

Jacob Abbott (1803-1879): lighting the way for youth.

W. P. Palmer.
Associate, Curtin University

ABSTRACT

Jacob Abbott was born in Hallowell, Maine, on 14 November 1803. He was the second of seven children and eldest son of Jacob and Lydia Abbot (note the different spelling of the name). He had a happy childhood with loving parents. Jacob and each of his four brothers attended Bowdoin College, near Brunswick, from which they graduated and all became ministers and/or teachers. He studied at Andover Theological Seminary in 1821, 1822, and 1824 and he was a tutor there in 1824-1825. From 1825 to 1829, he held a position as professor of mathematics and natural philosophy at Amherst College. This basic experience in teaching and research in the sciences helped his future career. His life spanned several careers, as a school and university teacher, as a headmaster, as a pastor, as a children's writer and as a journalist.

Although the majority of his writings (more than two hundred books) were for young children on topics other than science, he also produced a series of books for children of primary/early secondary age which were exceptionally popular. The hero of many of these books is Rollo, a young boy who is the central character. Rollo is helped by his Uncle George (and others) to carry out experiments and discuss them. There are a number of articles that review Jacob Abbott's merits as the major children's author of the period. However he was also an influential educator of boys and girls who communicated a scientific view of the world to children within his fiction. He wrote children's books explaining scientific principles such as his series on museums, heat, light, air and water. He also communicated to adults through technical and travel articles in *Harper's Monthly*.

Jacob Abbott was influential in science communication and should be remembered as one of those who lit the way towards greater understanding for all in science.

Jacob Abbott (1803-1879): lighting the way for youth.

W. P. Palmer
Associate, Curtin University

SOURCES

The main source of information about Jacob Abbott as a children's writer who wrote in part about science for children, but also wrote about travel and science in *Harper's Monthly* for adults, is Abbott's own writing. He also wrote for adults about education generally and about treating children sympathetically. He receives virtually no mention in dictionaries of science or biographies of scientists or the wider scientific literature. Yet he was a significant voice in helping children understand and take an interest in science. The best biography of Jacob Abbott was written as an introductory section of a memorial edition of one of his first books called *Abbott's Young Christian* written mainly by his son Edward. There are other family portraits of him, one written by his son, Lyman Abbott. There is a brief one chapter biography in a book by Jennie Lawrence Pratt of Maine Writers Research Club. Because Jacob Abbott was an important children's author, much of the secondary literature relates to his stories and religious writing with only occasional mention of his scientific writing. Complete online copies of most of his books can be obtained via *Book Google*, the *Internet Archive* or the *Hathi Trust*, whilst most of his articles for *Harper's Monthly* can be obtained from the periodicals section of *The Nineteenth Century in Print* site. The internet has opened the way to the detailed study of nineteenth century science writers as much primary source material is available to scholars anywhere in the world.

JACOB ABBOTT'S BACKGROUND

Jacob Abbott was born in Hallowell, Maine on 14 November 1803 to Jacob and Lydia Abbot. He was the second of seven children and eldest son of Jacob and Lydia Abbot (note the different spelling of the name). He had four brothers and two sisters. He was descended from George Abbot, a Yorkshire Puritan, who emigrated to New England in 1640 (Abbott and Abbott, 1882, p. 2). His parents, Jacob and Lydia Abbot moved to Hallowell in 1801, by wagon from Concord, New Hampshire, to Boston and then by boat from Boston. Jacob Abbott's father was Jacob Abbot 2nd (born in 1776) and his grandfather was Jacob Abbot 1st (born 1746). When he lived in Concord, Jacob Abbot 2nd was a first lieutenant in the artillery. His father, Jacob Abbot 1st was a Justice of the Peace (JP) and a business associate of Hon. Samuel Phillips after which he became a trustee of Phillips Academy, Andover. After Jacob Abbot 2nd moved to Hallowell, he worked for various landed gentry in helping immigrants organise into settlements. In 1802 Jacob Abbot 1st joined him. Jacob Abbot 1st was personally responsible for the building of 'Coos Road' through virgin forest. Together with a number of others Jacob Abbot 2nd and Jacob Abbot 1st helped to found and maintain ten or more townships along this route (Abbott and Abbott, 1882, pp. 3-5). It was a time of expansion in Maine. Jacob and Lydia Abbot were, 'the strictest class of Christians', according to Jacob's brother John and they impressed upon their children the importance of a Christian life (URL: Johnson, D).

JACOB ABBOTT'S CHILDHOOD AND EDUCATION

Most of Jacob Abbott's childhood was spent in Hallowell, which he always recollected with pleasure. He spent a short time in Brunswick where he attended Miss Buss's school. In Hallowell,

he attended the village academy and had good friends amongst the local children, particularly amongst the Vaughan and Merrick families. This is of interest in that Dr Benjamin Vaughan (a wealthy landowner) had been a pupil of Joseph Priestley, had been an agent for Lord Shelbourne in England and a friend of Benjamin Franklin, thus providing a liberal and progressive atmosphere for the small community of Hallowell (Abbott and Abbott, 1882, pp. 6-8). Jacob Abbott said that this gentle upbringing influenced him all his life.

At the age of thirteen (Spring 1817), Jacob went to Bowdoin College. His grandfather, Jacob Abbot 1st, now lived in Brunswick which was close to the College, and could keep an eye on him. However Jacob Abbot 1st died just before Jacob's graduation in 1820. Jacob usually went home to Hallowell for vacations but for two of them taught locally at a Quaker school. At some point during his years at Bowdoin College, he added the second 't' to his surname, to avoid being 'Jacob Abbot the 3rd'. At college, a friend, T. T. Stone states that Jacob liked the physical sciences, particularly chemistry and mineralogy, followed by mathematics.

After his graduation from Bowdoin College in 1820, Jacob taught at Portland, Maine, and Beverly, Massachusetts and attended a course at Andover Seminary. At Portland Academy, one of his pupils was Henry Wadsworth Longfellow, though in later life, Longfellow had only a vague recollection of Jacob Abbott. In August, 1823, Jacob wrote an article about 'lightning' which was published in the *Essex Register*; this was probably his first publication. Numerous other minor publications followed, usually under a 'nom de plume' of 'Erodore' (Gushing 1885, p. 98). In this period, he had at least a dozen publications. For example, one was entitled 'An Experiment' (Abbott, 1824).

It is interesting to observe that all five Abbot sons followed strikingly similar career patterns; all five graduated from Bowdoin College, all studied theology at Andover Seminary, all became teachers and ministers; all became authors, often co-operating together, except the youngest (Samuel) who died in 1849.

JACOB ABBOTT'S EARLY CAREER

In late 1824, Jacob began his academic career as a tutor at Amherst College (Tyler, 1824, p. 131). In 1825, he was appointed Professor of Mathematics and Natural Philosophy.

It appears from the records that at the meeting for organization in April previous, Rev. Jasper Adams was appointed Professor of Mathematics and Natural Philosophy, and Mr. Jacob Abbott, Associate Professor of Mathematics and Professor of Chemistry. Mr. Adams seems not to have accepted, and at the annual meeting Mr. Abbott was appointed in his place. At the same time a Professorship of Chemistry and Natural History and a Tutorship of Mathematics were established and filled by the choice of Mr. Hitchcock and Mr. Snell (Tyler, 1824, p. 160).

This record is correct in its outcome, though the full biography (Abbott and Abbott, 1882, pp. 28-29) indicates that Jacob also refused the position of Associate Professor of Mathematics and Professor of Chemistry which was offered with a salary of \$600. The reason that he gave for his refusal are that 'the duties of a chemical professorship do not seem sufficiently alluring to induce

me to abandon all my former studies and plans...'; this is perhaps a little surprising as earlier he had found chemistry a very interesting subject.

It may be relevant to note that a higher salary was offered for the position of Professor of Mathematics and Natural Philosophy:

Mr. Jacob Abbott was appointed Professor of Mathematics and Natural Philosophy, with a salary of eight hundred dollars, 'one hundred of which, however, are to be appropriated by him annually, with the advice of the other members of the Faculty, towards making repairs and additions to the philosophical apparatus.

(Tyler, 1824, p. 154)

However, after he had been appointed, he had very little by way of physical science books or apparatus available to assist his teaching as may be seen from the following quotation.

"Prof. Olds, the first incumbent of the chair of natural philosophy, and Prof. Jacob Abbott, his successor, had only the meagre collection already described with which to illustrate the principles of the science. In 1831, Prof. Hovey, the successor of Prof. Abbott, visited Europe for his health; and the opportunity was seized upon by the friends of the College to solicit contributions, and to commission the Professor to purchase books for the Library, and apparatus for the scientific departments.

(Tyler, 1824, p. 617)

Nonetheless, he was evidently an excellent lecturer. Rev Asa Ballard said that he was 'uniformly popular and generally respected'. Of Jacob's teaching he said:

He had a remarkable faculty making the dry study of mathematics attractive. He seemed to have an inexhaustible fund of anecdote and illustration, which he used as felicitously in teaching science as he did subsequently in preparing a popular literature for the young. (Abbott and Abbott, 1882, pp. 32-33)

In 1826, he was ordained, and sometimes preached in the college chapel. On May 18, 1828, Jacob married Harriet Vaughan with whom he had six children (URL: Lach, Edward L., Jr.); she was a childhood friend and was the elder daughter of Mr Charles Vaughan, who had been influential in Jacob's education. Also in 1828, Jacob published his first book, co-authored with Professor N. W. Fiske, entitled *The Bible Class Book*, which was reprinted in an improved format in 1829 (Abbott and Abbott, 1882, pp. 110-111). Over the next few years he wrote more than a dozen books with religious themes.

In 1829 he received an invitation to establish a school (to be called The Mount Vernon School) for young ladies of which he would be principal. The salary would be \$1500 per annum with increases in salary in future years. He took some time to come to a decision to accept the position. There were a number of reasons for leaving his professorship at Amherst College suggested in the main family-written biographies. These were that as a married man, he found it difficult to manage on the salary at the college and his father needed financial assistance; the shortages of books and equipment made teaching difficult; he thought his health was failing. An additional

reason, not presented in the family-written biographies can be found online (URL: Lach, Edward L., Jr). Jacob and four fellow faculty members founded the Pentagon, a club with the aim of considering educational policies and problems. The group suggested curriculum changes at Amherst. The proposed changes were implemented in 1827. Only eighteen of sixty-seven freshmen entering in 1826 registered the new syllabus, so this "parallel course" soon collapsed, perhaps because Faculty members resented the increased teaching load or because there were insufficient resources to complete the experiment successfully. Abbott saw his project stopped by the trustees in early 1829 and resigned from the faculty.

He left Amherst for Mount Vernon School in May 1829 (Abbott and Abbott, 1882, pp. 39-41).

JACOB ABBOTT, MOUNT VERNON SCHOOL AND THE ROXBURY PASTORATE

Mount Vernon School for girls was opened on 1st June 1829 in a house on Mount Vernon Street in Boston. The venture was successful and the school expanded and shifted premises several times in its first few years. Likewise Mr and Mrs Abbott had to move on from rented to more permanent accommodation. He continued his writing, publishing *The Little philosophers* in 1830, *Early Piety* in 1831 and made a start on *The Young Christian* series. His experience of being a headmaster at Mount Vernon gave him confidence to write on educational matters and he wrote *A Description of the Mount Vernon School*, though this was not published, but is now available on the internet (Abbott, 1832). At Mount Vernon, Abbott showed 'his unusual talent for the instruction and government of the young' introducing many innovations which are now commonplace in the educational system. He abandoned 'traditional disciplinary methods' and 'he appealed to the honour and conscience of his pupils by making the school largely self-governing' (Anon, 1936).

His son, Lyman Abbott, gives a brief account of his father's views on the way that children should be treated, different from the harsh methods of his era pointing out that these views can be found in *Gentle Measures in the Training of the Young* (1871a).

Toward the close of his life he published a volume entitled, *Gentle Measures in the Training of the Young*. In this volume he interprets in a very simple form and with many concrete illustrations the philosophical principles on which all his children's books were based (Abbott, L., 1922).

My father was constitutionally a democrat, that is, a believer in self-government, and it was because he believed in self-government that he laid stress upon the duty of the parent and the teacher, to maintain his authority by so exercising it as to develop self-control in his subjects (Abbott, L., 1922).

A number of commentators see Jacob Abbott as one of the early thinkers in what is now a science on its own, educational psychology. Sporer (Abbott & Sporer, 2005) considers that Jacob Abbott was 'an authority on almost every facet of child psychology' and also:

The book most influential in shaping the transition in views on child nurture from 1860 to 1880 was Jacob Abbott's *Gentle measures in the management and training of the young*. Convinced that children could develop upright moral characters and still

retain freedom and a zest for life, Abbott embraced only the more positive features of Darwin... (Singley, 2004).

Several students have fond memories of Mount Vernon School with Abbott as Principal. For example,

At the age of sixteen, she [Elizabeth Stuart] left her father's house to enter the Mount Vernon school, an institution—then existing in Boston, under the care of Rev. Jacob Abbott, in whose family she resided for the greater part of two years. This period was exceedingly fruitful of events which affected her whole character.

(Trusta, 1853, p. 18)

Jacob did not feel that he wished to stay permanently as a headmaster; he had literary ambitions and was receiving offers of literary positions such as editor of a New York paper, *The Observer*; he also wished to offer his abilities to God; finally his health was again troubling him. In 1834, Jacob and Harriet Abbott left Mount Vernon School, after giving the School's trustees a year's notice as they felt that the school's future was assured. Abbott was succeeded by Professor E. A. Andrews (Abbott and Abbott, 1882, p. 54).

Jacob and Harriet Abbott moved to Roxbury, where Jacob accepted the pastorate of a Congregational Church. The following year, he published what became the first of the Rollo series. In early 1835, Jacob handed over the care of the Eliot Church to his younger brother John, but continued to live in Roxbury with his family, preaching locally but mainly engaged in writing more books for children. In 1837 he bought a house in Roxbury, though he and his young family stayed with his father in Farmington during the winter of 1837 and on the land opposite his father's house built a cottage which he called *Little Blue*. During the following year he assisted his brother Charles with the running of a boys' school in Boston.

JACOB ABBOTT'S LATER YEARS

From 1839 to 1843, he, Harriet, and his young family lived in and improved his property at *Little Blue*, in one of the happiest periods of his life, writing yet more books that provided his income. In the spring of 1843, Jacob made his first visit to Europe on the steamship *Britannia*, but on his return his wife Harriet was gravely ill and she died on 12th September 1843. Jacob then leased *Little Blue* to his youngest brother Rev Samuel Phillips Abbott, who used the property to start a school. Between 1848 and 1870 Jacob made about half a dozen trips to Europe. During these and earlier trips he explored the British Isles and much of the Continent and he stored up details of these travels for use in writing his travel and historical books for young people (Pratt, 1924, p. 243). Evidence for the dates of some of these trips can be found from the passengers noted by British newspapers. In 1847, Jacob Abbott's name was announced as arriving on the *Cambria*, having had 'thick weather' during the passage (Anon, 1847). He also returned to England in 1853:

Among the passengers by the Pacific is Gorham D. Abbott Esq, bearer of dispatches, and his brother Jacob Abbott Esq, author of various educational works, chiefly historical. The visit of these gentlemen to Europe is connected with literary and scientific pursuits (Anon, 1853, p. 6)

In such visits to Jacob sometimes met with influential people, such as John Henry Newman of the 'Oxford Movement' who had strongly criticised one of Abbott's early books, *The cornerstone* in *Oxford Tracts for the Times* (No.73) when defending religion against rationalism and citing Abbott as a rationalist (Lightman, 1997, p. 57). When in England in the summer of 1843, Jacob visited Newman unexpectedly and they became friends as Newman wrote 'we parted with a good deal of warm feeling' (Short, 2006, pp. 34–35).

Meanwhile Jacob and his two brothers, Gorham and John, went to New York to start a girl's school called Abbott's Institute. By 1845, the school had grown to two hundred pupils, so they started a boy's school, the Mount Vernon School for boys, nearby. Both institutes prospered and in 1850 Jacob Abbott ceased to be headmaster and became an 'instructor in mathematics, natural philosophy and English literature' (Abbott and Abbott, 1882, p. 87), whilst his brother John became Principal. In November 1853, Jacob married for a second time; his wife was Mrs Mary Woodbury and she frequently accompanied him on his trips to Europe. Mary died in April 1866.

In 1855, after his father and mother had died, he inherited their Farmington property of *Fewacres*, which was opposite his former property at *Little Blue*. Over the next five years he improved the property and after 1870 lived there permanently, in less than perfect health from 1871, until his death on Friday, 31st October 1879 (Anon, 1879).

JACOB ABBOTT'S OPUS AND ITS ADMIRERS

Most biographies of Jacob Abbott claim he wrote more than two hundred books. Various figures follow:

'A complete list of his works would comprise more than 200 titles and many of them are serials.' (Anon, 1879).

'A complete catalogue of his works (which are chiefly for the young) would considerably exceed 200 titles.' (URL: Appleton's Encyclopaedia)

'Number of volumes of which Mr Abbott was exclusively the author180

Number of volumes of which he was the editor or joint author.....31

Total 211' (Abbott and Abbott, 1882, p. 126)

'He had written 180 books and edited or co-authored an additional 31' (URL: Johnson, D.).

'All told, Abbott is credited with 211 books, the vast majority for a juvenile audience' (Pandora, 2009, p. 80).

From 130 to 140 books, in all, were written and published during the 25 years from 1848 to 1872' (Abbott and Abbott, 1882, p. 88).

He was thus writing five or six books each year for twenty-five years as well as travelling and writing journal articles, combined with periods of teaching and school administration. Evidently

he was able to write ‘anywhere and everywhere, dependent on no place, time, mood, convenience or accessory’ (Abbott and Abbott, 1882, p. 105). His writing was mainly fiction; *Appleton’s Encyclopaedia* summarises his total opus as follows: many of Abbott’s books are available as a series comprising several volumes. The first was the *Young Christian* series (4 volumes), followed by the *Rollo Books* (28 volumes), the "*Lucy Books* (6 volumes), the *Jonas Books* (6 volumes), the *Franconia Stories* (10 volumes), the *Marco Paul Series* (6 volumes), the *Gay Family series* (12 volumes), the *Juno Books* (6 volumes), the "Rainbow" series (5 vols.), and four or five other series; *Science for the Young* (4 volumes which were *Heat, Light, Water and Land*, and *Force*); *A Summer in Scotland* ; *The Teacher*. There were also more than 20 of the series of illustrated histories which he wrote with his brother John, and a separate series of histories of America in 8 volumes. (URL: Appleton’s Encyclopaedia)

It should be noted that the *World Catalogue* (www.worldcat.org) has 2375 entries under Jacob Abbott, which includes books, translations and articles by and about Jacob Abbott. There are said to be nine theses/ dissertations about his writing. Abbott’s books were also popular in Britain; in his obituary in *The Times*:

All of his books had an extensive circulation in this country, and nearly all of them were republished repeatedly and in many different forms in England. They were also translated into various languages, both in Europe and Asia (Anon, 1879b, p. 10).

The author of this study, having looked at many of the advertisements for and reviews of Abbott’s books in *The Times* and in British provincial newspapers, has observed that the historic and religious works appear to be advertised most frequently whilst the scientific works and the Rollo books are seldom advertised, as presumably there was little market in England for them. Thus in America, Abbott was recognised for his scientific and educational work as well as for his children’s stories whilst in Britain he was mainly viewed as an American author of children’s literature with liberal religious opinions.

Abbott’s writing brought him admiration on both sides of the Atlantic. Florence Nightingale, the influential nurse, health professional and heroine of the Crimean War, was a great admirer of Abbott’s books.

Her [Florence Nightingale's] experience of religious conversion in 1836 and call to service in 1837 were both shaped by reading the work of an American Congregational minister, Jacob Abbott, ... (McDonald, 2004, p.xii).

Thomas Arnold, British educator, historian and headmaster of Rugby School, was a correspondent of Jacob Abbott (Worboise, 1870, p. 152-153). Also in Britain, Sir David Brewster, a scientist, was familiar with Abbott’s writing. ‘...he [Sir David Brewster] inquired with great interest concerning him [Jacob Abbott], and did not hesitate to say that he knew not a more attractive writer’ (Sprague, 1855, p. 286). In the USA, even President Abraham Lincoln was a fan of Jacob Abbott’s writing:

I want to thank you and your brother for Abbott’s series of Histories. I have not education enough to appreciate the profound works of voluminous historians, and if I had, I have no time to read them. But your series of Histories gives me, in

brief compass, just that knowledge of past men and events which I need. I have read them with the greatest interest. To them I am indebted for about all the historical knowledge I have.

(URL: Makers of History, *quotation by President Abraham Lincoln*)

The quotation from Abraham Lincoln indicates that works designed for children may also be used by adults. One view of Abbott's writing, expressed by Cart (2001, pp. 1546-1547), was that Abbott's 'enormously popular Rollo books were essentially instructional nonfiction masquerading in some very threadbare clothes of fiction.' This view was intended as dismissing Abbott's value as a writer of fiction, yet it does contain a germ of truth. Abbott did indeed intend his fiction to be moral tales which would provide a role model for children in their daily lives and provide factual material that would assist in their instruction.

In 1869, *Harper's magazine* advertised widely that it had procured the services of a number of well-known authors to write copy for them and these included Mr. Jacob Abbott and Professor Elias Loomis on popular science. Appendix 1 (containing Tables 1 and 2) shows that Jacob Abbott had not had a science article published with *Harper's magazine* for 17 years and there was also a gap of 14 years for his travel articles. Harper's had, of course, remained the major publisher of his books over that period as Abbott found that writing books was more rewarding than writing articles. Abbott's fame had increased and from a publisher's point of view having him writing copy for them would greatly increase sales of *Harper's magazine*.

Abbott's beliefs about society were progressive for his time. He rejected the institution of slavery (Quinlivan, 1982, p. 27). He did not seek to excuse 'the acts of injustice and cruelty which have been perpetrated so extensively upon the Indian tribes' (Abbott, 1860, p. 288), though some of his other comments appear to diminish that concern. He had both male and female main characters throughout his writing and his teaching career was at both girls' and boys' schools. Many commentators consider that Abbott opposed corporal punishment in schools and the home, but he considered it necessary in exceptional cases.

I think, however, that corporal punishment ought to be limited to "extreme cases of wilful, deliberate, and malicious disobedience, as the ultimatum, or last resort only," and that those teachers who have not sufficient moral and intellectual ascendancy to govern their schools with this restriction as to corporal punishment ought to engage in some other occupation. (Abbott, 1847, p. 228)

If you cannot govern your child without corporal punishment, it is better to resort to it than not to govern him at all. (Abbott, 1871a, p. 282)

JACOB ABBOTT'S SCIENCE BOOKS AND ARTICLES

Of the various series which Abbott wrote, The *Rollo* series was probably the most popular and this series is usually considered to contain the greatest amount of scientific content. Strangely Jacob wrote 'the first of the Rollo series largely by accident in 1835' (Rodgers, 1978, p. 129). The story is that a publisher's representative had a number of excess engravings and asked Abbott if he could make something of them. He did and the first Rollo book was produced which earned him \$150 (Abbott and Abbott, 1882, p. 117).

In one of the later Rollo books that used travel as a part of Rollo's adventures, Rollo goes to Europe with his parents, younger brother, his cousin Jane and Uncle George, meeting other children, such as Jenny, on the voyage. Abbott had usually visited the countries that Rollo visited in his books, so that real places are described. To illustrate this, one book, *Rollo on the Atlantic*, (Abbott, 1853) will be used as an example as Abbott made this crossing many times. It is the first of the travel adventures and three short extracts will be provided.

EXTRACT 1 The books are intended to be books of instruction rather than of mere amusement; and in perusing them, the reader may feel assured that all the information which they contain, not only in respect to the countries visited, and to the customs, usages, and modes of life that are described, but also in regard to the general character of the incidents and adventures that the young travelers meet with, is in most strict accordance with fact, the main design of the narratives is, thus, the communication of useful knowledge; and everything which they contain, except what is strictly personal, in relation to the actors in the story, may be depended upon as exactly and scrupulously true. (Preface, p. 7)

EXTRACT 2 "There, Rollo," said Jane, "you had better be careful, and not let your tumbler get upset."

"Why, it is nothing but water," replied Rollo. "It won't do any harm. I would as lief have a little water spilled on me as not."

"I should not care about the water so much," replied Jennie;" but I would not as lief have everybody laughing at me as not."

This was a very important distinction, and Rollo concluded that it was, after all, better to be careful. (p. 107)

EXTRACT 3 Navigators, then, at sea, always go out upon the deck at noon, if the sun is out, with a very curious and complicated instrument, called a sextant, in their hands; and with this instrument they measure exactly the distance from the sun at noon down to the southern horizon (p. 160)

Extract 1 is from the preface and spells out Abbott's intention of providing truthful, accurate information. Extract 2 is a conversation between Rollo and a young friend, Jennie, where both are very polite and use the archaic word 'lief', which even in the 1850s was unlikely to be used in children's conversation. Also in the end, Rollo makes a correct moral decision. Finally, Extract 3 is an educational section where a useful scientific instrument, the sextant, is described and its purpose explained. All this is typical of Abbott's writing. A contemporary reviewer of *Rollo on the Atlantic* gave this book a favourable review stating that 'We predict for this series popularity as wide and deserved as either [any] of the author's former publications' (Anon, 1854, p. 267). In the Rollo series volumes with a larger scientific content were *Rollo's experiments* and *Rollo's museum* and the four volumes in *Rollo's philosophy* (*Water, Air, Fire and Sky*).

The little philosopher (Abbott, 1833) was an early attempt at clarifying scientific concepts for young children and Abbott's ideas seem in line with modern teaching methods. His aim was expressed as follows: '... it is not intended to give to children a superficial, and, consequently, useless acquaintance, with subjects and sciences beyond their grasp; but, as its title imports, to teach them to think and to reason about common things (p. 7).'

Several of Abbott's other books contain a high proportion of scientific detail such as *The Harper establishment: or, how the story books are made* (Abbott, 1855) which provides information about the architecture and floor plans of the Harper building and the print technology, including marbling (Wolfe, 1990, p. 105) and culture during the early machine-press age. Chapter 24 of *The Gibraltar gallery: being an account of various things...* includes a description of gold mining (pp. 153- 160) in America. Jacob Abbott interprets the scope of science broadly.

Finally there is his series of four books on scientific concepts written for older children (Pandora, 2009, p. 81) which was the *Science for the Young* series which consisted of *Heat*, *Light*, *Water and Land*, and *Force*. These are all favourably reviewed in *Harper's Magazine*, for example:

Water and Land (Harper and Brothers) constitutes the third volume of Mr. Jacob Abbott's series of *Science for the Young*. It possesses the same features which characterize its predecessors, clearness and precision of statement, amplitude of illustration, and fullness and freshness of scientific fact and theory.

(Anon 1872, p. 297)

In the first volume of the *Science for the Young* series, *Heat* (Abbott, 1871b), Lawrence (more than 20 years old) and John (13 years old) are introduced as new characters, whose adventures are used to explain science content. In the second volume, *Light* (Abbott, 1871c, pp. 108-115), Lawrence and John, visit the Royal Polytechnic Institution in London and watch one of Professor Pepper's lectures on Pepper's ghost. Abbott describes the very entertaining show, which cost one shilling, and points out that at the end of the show spectators were allowed to see how the show was produced (Palmer, 2005). One can be sure that what Abbott writes here as fiction is actually fact. Abbott says of the experience:

The lecturer was the celebrated Professor Pepper, who is distinguished for his tact and skill in explaining and elucidating philosophical principles and making everything clear. (Abbott, 1871c, p. 108)

Very few studies have been made of Abbott's scientific work. The most recent was a study comparing the science in the writings of Samuel Griswold Goodrich and Jacob Abbott (Pandora, 2009, pp. 75-98). Pandora (p. 98) quoted Almira Phelps (Palmer, 2010a), who believed that the 'diffusion of intellectual light' was spread more broadly in America than in Europe, though Europe may have some brighter stars. Pandora considers that this widespread diffusion owed much to the efforts of Goodrich and Abbott. In an earlier study, the writing of Mary Edgeworth was compared with the writing of Jacob Abbott, Rodgers (1978, p. 129) found 'a common loyalty to the moral universe of John Locke and Benjamin Franklin.'

Similarities can also be observed between the career of Joel Dorman Steele (Palmer, 2010b) and Jacob Abbott. Jacob Abbott and Joel Dorman Steele, were both science-orientated in terms of career, each contributed to educational theory and each moved from a career in teaching to a career in writing. Both wrote series of historical books for children as well as science books, sometimes even with similar topics. Both travelled widely, both had bouts of ill health, wrote huge numbers of books and were active Christians whose books were used as basic readings for the Chautauqua adult education conferences.

The feature to be emphasised in this study is the fact that Abbott also worked for Harper's, effectively as a journalist writing articles for *Harper's Monthly*. Appendices 1 and 2 list the main articles that Jacob Abbott wrote during his writing career including very brief comments on them. Table 1 lists the science articles written for *Harper's Monthly*, whilst Table 2 lists the travel articles which he wrote for *Harper's Monthly*. Appendix 2 contains some other articles he wrote for other journals, though there may well be others existing that have not been cited.

CONCLUSION

The interesting and perhaps unique features of Abbott's work was his brilliant communication of religious, educational and scientific principles through both fiction and non-fiction to audiences of all ages, living his own life in accord with what he wrote. He was a science communicator 'par excellence'.

REFERENCES

Abbott, J. (1824). An experiment, *Recorder and Telegraph* (New series), Volume 10, Number 9.

Abbott, J (1832). *A description of the Mount Vernon school in 1832. Being a brief account of the internal arrangements and plans of the institution. Addressed to a new scholar*. Boston: not published (Available by the Internet Archive, Wayback Machine).

Abbott, J. (1833). *The little philosopher, for schools and families: designed to teach children to think and to reason about common things; and to illustrate for parents and teachers methods of instructing and interesting children: with a copious introduction, explaining fully the method of using the book*. Boston: Carter, Hendee and Co.

Abbott, J (1847). Letter March 23 to Mr. Cobb, quoted in *The evil tendencies of corporal punishment as a means of moral discipline in families and schools, examined and discussed*, Lyman Cobb. New York: M. H. Newman.

Abbott, J (1853). *Rollo on the Atlantic* (Rollo's tour in Europe). Boston: DeWolfe, Fiske, & Co., Publishers.

Abbott, J. (1855). *The Harper establishment: or, how the story books are made*. New York: Harper & Brothers.

Abbott, J. (1856). *The Gibraltar gallery: being an account of various things both curious and useful*. New York: Harper & Brothers.

Abbott, J (1860). *Aboriginal America* (American history series). New York, Sheldon & Co.; Boston, Gould & Lincoln.

Abbott, J (1871a). *Gentle measures in the management and training of the young*. New York, Harper & Brothers.

Abbott, J. (1871b). *Heat*. New York: Harper & Brothers.

Abbott, J. (1871c). *Light*. New York: Harper & Brothers.

Abbott, J. and Abbott, E. (1882). *Abbott's Young Christian: a memorial edition; a memorial edition, with a sketch of the author by one of his sons*. New York: Harper and Brothers.

Abbott, J. & Sporer, P. D (2005). *Gentle measures: a renowned 19th century educator discusses effective sympathetic methods of managing children and developing their mental and moral capacities*. Chester, NY: Anza Classics Library.

Abbott, Lyman, (1922). Jacob Abbott, friend of children, extracted from *Silhouettes of My Contemporaries*. New York: Doubleday and Page, at URL: <http://www.readseries.com/auth-a/abb-lym.html>

Anon (1847). News and observation, *Liverpool Mercury* (Liverpool, England), Issue 190, Friday, July 16.

Anon (1853). America, *The Morning Post* (London, England), Issue 24735, Friday, April 1st.

Anon (1854). Review of *Rollo on the Atlantic*, in *The Merchants' Magazine and Commercial Review*, volume 30, page 267.

Anon (1870). Literary notes, *Boston journal of chemistry devoted to chemistry as applied to Medicine, Agriculture, and the Arts*. 4(8)92, (February 1st)

Anon (1872). Editor's Literary Record, *Harper's new monthly magazine*, 44(260)296-303 (January).

Anon (1879a). Other deaths: Jacob Abbott. *The New York Times*, November 1st.

Anon (1879b). Obituary, *The Times*, p. 10; Issue 29731; column E, Friday, Nov 21st.

Anon (1911). Abbott, Jacob. *Encyclopædia Britannica* (Accessed 20/08/2011) at URL http://en.wikisource.org/wiki/1911_Encyclop%C3%A6dia_Britannica/Abbott,_Jacob

Anon (1936). Jacob Abbott in *Dictionary of American Biography*. New York: Charles Scribner's Sons.

Appletons Encyclopedia (2001). at URL: <http://virtualology.com/apjacobabbott/>

Cart, M. (2001). Carte Blanche: fantasy is flourishing, *Booklist*, 97(16)1546-1547.

Gushing, W. (1885). *Initials and pseudonyms: a dictionary of literary disguises*. New York: Thomas Y. Crowell & Co.

Johnson, D. (2011). *Jacob Abbott* at URL: <http://www.readseries.com/auth-a/ab-bio.html> (Accessed 10/08/2011)

Lach, Edward L., Jr. 'Abbott, Jacob'; URL: <http://www.anb.org/articles/09/09-00002.html>; American National Biography Online February. 2000. (Accessed 13/08/2011)

Lightman, B. V (1997). *Victorian science in context*. Chicago: University of Chicago Press.

Makers of History *Jacob Abbott, John Charles Abbott* at URL: http://www.heritage-history.com/www/heritage.php?Dir=home&FileName=series_makershistory.php

McDonald, L. (editor) (2004). *Florence Nightingale on public health care: collected works of Florence Nightingale*. Waterloo, Ontario, Canada: Wilfrid Laurier University Press, p. xii.

Palmer, W. P. (2005). The appeal of Pepper: John Henry Pepper (1821-1900) and his contribution to science education, *Teaching science*, (Journal of the Australian Science Teachers Association) 51(2)14-20 (Winter).

Palmer, W. P. (2010a). Almira Hart Lincoln Phelps (1793-1884): her life, her textbooks and her educational influence, *Proceedings of the Sixth International Conference on Science, Mathematics and Technology Education* [as CD], editors Wen-Hua Chang, Darrell Fisher, Chen-Yung Lin & Rekha Koul, Hualien, Taiwan, pp. 387-396.)

Palmer, W. P. (2010b). Joel Dorman Steele and his influence on American science textbooks, 2010 AAHPSSS Conference, University of Sydney, Friday 9 July to Sunday 11 July, 2010.

Pandora, K. (2009). The children's republic of science in the antebellum literature of Samuel Griswold Goodrich and Jacob Abbott. *Osiris*, 24(1)75-98.

Pratt, J. L. (1924). Jacob Abbott, the author of the Rollo Books, *Just Maine Folks* (Maine Writers Research Club). Lewiston, Maine: Maine Writers Research Club, p. 239-251.

Quinlivan, M. E.(1982). Race relations in the antebellum children's literature of Jacob Abbott, *The Journal of Popular Culture* 16 (1) 27-36.

Rodgers, D. T. (1978). *The work ethic in industrial America, 1850-1920*. Chicago: University of Chicago Press, p. 129.

Short, E. (2006). Bound for Rome, Newman's long goodbye from the Church of England, *The Weekly Standard*, November 6, 12(8) 33-35.

Singley, C. J. (2004). Words for Children. *A Companion to American Fiction 1780–1865*. Samuels, Shirley (editor). London: Blackwell Publishing.

Sprague, W. B. (1855). *Visits to European celebrities*. Boston: Gould and Lincoln, p.286

Trusta, H. [pseudonym] (1853) *The last leaf from Sunny Side*. Boston: Phillips, Sampson, and Company

Tyler, W. S. (1824). *History of Amherst College during its first half century. 1821-1871*. Springfield, MA: C. W. Bryan & Co.

Wolfe, R. J. (1989). *Marbled paper: its history, techniques, and patterns: with special reference to the relationship of marbling to bookbinding in Europe and the Western world*. Philadelphia: University of Pennsylvania Press.

Worboise, E. J. (1870). *The life of Thomas Arnold, DD*. London: Strahan & Co, p. 152-153.

APPENDIX 1

Table 1 Jacob Abbott's scientific articles in Harper's new monthly magazine (1851-1872)

Article title	Reference	Volume (issue) page	Comment
Novelty iron works; with description of marine steam engines, and their construction.	May 1851	2(12) 721-734	A detailed, well-illustrated, technical article
Francis's life boats and life cars	July 1851	3(14) 161-171	Title: Fancis's Life Boats And Life Cars (printing error in title- should be Francis's)
Benjamin Franklin: Early and private life of Benjamin Franklin.	January 1852	4 (20) 145-166	First of two articles about Benjamin Franklin. Abbott sees Franklin as a role model for Americans.
Benjamin Franklin: Public life of Benjamin Franklin	February 1852	4 (21) 289-310	Abbott includes some information about Franklin's scientific experiments.
Armory at Springfield	July 1852	5(26) 145-161	A description of the Springfield and the manufacturing processes in the armory.
The freaks of lightning.	April 1869	38(227) 577-589	Note the 17 year gap in Abbott writing for Harper's. A series of anecdotes about unusual electric discharge.
Deep-sea sounding	May, 1869	38(228) 843-845	Brief article with good illustration.
Military pyrotechnics of former days.	June, 1869	39(229) 35-40	The use of Greek fire in war.
Early aeronautics.(Incorrect page numbers –should be 145-157)	July, 1869	39(230)145-146	A long and detailed article about early balloon flights with excellent woodcuts.
New theory of heat	August 1869	39(231) 322-329	Abbott describes Joule's work on the mechanical equivalent of heat
The spots in the sun.	May 1870	40(240) 818-825	QUOTE 'Enormous flame-like coruscations, in masses larger than this globe, rise, and glow, and wave, and then melt away and disappear.'
The mysteries of a thunder-shower.	June 1870	41(241) 21-34	Rather a protracted explanation.
The ocean steamer.	July 1870	41(242)185-199	Lengthy explanation with good illustrations.
The electric light.	August 1870	41(243) 354-359	QUOTE 'The electric light has already begun to be practically employed...'
The spectroscope	October 1870	41(245) 720-723	Abbott was able to emphasise important new processes- 'spectral analysis opens an entirely new avenue of exploration for man into the realms of nature'
The negative in photography	November 1870	41(246) 845-848	Brief well-illustrated article.
Inveigling nature into a disclosure of her secrets.	December 1870	42 (247)78-80	Finding the velocity of light by the Fizeau method (1850)
Lyell and geology.	September 1871	43(256) 590-596	QUOTE '...this writer [Lyell], in connection with Darwin, and with some others who seem to be following in their steps, are founding, as it were, almost a new school of scientific discussion...'
A siren of science; or the mode of numbering sonorous vibrations.	November 1872	45(270) 844-849	Abbott describes the Savart wheel which is a device which Savart used for research on the limits of hearing.

Table 2 Jacob Abbott's travel articles in Harper's new monthly magazine (1852-1871)

Article title	Reference	Volume (issue) page	Comment
Memoirs of the Holy Land: Mount Carmel.	August 1852	5 (27) 289-304	Article includes good maps and illustrations.
Memoirs of the Holy Land: The River Jordan	September 1852	5(28)433-450	A mixture of biblical history and the story of Lt Lynch's expedition using Francis Lifeboats (see science articles).
Memoirs of the Holy Land: The Dead Sea; Sodom & Gomorrah.	October 1852	7(29) 577-596	Starts with a sermon! Then gives details of various explorers' travels in the area. Considers it 'a scene of unrelieved and gloomy desolation'.
Memoirs of the Holy Land: Mount Lebanon.	November 1852	8(27)721-739	Biblical commentary, details of cedars of Lebanon, retells the story of Micah mixed with his own observations.
Memoirs of the Holy Land: Mount Sinai; The Exodus.	January 1853	6(33) 145-161	Again Abbott talks about the scenery and its barrenness mixed with biblical commentary. Mount Sinai was 'most grand and sublime in sombre glory'.
Memoirs of the Holy Land: the sea of Galilee	February 1853	5(33) 289-300	Religious and geographical commentary intermixed. The fountain of Emmaus 'still continues its ceaseless and unchangeable flow issuing from the rocks.'
Memoir of Damascus.	October 1853	7(41) 577-599	Religious and geographical commentary intermixed with an emphasis on St Paul.
Memoirs of the Holy Land - Bethlehem.	December 1853	8 (43) 1-18	Largely concerns the details of Christ's birthplace, with Abbott wondering whether the historic shrines are where Christ was born.
Rome.	December 1867	36(211) 116-119	Notice the 14 year gap in his writing for Harper's. 'This beautiful heart of Italy has stood conspicuous before the world for half a century as being in a worse condition in respect to idleness, brigandage, beggary, insecurity of life and property, stagnation of business, and general prevalence of discontent and misery, than any other land in Christendom.'
Memoir of Babylon.	January 1868	36(212) 162-181	Largely biblical commentary
The Stricken Heart: a romance of the Andes.	November 1871	43(258) 877-884	A short story.

Appendix 2

Also sometimes *Harper's Magazine* included serialised works of Jacob Abbott such as *Rodolphus*.—A Franconia story, which was serialised in *Harper's Magazine* from March to May 1852. March, pp. 433—447, April, pp. 577—592 & May, pp. 721—736.

Jacob Abbott's scientific articles in *Riverside Magazine for young people*, Volume 4 edited by Horace Elisha Scudder

Gunpowder explosions, pp. 15-16. This article is favourably reviewed as 'capital in its way' (Anon, 1870, p. 92), though the reviewer expressed the opinion that Abbott's phrase 'reduced to a state of the most extreme comminution' could be expressed more simply as 'ground to the finest powder'.

The Riverside magazine for young people, Volume 4 edited by Horace Elisha Scudder

The article, *How railroads are made*, pp. 221, 251, 375 and 507 gives considerable detail about all aspects of the establishment of railways in America.