosophical apparatus in 1819.³⁶ In the first

33 *Ibid.*, p. 23. Two other drafts exist of McCulloch’s concept of liberal education. They elaborate and frequently state his ideas more strongly. See “Lecture on Education”, MG1, Vol. 552, Item 107, and “Theological Writings”, MG1, Vol. 555, Item 30, PANS.

34 McCulloch, *The Nature of Liberal Education*, p. 24.

35 Robert Patterson to the Reverend George Patterson, 12 December 1846, p. 2 in MG9, No. 31, Scrapbook Collection Rev. George Patterson, p. 22, PANS. Robert Patterson believed that his philosophical classes began in 1817 or the first part of 1818.

36 This first order for philosophical apparatus apparently cost the trustees £200. See Petition James McGregor, *et al.*, to the House of Assembly, March 1820, in RG14, School Papers, Pictou Academy, Vol. 51 & 52, Item 10, p. 1, PANS.

essay Patterson reviewed the Cartesian concepts which McCulloch had outlined in his lecture as the main properties of matter — length, breadth, thickness, divisibility, figurability, solidity, porosity and elasticity. He explained each property and gave a few examples for each. Patterson concluded with a warning to the reader: “As the knowledge of philosophers respecting matter is as yet very limited There [sic] may be other general qualities which have not yet been discovered”.³⁷ The second essay reflected the Newtonian foundation of his mentor. It dealt with the definition of gravity and basic physical notions of weight, mass and velocity, and included several examples of each. For instance, in discussing velocity of gravitation in proportion to the rate of descent of a falling body Patterson stated that at twelve miles distant from the surface of the earth the body would fall three miles in one minute and would reach the surface of the earth in two minutes because “when it has descended these three miles it has acquired a velocity which will carry it twice as far as it did in the first minute which together will make the twelve miles”.³⁸ He concluded the essay with an explanation of the centre of gravity. Both essays demonstrate that at least Arch Patterson had been exposed to a few concepts of physical science and would therefore be able to converse with scientific language.

McCulloch attempted to reinforce this scientific instruction in 1821 with natural science field trips. Unfortunately, the students completely disappointed him. They caught a number of moths but, through their lack of knowledge, damaged the specimens. He therefore worked with his family and began systematically collecting and preserving insects of the region. McCulloch donated this entomological collection to the University of Glasgow, his *alma mater*, and in 1822 the University awarded him a Doctor of Divinity honorary degree for his work in the colony. McCulloch was also accepted into the Wernerian Society of Edinburgh in 1823 and began plant exchanges with the Scottish naturalist Patrick Neill. Unfortunately, McCulloch was forced to sell his next family collection to alleviate the increasing indebtedness of the Academy. By 1828 his Pictou Academy museum was “filled with birds and beasts the side of a room thirty-three feet long and ten feet high [and was] the first thing of the kind in the province”.³⁹ McCulloch was visited in 1829 by the new Lieutenant Governor, Sir Peregrine Maitland, who “expressed himself very much pleased [and] declared he had no conception of the existence of any such thing [the philosophical apparatus and the museum] in the province”.⁴⁰ This

37 Arch Patterson, “1. Essay 1st on the General Qualities of Matter”, in “Essays on Various Subjects”, Vol. 2, 1820, dated 1 December 1819, p. 9, Micro: Places, Pictou Academy, Reel V, PANS.

38 Arch Patterson, “Essay 2. on Gravitation”, dated 20 January 1820, p. 7, in *ibid.*

39 Thomas McCulloch to James Mitchell, 5 July 1828, MG1, Vol. 553, Item 35, PANS. This first collection was placed in the Hunterian Museum of the University of Glasgow. Through these collections McCulloch was able to “cash in” on a natural history craze which was just beginning in Europe.

40 McCulloch to James Mitchell, 4 September 1829, MG1, Vol. 553, Item 43, PANS.

second collection so impressed John James Audubon when he visited Pictou in 1833 that he pronounced it the finest in North America and was pleased to accept gifts of birds, shells and minerals from McCulloch.⁴¹ Audubon's visit proved particularly important for McCulloch's son, Thomas Junior, who collaborated for years with the eminent naturalist, sending many samples of Nova Scotia bird life to him in New York.

These scientific endeavours spearheaded by a college followed a practice which began as early as 1794 in Ayr, Scotland, when the town invited subscriptions for a new type of scientific education to be given in a reorganized post-secondary institution called an academy. Instruction on scientific subjects was to come after the school's classical course and to provide a substitute for attendance at university.⁴² In fact, the curriculum of the new academies in Scotland was designed as a direct attack on the program of studies and teaching of Scottish universities, which were painted by academy promoters as cultivating speculative and indolent habits as well as preparing students only for the learned professions. Like Perth Academy (established in 1759-60), these later 18th century academies were aimed at the sons of tenant farmers and of the middle-class merchants who were thriving from Scotland's rapid commercial and economic growth. Besides the advantages of a more practical curriculum, the Scottish promoters argued that the academies offered cheaper education, better supervision of students and teachers who were less conscious of rank and behaved more as schoolmasters. There were two major differences between the earlier Perth Academy and these later institutions. Perth had a separate local college for higher instruction, equivalent to the universities in its level of instruction. The later academies were part of a composite school unit and offered a practical training at a level intermediate between the grammar school and college.

When establishing Pictou Academy, McCulloch had followed the earlier Perth model. His enemies, on the other hand, promoted the model of the later academies. Nonetheless, these academies did have an indirect influence on McCulloch's thinking. When the academies proved a threat to Scottish universities, the universities of Edinburgh and Glasgow began to extend the teaching of private classes and of extra subjects, particularly in the newer fields of science. These large classes proved to be a source of steady income for the faculty. By 1826 chemistry lectures, replete with laboratory demonstrations, became a fashionable fad for adults. McCulloch, in Scotland at this time to raise more funds for his beleaguered Academy, studied the techniques of these

41 This second collection was offered to the province for £500 but, on being refused, was disposed of in London. The third collection was assembled while McCulloch was Principal of Dalhousie College and was intended to illustrate lectures in natural history, as well as form the nucleus of a provincial museum. Later his son presented it to Dalhousie. See Harvey, "Dr. Thomas McCulloch and Liberal Education".

42 Donald J. Withrington, "Education and Society in the Eighteenth Century", in W.T. Phillipson *et al.*, eds., *Essays in Scottish History in the Eighteenth Century* (Edinburgh, 1970), p. 177.

university lecturerers. He purchased more second-hand apparatus from Professor Reid, a classmate of his from the University of Glasgow, and ordered a number of scientific works, particularly in chemistry. They included 21 copies of Millar's *Chemistry* @ 1/6s; Murray's 2-volumed *Chemistry* @ 3s.; *The Chemist*, 2 volumes @ 3s.; 1 copy of *The Journal of Science*, 3 volumes @ 4/6s.; and Boswell's *Chemistry*, 2 volumes @ 2s.⁴³ Since he ordered multiple copies, probably to be used as textbooks for his senior students, it could be assumed that McCulloch began his scientific lectures on a regular basis to his students when he returned to Pictou Academy in 1826.

In May 1827, McCulloch delivered his own series of public scientific lectures in Pictou. Apparently the first lectures of their kind in Nova Scotia, they covered the topics of magnetism, electricity, galvanism and pneumatics.⁴⁴ Three years later, after many misgivings about his ability and the reliability of his patched-up equipment,⁴⁵ McCulloch commenced a series of 21 lectures in natural philosophy at the Halifax Exchange Coffee House. Joseph Howe, the editor of *The Novascotian*, remarked after his first lecture that the series promised to become one of "the leading topics of discussion in town, and [one of] the most attractive novelties of the season. He...was listened to with much interest by a numerous and respected company. The large room in the exchange was filled by the auditory, and an equal number attended the day classes".⁴⁶ McCulloch's lectures, Howe reported on 3 March, continued to be well attended. When they ended in mid-April, the members of McCulloch's evening class showed their appreciation by presenting him with a gold watch. The day students gave him a snuff box.

McCulloch's public science lectures were significant for a number of reasons. They were a means of supplementing his scanty income, especially at a time when the Academy was in serious financial straits. Between 1820 and 1832 eight bills requesting funds for Pictou Academy were vetoed by Council, and by 1833 the Academy had accumulated a debt of £972 7s 2d. McCulloch's aggressive defence of his institution against the attacks of its enemies had alienated many of his moderate supporters, for instance the Baptists, throughout the province and he undoubtedly hoped, as Howe put it, that liberal-minded people in the community would be able to rise above "the conflicting views and opinions of the friends and enemies of the Pictou Academy" and recognize that he had the "talent and experience sufficient to make his lectures rich intellectual treats, such as have seldom, if ever, been presented to our townsmen".⁴⁷ By reaching a

43 MG1, Vol. 550, Item 56, PANS. Professor Reid could not have been Thomas Reid, the famous common-sense philosopher, as he had died in 1796.

44 *Acadian Recorder*, 12 May 1827.

45 Thomas McCulloch to James Mitchell, 21 November 1829 and 3 December 1829, MG1, Vol. 553, Items 45 and 46, PANS.

46 *The Novascotian*, 18 February 1830.

47 *Ibid.*, 20 February 1830.

consensus on general principles, common to all mankind, McCulloch and his common-sense mentors hoped that people could learn to bury their differences of party or faction, agree on a moderate course of social improvement and work together for social change. Science was to provide the common ground for a transformed society.

Six of McCulloch's original 21 lectures survive in extensive note form.⁴⁸ They follow a common pedagogical pattern. McCulloch introduces the main concepts to be discussed, cites major authorities in the field, illustrates what he is talking about with an experiment and invariably closes with a general principle, which is often allied to the providential wisdom of the deity. For instance, chemistry is defined in his introductory lecture as "a branch of that system of general principles or laws to the operation of which the deity has subjected matter in its countless diversity of forms and changes".⁴⁹ Like many of his contemporaries, who also followed in the tradition of Isaac Newton, McCulloch linked natural philosophy with Christian theology.

McCulloch was more concerned with the technique rather than the subject matter of science and he emphasized the moral and societal advantages of an ordered collection of facts, as Lord Bacon had taught. In all his lectures he noted the value of theoretical chemical research to the world of change in which his audience was living and the future possibility of the control of nature. Great Britain, for instance, had reduced its dependency on foreign imports in porcelain and other products and had achieved unprecedented manufacturing success due to the application of chemistry to society. Science, then, provided a key tool to man in the transition towards industrialization. But to change his society man had to learn to think in more abstract terms. This educational transformation could be assisted by means of a more widespread knowledge of science. McCulloch introduced his audience to the nomenclature of chemistry, Newton's theories of attraction and repulsion, Cartesian conceptions of the properties of matter (extension, divisibility, figurability, solidity, porosity, and inertness), and Lavoisier's caloric view of combustion. Although McCulloch mentioned the work of John Dalton and his minute particles (atoms) in his first lecture, his subsequent lectures make no reference to Dalton's 1807 Edinburgh lecture in which he first introduced the notion of indivisible particles, rejected the unity of matter and dismissed short-range forces. McCulloch remained traditionally Newtonian. In his first three lectures he illustrated the practical advantages of

48 Lecture No. 1, "Chemical Lectures in Halifax — Introductory Lecture", has three versions, Items 76, 111 and 106; the latter (106), judging by the firm handwriting, is probably the final version. Lecture 2, "Nature of Matter", is Item 77; Lecture No. 3, Item 78; and Lectures 4-6, Item 83. Another lecture on "Electricity", Item 91, is not labelled as being in the series, but was probably part of McCulloch's 1827 Pictou lecture series. Included in the McCulloch manuscript file is one entitled "Course 1. Delivered to the divinity students when they attended in the evening", and "Science test", presumably for McCulloch's natural philosophy class at the Academy, MG1, Vol. 552, PANS.

49 McCulloch, "Introductory Lecture", MG1, Item 76, Vol. 552, p. 1, PANS.

chemical principles by demonstrating the chemical processes involved in the making of plaster of paris and epsom salts.

In lectures four to six, McCulloch explained Lavoisier's caloric, "that element which produces in us the feeling of heat", and acknowledged that there were two theories which attempted to explain heat: the fluid theory, derived from Newton, and the motion theory, which denied the *material* existence of heat and claimed that all heat was merely a *sensation* produced by the vibration of minute particles. Rather than elaborating on these theories, however, McCulloch attempted to capture the essence of the chemical revolution, its conceptual change from a qualitative account of physical processes to an emphasis on quantitative description of substances, especially through the use of scientific instruments. Although common sense would indicate, for instance, that the feeling of heat was relative (illustrated by the immersion of one hand in cold and the other in hot water and then testing both in water of intermediate temperatures), the thermometer demonstrated that a quantity of caloric can be accurately measured. Both the thermometer and Wedgwood's pyrometer were based on the principle that the expansion and contraction of bodies correspond to the temperature to which they are exposed. Other physical phenomena could also be measured. Specific gravity, or the density of matter, could be gauged by placing bodies of equal bulk, such as a gold piece and a cork, in distilled water and measuring the displacement of the water. McCulloch showed his audience how an hydrometer measured the specific gravity of liquids, such as alcohol. He then pointed out the necessity of spirit dealers keeping alcohol at a constant temperature in order not to weaken its specific gravity.

McCulloch's emphasis on general principles and his stress on an extensive series of facts reduced to luminous order demonstrated his enlightenment concern for rationality. The more abstract and mathematical scientific models, which were increasingly finding favour with chemists, would not have served McCulloch's purpose since he wished science to provide a moral model for mankind which would overthrow the shackles of superstition and episcopal authoritarianism. By cultivating a taste for scientific curiosity about the physical world, by inculcating through scientific experiment and collection habits of accurate observation, and by constantly subsuming these facts to general providential principles, McCulloch hoped that Nova Scotians would acquire intellectual self-discipline and respect for duty. They would thus eliminate their current ignorance, materialism and pleasure-loving ways. The process of scientific study, McCulloch believed, would lead them towards better habits of work and thus would increase material prosperity in the province. Finally, general principles, illustrated abundantly in scientific analysis and synthesis, would serve as models for political judgment; people would learn to rise above their particularistic self-interest and serve a Higher Reality in their everyday lives.

It is difficult to estimate the immediate impact of McCulloch's lectures.

Although many members of leading Nova Scotia families, such as Charles, W.B. and Joseph Fairbanks, James and Thomas Murdoch, J.D. and John Archibald, George P. Lawson, as well as Pictou Academy supporters George Smith, Thomas Dickson and Joseph Howe, were included in the list of 83 people who attended McCulloch's evening class, no evidence exists as to their reaction to the lectures. There were no letters written to the Editor either praising or criticizing them, although one of McCulloch's former students, Charles Archibald, wrote to him in 1837 stating that in his subsequent studies abroad he heard "many of the first scientific men of the age, and without flattery I can say that the course of Lectures on Chemistry which you were delivering when I left Halifax nearly six years ago, would bear comparison with any I ever attended".⁵⁰ Judging by the lack of public criticism of these lectures, their repetition subsequently in Halifax, Charlottetown, Saint John and Newcastle, McCulloch probably was right to believe that they had engendered "a kindly feeling [and...] that my lectures were supposed to have done more good to the academy than anything that previously happened".⁵¹

In fact, in the short term, the science lectures of McCulloch were more important for their sociological than for their scientific significance. They served as a useful tool to promote a reform ideology and as an instrument to advance McCulloch to a position of eminence in the community. In 1838 he was appointed to the presidency of the newly opened Dalhousie College, despite strong objections from the extreme members on the Legislative Council. Certainly, a number of young men were strongly influenced by McCulloch's leadership in the promotion of science; several pursued their scientific interests either professionally or as amateurs long after they had graduated from Pictou Academy.⁵² Many of McCulloch's students became teachers in the district of Pictou and they probably spread his views about science throughout the community.⁵³

But it was the distinction McCulloch and his Pictou Academy graduates gave to science at Dalhousie College that proved the most long-lasting of McCulloch's influences. On his appointment McCulloch wrote to Charles Archibald that it was "requisite to render the College a scientific institution. To give its

50 Charles Archibald to McCulloch, 18 November 1837, MG1, Vol. 553, Item 137, PANS.

51 F.C. MacIntosh, "Some Nova Scotian Scientists", *Dalhousie Review*, 10 (1930-1), p. 203. In the McCulloch quotation cited by MacIntosh, McCulloch adds: "[The lectures] brought me into contact with numbers in the higher circles to whom I had been sadly misrepresented, and who did not find me that arrogant and violent man they had heard me to be" (p. 203).

52 See Clelia Pighetti, "William Dawson and Scientific Education", *ibid.*, 60, 4 (Winter 1980-81), pp. 622-33; Allan C. Dunlop, "Pharmacist and Entrepreneur, Pictou's J.D.B. Fraser", *The Nova Scotia Historical Quarterly*, 4, 1 (March 1974), pp. 1-21 and "The Pictou Literature and Scientific Society", *ibid.*, 3, 2 (June 1973), pp. 99-116.

53 In 1822, for example, eight of 15 members in McCulloch's Natural Philosophy class of the previous year became teachers in the District of Pictou. D.C. Harvey, "English Schools in Nova Scotia, 1811-25", *Journal of Education*, 5 (May 1934), p. 475.

students general intelligence, it ought to contain every kind of natural production to be found in the Province, and as much as possible from other quarters".⁵⁴ When McCulloch died and the first professor of natural philosophy, the Reverend James MacIntosh, resigned in 1843, Thomas McCulloch Junior was hired to teach the 11 students in attendance. In 1848 the College became a high school under Thomas' headmastership. However, in 1863, Dalhousie College reopened on principles proposed by William Dawson, a famous Pictou Academy graduate, geologist and Principal of McGill College at that time. Thomas McCulloch again taught the natural philosophy class and when he died in 1865, the subject was taught by another of his father's pupils, the Reverend James Ross, who became the second President of Dalhousie (1863-85). Another Pictou graduate, J.J. MacKenzie, was offered the first chair in physics in 1878. He and two other Pictonians, Herbert Bayne and Archibald Purves, together with J.G. MacGregor, grandson of the Reverend James MacGregor, in 1873 were probably the first Nova Scotians to take post-graduate work in Europe. MacGregor was the first beneficiary of the George Munro Chair of Physics, in 1879 endowed at \$2,000 by another Pictonian, George Munro, who had gained his wealth in the publishing business in New York. MacGregor and two later Pictou Academy graduates, G.H. Henderson and J.H.L. Johnstone, attained high honours for Dalhousie in the field of physics and in the promotion of science in Canada.⁵⁵ Another Pictou Academy graduate, Ebenezer MacKay, became the second MacLeod Professor of Chemistry and Mineralogy at Dalhousie in 1896, succeeding the founder of the Department, George Lawson. By this time the Chemistry Department with 100 students had its own laboratory on the second floor of the new Forrest Building. A Faculty of Pure and Applied Science was advertised, heralding the teaching of engineering classes at Dalhousie. By the end of the century, then, McCulloch's dream of science providing Maritime students with a general and a practical "intelligence" had indeed been achieved.

54 Thomas McCulloch to Charles D. Archibald, 24 April 1838, in McCulloch, *The Life of Thomas McCulloch*, p. 173.

55 J.H.L. Johnstone, *A Short History of the Physics Department Dalhousie University, 1838-1956* (Halifax, 1971). Herbert Bayne returned to Dalhousie in 1877 to teach in the Department of Chemistry under Professor George Lawson, the first professor (1863) to be appointed to the field of chemistry in Canada. Bayne left Dalhousie University in 1879 to become Professor of Chemistry at the Royal Military College, Kingston. What was left of Pictou Academy's "philosophical apparatus" was used between 1838-55 by Dalhousie's Department of Chemistry until a major fund-raising drive gleaned \$2500 in 1879 for new apparatus. Walter Chute describes McCulloch's original equipment as "apparatus to provide demonstration lectures on the alkalis, alkaline earths, gases and the oxyhydrogen blowgun, the argand lamp and a variety of demonstrations based upon a 'galvanic apparatus' and an air pump". However, even McCulloch as President in 1839 reminded the Board of Governors that this apparatus was "vastly deficient". See, Walter J. Chute, *Chemistry at Dalhousie, a History of the Chemistry Department, Dalhousie University* (Halifax, 1971), p. 3.