Zeitschrift: Zeitschrift für pädagogische Historiographie
Herausgeber: Pädagogische Hochschule Zürich
Band: 12 (2006)
Heft: 1

Artikel: Religion and rationality : Quaker women and science education 1790-1850
Autor: Leach, Camilla
DOI: https://doi.org/10.5169/seals-901847

Nutzungsbedingungen
Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Siehe Rechtliche Hinweise.

Conditions d'utilisation
L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. Voir Informations légales.

Terms of use
The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. See Legal notice.

Download PDF: 11.05.2025

ETH-Bibliothek Zürich, E-Periodica, https://www.e-periodica.ch

Religion and Rationality: Quaker Women and Science Education 1790–1850

(Red.) In der traditionellen Bearbeitung der Frömmigkeitsbewegung wird diese in der Regel vom Endpunkt aus, von ihrem Rückzug aus der Modernität zu Ende des 19. Jahrhunderts her betrachtet. Der vorliegende Artikel nimmt eine andere Perspektive ein und verweist in Bezug auf die Naturwissenschaften gerade auf die Modernität der Frömmigkeitsbewegung. Damit wird gleichzeitig auf die grosse Bedeutung der theologischen Debatten im 18. und frühen 19. Jahrhundert für die historische Bildungsforschung verwiesen, die bislang zu wenig Beachtung gefunden haben.

■ Camilla Leach

This paper will examine the work of two Quaker women, Priscilla Wakefield (1751–1832) and Maria Hack (1777–1844) within the context of popularisers of science. Both women specialised in writing scientific educational texts for children and young adults. Appreciation of their work and contribution to the development of science is enhanced by an understanding of the culture and community of the Quaker society of which they were members. I want to show how the Quakers were supportive to the development of science, how this was taught to Quaker girls in school and to boys and girls in the home. What sources were available to provide scientific information and investigate the role of mothers in the scientific education of their children in the domestic sphere. I ask the question whether a study of science in the late eighteenth and early nineteenth centuries created theological conflicts of doubt for Quakers as Christians? If so, how were these reconciled, and how were Quaker children educated to avoid these conflicts and doubts?

From the late eighteenth century onwards science became professionalised and the demarcation between the «professional» and the «amateur» scientist arose. By 1825, the surgeon Walter Weldon realised that the amateur was increasingly unable to participate in chemistry because of the increased need for specialist materials, equipment and facilities (Weldon, cit. in: Golinski 1999, p. 260f.). One clear way in which amateurs and specialists were demarcated in this period was in the exclusion of women from specialist training and research. Jane Marcet (1769–1858), a well known writer of scientific texts and a contemporary of Wakefield and Hack, had supported this demarcation when she made it clear in her own text that as a woman she did not claim «the title of Chemist» (Marcet 1806). It was, she acknowledged, inappropriate for a woman to enter «into the minute details of practical chemistry». Marcet advised her female readers to refrain from using chemical terms pedantically in everyday conversation and not to think of studying pharmacy, which «properly belongs to professional men» (Golinski 1999, p. 261). Paradoxically, this was also a period in which the pursuit of science captivated popular culture (Cooter/Pumfrei 1994; Lightman 1997; Shapin 1974; Topham 2000). Amateur scientific societies were formed around the country (Hallam 1989; Pym 1882), the Mechanics Institutes were established (Curtis familiy records; Allen 1846) and scientists such as Humphrey Davy and his pupil Michael Faraday (Lightman 1997) toured the country giving scientific lectures. All these activities increased women's access to, and participation in science on a non-professional level (Phillips 1990). The result was that women participated in certain aspects of much nineteenth-century science, although most of them were engaged in the data gathering rather than the idea-creation component of science, or so it has been perceived so far (Ogilvie 1993, p. 18). Humphrey Davy (1778–1829) saw the position of women in intellectual life as important, but regarded the part they played in transmitting scientific knowledge as of secondary importance. He expected women to be aware of scientific advancement, but not to penetrate into the realm of the specialist (Golinski 1999, p. 194).

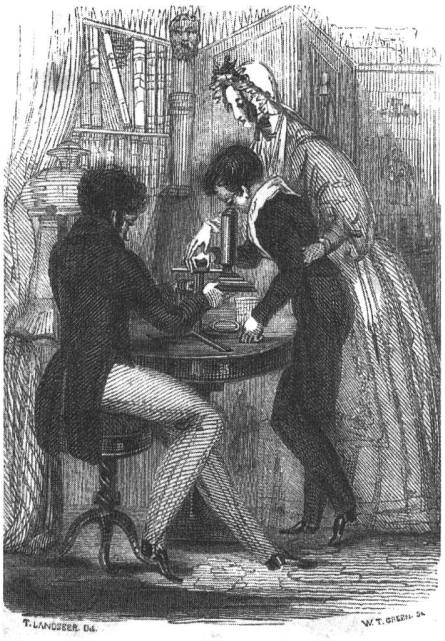
Quakerism had emerged in Britain as a distinctive Nonconformist Christian sect in the seventeenth century. As part of their beliefs Quakers rejected the concept of original sin and believed that the Spirit of God, also referred to as the «Inner Light» or the Truth, dwelt within all humanity. It was their duty as Quakers to search out the Truth and in so doing they would become closer to God. In contrast

to the established Church of England, the Quakers rejected all formal worship, had no liturgy and believed that the Bible should always be read whilst under the leading and guidance of the Holy Spirit. Unlike the many Evangelical Christians of this period who believed that God's word as revealed in the Bible was fixed, the Quakers' approach created a space whereby God's word could be reinterpreted and revealed anew to each generation. This had important consequences for their study and assimilation of scientific ideas into their religious belief system (Braithwaite 1919; Punshon 1984).

Alongside the religious searching, out of which Quakerism emerged, there was an ever-increasing urge to explore and understand the physical world as created by God, and an acceptance that this called for a new type of scientific mind (Raistrick 1950, p. 221). During their history, the *Religious Society of Friends* secured almost forty times their due proportion of the *Fellows in the Royal Society* (ibid., S. 222).[1] A correlation has been seen between the Quakers' approach to religion and the study of science: both Quakers and Scientists insist on a complete surrender to the guidance of truth and the revelation of that truth in their work (ibid.). The intimate connection that existed for Quakers between the study of science and the search for God are found in the memoirs of Quaker scientists such as William Allen,[2] a contemporary of both Wakefield and Hack. In his memoirs, Allen attests to the importance of both science and religion in his life; but he constantly reminds himself that it is religion rather than science that is to have the utmost priority: «Beware, lest chemistry and natural philosophy usurp the highest seat in thy heart» (Allen 1846, p. 23). Rather than being feared, experimental science, particularly natural science, was prized by Quakers because it offered a chance to reveal more about the eternal purposes of God whilst avoiding the idleness of contemplation.[3]

From the late eighteenth to the mid-nineteenth centuries, the Quaker community was an integral part of a network that was producing advanced and innovative science. Quaker scientists, who were contemporaries of Priscilla Wakefield, Maria Hack and William Allen included the meteorologist Luke Howard, John Dalton, who proposed the theory of atoms, William Curtis, the botanist, William Philips, who was one of the founders of the Geological Society, and the medic Dr John Fothergill (see Raistrick 1950, p. 187ff.). Intellectual circles of this nature gave Quaker women writing about science access to current scientific thinking as a basis for their texts.

Within Quaker educational philosophy a stress on those subjects which were practical and creative had been encouraged since the inception of the society,[4] because it was seen to be «consistent with Truth and Godliness» (Penn, cit. in: Raistrick 1950, p. 32).[5] Evidence is available to show that Quakers, like the Unitarians, placed a high value on the study



of science and technology and considered knowledge of it an important part of their children's education. In both fiction and in life Quaker children were taken on tours of Britain and Europe which included visits to commercial and industrial sites where they were introduced to scientific and technological processes, as well as historical sites (ibid., p. 42).

Provision of science education within Quakerism does not appear to have been differentiated by gender. Quakers made a conscious decision to provide opportunities for girls as well as boys to study science. Often Quaker school children and young adults were taken to public lectures given by visiting scientists. The Quaker Dr Thomas Pole on moving to Bristol in 1802 felt it important to reinstate his scientific lectures. In a prospectus issued in 1802 he states that his courses on General Science would be adapted to persons of both sexes, as he deemed women to have been too much excluded from the opportunities of Scientific Improvement (Wedmore 1908). Briefly two other factors which may have had a bearing on the Quakers emphasis on science within the curriculum is that until the repeal of the *Test and Corporation Act* in 1824 Quakers could not attend a university where they had to subscribe to the 39 articles of the Church of England. This therefore limited their entry into many of the professions and led to them embracing industry and commerce. Additionally any Quakers who became bankrupt were disowned from the Society. Wives were not allowed to plead ignorance of their husband's business affairs to avoid disownment. Hence they needed an education that would enable them to fully understand the business of their husband.

In 1824 Edward Harris of Stoke Newington wrote a letter, circulated amongst T*he Religious Society of Friends*, which advertised the opening of Susanna Corder's new school for girls. Susanna Corder was a

Quaker Elder and the shareholders of the school included William Allen, Luke Howard and Joseph Forster. The school was fortunate to secure not only William Allen's assistance with the teaching of science «but the use of extensive philosophical apparatus» (Friends Hous Library, Vol K/6A). The school became well known as a centre of intellectual excellence. This poem written by Quaker Joseph Pease in a letter to his cousin in 1827, also highlighted the academic renown of the school, especially the scientific education given to the girls:

«Dear Coz, in my last (which I sent by Friend P.)
I shewed the advantage as well as renown
That our body of Friends cannot fail to acquire
By the Female Establishment 2 miles from Town.
Where the pupils imbibe such astounding variety
Of stores intellectual – I solemnly vow
Since the earliest days of the Quaker Society,
Such achievements by girls were ne'er heard of till now.
No science, no art, in their tribe is a mystery
The path of the earth and the tides of the sea,
Cosmography, Algebra, Chemistry, History,
To those juvenile Blues are a mere A.B.C.»
(Friends House Library MS Box 10(13)2).

Examples from other schools and official survey's carried out by the Society show that the work carried out in Susannah Corder's schools was not an isolated event.

To a Society amongst whom many of its members were in manufacturing and industry the importance of science in the education of Quaker children is reinforced in the works of Priscilla Wakefield. In *Mental Improvement* (1797) Wakefield implies to the reader that she is surprised that it is not only children but young adults who have little awareness of how the objects which they use every day are manufactured and constructed: «A judicious instructor will find matter for a lesson among those objects, that are termed common or insignificant. How little this is generally the case, may be collected from the ignorance, not of children only, but sometimes of youth, who, although they have attained a considerable degree of classical learning, are unacquainted either with the materials of those things they daily use, or the methods of manufacturing them» (Shteir 1996, p. 3).

" Oh, Mamma, they move, they move!"

Page 16.

So in Wakefield's texts, children were taken to manufacturing sites and the science behind industrial processes was explained to them, the classification of plants and insects was introduced, and most importantly, children were taught to reason and arrive at their own judgements.[6]

Like Wakefield, Maria Hack emphasised knowledge that could be useful to those entering scientific or commercial careers.[7] The works of both Wakefield and Hack went through several editions, illustrating that there was a market demand for scientific texts written at a level suitable for use with children. Wakefield and Hack, like their contemporary, the scientist William Allen, perceived no dissonance between a study of science and adherence to a belief in God. Wakefield noted: «No branch of science seems better adapted to this important purpose than natural history. The visible world presents a scene of novelty and delight, well calculated to engage the attention of the youthful mind, and form with a proper guide, the first lesson in natural religion; imprinting in indelible characters, the existence of a Supreme First Cause possessing the attributes of infinite wisdom, power, and goodness ... There are but few elementary works on these subjects, adapted to young readers, either from their high price, or their scientific manner, which is more likely to alarm than attract the inexperienced pupil» (Wakefield 1816, p. iiif.).[8]

In the eighteenth and nineteenth centuries religion and debates concerning the existence of God were still heavily influenced by the theory of Natural Theology, most famously expounded in this period by William Paley. Paley adopted the view that the findings of the natural sciences all revealed a world whose complexity and intricacy indicated the presence of a designer God. Paley believed that the exercise of human reason in examining and observing the created world would lead to the conclusion that behind it existed a Supreme Being (Richardson 1983, p. 37).

References to the use of human reason, to living in an enlightened age, to debates regarding the existence of God, and to the scientific study of nature are to be found throughout the works of Priscilla Wakefield and Maria Hack. Both entered these debates through the medium of their children's texts and so engaged with those who, in an age of Enlightenment, were attempting to discover through empirical science how the world and society functioned.

In a period when divisions between the sciences, and also between the amateur and the professional

scientist, were still being constructed, Priscilla Wakefield represented herself as an authoritative figure qualified to speak about both natural and social sciences. In Volume II of *Domestic Recreations,* Wakefield cited the work of William Paley as the basis of her approach to the study of science. She presented herself as qualified to extend Paley's work using evidence provided by a study of the human body:

Like Wakefield, Maria Hack adopted Paley's *Natural Theology*, and used the work to introduce children to both the study of religion and science. In Hack's introduction she made it clear that if children were to obtain a belief in God and have the moral and spiritual advantages which stemmed from this belief, then it was important that the evidence of God that they could detect with their senses was imprinted upon their minds from as young an age as possible. This knowledge would also arm them to refute those who doubted the existence of God.

«Though I have purposely avoided placing the formidable words *Natural Theology*, in the title page, yet parents will perceive, at a glance, that the admirable work of Dr Paley has been used as the basis of this little volume. In some places the language of that work is too technical; and in others the reasoning is either above the comprehension of children, or illustrated by examples unsuitable for them: yet it abounds in passages peculiarly adapted to young people, as soon as their minds become susceptible of religious knowledge which I have seen children, from seven to ten years old, listen to such passages ... When other works of established authority suited my purpose better, I have not confined myself to Paley; neither are the moral and religious lessons which have been deduced from the various natural phenomena referred to, uniformly taken from him. Sometimes they arose spontaneously from the subject, and sometimes I availed myself of such passages in the writings of Dr Hartley and Bishop Law, as seemed to suit my purpose» (Hack 1836, p. vif.). But as this quote shows she is not above improving upon or extending the ideas of Paley where she thinks necessary.

Maria Hack's readers are introduced in several of her books to the character of Harry Beaufoy. He's taught about the functioning of the body, geology, lifecycles of animals etc. The aim of this curriculum was to provide Harry with enough scientific evidence of the intricate design of the world and its life-forms, so that he could be in no doubt as to the existence of God.

It was emphasised that a religion of nature by itself was not enough. Although nature might provide evidence of the existence of God, children still needed the guidance provided by the Bible (ibid., p. 173ff.). The Bible was important to Maria Hack, but her belief in the use of reason did not permit her to adopt biblical literalism. In *Geological Sketches and Glimpses of the Ancient Earth* (1832) Hack taught that there were several theories regarding the creation of the earth. Although brought up within Christianity, Harry, the protagonist of *Geological Sketches*, could not reconcile himself to the idea of Creation having taken place in six days. His mother gives him two or three alternative theories that have been suggested including the problems raised by fossil remains and ends by stating: «and lastly, your difficulty may be explained and, I think, very satisfactorily by understanding the Days of Creation to mean, not ordinary days but periods of time. However, I have no wish to press this explanation upon you. You know too little of the subject to form an opinion at present, and it is not of any consequence which of the three I have mentioned you may hereafter think most probable. Neither of them has any tendency to lessen your reverence for the Scriptures» (Hack 1832, p. 39f.).

The conversation ended by his mother stating «happily we do not live in the days of Galileo!» (ibid., p. 41). The example of Galileo was used to provide an opening for Harry to be taught that for those who had been shown how to exercise their powers of reason there was no need for a conflict between religion and science, especially in the more enlightened period of the nineteenth century.

Priscilla Wakefield and Maria Hack researched their work extensively before writing and publishing.[9] Research for *Geological Sketches* (1832) involved Maria Hack reading over eighteen contemporary works on geology, geography and science. In her introduction Maria Hack wrote: «The references will show that the works of those who are considered the best authorities, have furnished the materials».[10]

The work of women like Wakefield and Hack was important in the transmission of scientific knowledge to a mass audience, but it has been claimed that these women did not engage directly with science; they «eschewed the controversial» and did not produce work of a high intellectual standard. The only originality to be found in their work was in the types of discourse they evolved «as they told the story of science» (Gates 1997, p. 245). Science in the late eighteenth and nineteenth century, however, was as much the discussion of theory as the performance of experiments in laboratories. It can be argued that women made a significant contribution to scientific debate by the intellectually informed choices they made as to which scientific ideas they would propagate and which they would reject. They did not uncritically accept current scientific theory (Pym 1882, p. 41). Maria Hack's approach, in relating to her readership several theoretical interpretations of Genesis in the light of nineteenth-century geological findings, provides evidence that she was engaging with debates that were highly controversial (Hack 1836, p. 171ff.).

Quaker women also studied pedagogy and used this to inform the way in which they wrote and presented their work. Maria Hack and Priscilla Wake-

field presented much of their information to children through a series of conversations or dialogues, directed by a female mentor (Clarke 1997; Phillips 1990, p. 112ff.; Shteir 1996, p. 81ff.). By the 1790s through to the 1820s, this style of writing was the conventional form, indeed the canonical form, for most botany writing by women, both Quaker and non-Quaker (Shteir 1996, p. 83). Priscilla Wakefield used a conventional form of presentation, she did not expect children to learn by rote, she encouraged active observation and experimentation by the pupil in all her lessons (Wakefield, cit. in: Phillips 1990, p. 109). Maria Hack also expected children to learn through the use of their senses, including observation and experimentation. Hack saw the acquisition of facts without a thorough understanding of the principles behind them as inadequate. For her and for Wakefield, the intuitive curiosity of children was to be encouraged, extended and gently directed according to the age and abilities of the children. Information should be given to them at a level that corresponded with their levels of understanding. Subjects to be studied and examined scientifically by the children were to be taken from the world around them. The mother tutor was the guide, led initially by the interests of the children.

Harry Beaufoy as already shown is led by his mother to observe and question the world around him. One of the first lessons given to him by his mother is to teach him about voluntary and involuntary movements. Before going to bed one night he is made to look in the hen house and observe the birds sleeping on their perch, and to tell his mother of his findings: «Mrs Beaufoy was sitting on the sofa, when Harry returned to tell her of his disappointment. There was nothing to be seen in the hen-house but the fowls at roost; ... You have seen it, Harry, as you see a thousand other things, without being sensible of its ingenuity ... we are apt to overlook things which if we examined them would fill us with astonishment ... And now will you tell me why, when the fowls were asleep, they did not fall off their perches?» (Hack 1836, p. 9ff.).

Unable to answer, a practical demonstration is provided for Harry. The maid is asked to bring a dead chicken up from the kitchen and Harry is made to move the claws. His mother says: «You observed that, when the legs of the fowl were pushed towards the body the claws contracted immediately? Yes mamma; but what then? It is exactly what happens when birds go to roost. They assume that posture in order to sleep, and their claws then forcibly contract and grasp the perch. This is not effected by the choice of the bird, but by the tension or pulling of *tendons*, or cords, placed in its legs for that purpose. The weight of the animal's body gives that force which is necessary for the claws to retain their hold, and thus the creature is enabled to sleep in safety» (ibid., p. 17f.).

The next day Harry is shown the tendons in the leg of the chicken and invited to manipulate them.

"He opened the door with the utmost care"
Page 8.

His mother wants him to assimilate facts through his own senses so that he has discovered the truth for himself as opposed to relying solely on facts given by a secondary source (ibid., p. 27f.). For Wakefield and Hack, science was a part of everyday life. The teaching of science did not automatically require scientific laboratories with specialist equipment, much could be done with objects that were considered part of most households and therefore easily accessible for parents to use.

In Hack's *Lectures at Home, Discovery and Manufacture of Glass; Lenses and Mirrors; and The Structure of the Eye*, aimed at older children she began each session with a list of the equipment which would be needed during the series of lectures. In the very first lecture she again made it clear that the lecture was to be interactive; it was for young people, who were instructed that they must stop her if there was anything that they did not understand. The lecture was intended to explain the manufacture, use and properties of glass. She began by asking the children to handle and examine samples of glass. They were invited to enter into discussion by being asked if glass was a natural or an artificial substance (Hack 1834, p. 5). She then introduced the word transparent, and explained its derivation (ibid., p. 6). She continued by showing the children how to make sounds from glass by half filling it with water and running a finger around the top. She concluded the lesson by recalling the discoveries they had made about glass: «Glass then, has properties which are evident to three of our senses – Touch discovers that it is hard, smooth and cold: Sight, that it is bright and transparent. Hearing that it is sonorous. Taste discovers nothing, therefore we say that glass is *inodorous*. The sylla-

ble *in* is also borrowed from the Latin, it expresses the absence of a quality: *insipid* without taste; *ino*dorous, without smell. Now that we have examined such qualities of glass as are obvious to our senses and determined that it belongs to the class of artificial substances (i.e. those which have been brought to their present form by the art of man) perhaps you may like to know how he came to find out the way of making it» (ibid., p. 7).

Within this first lesson Hack introduced her pupils to the scientific techniques of observation and classification. They were shown how to use several of their senses in order to arrive at an informed decision about the properties of glass. And she has started to introduce her pupils to scientific language, clarified by simple explanations in order to ensure the pupil's full comprehension. Finally, the structure of the lesson was planned to finish by summarising, and reinforcing for the children, the main aims of the lesson. As these extracts demonstrate, Priscilla Wakefield and Maria Hack were not only imparting contemporary scientific knowledge but also an active experimential pedagogy.

Although research has, as yet, revealed only a few Quaker women who had a direct link with science in the businesses they established,[11] Wakefield and Hack's dissemination of scientific knowledge, and the practical science lessons organised by Susanna Corder, show a role for women in the development of scientific literacy for future generations of Quakers. The pedagogic approach they encouraged, enabled mothers and teachers to harness the interests of children arising naturally from their daily lives. They recommended engaging children in discussion and also stressed the importance of practical work. In her introduction to *Lectures at Home* (Hack 1834, p. 2) Maria Hack recognises that her primary aim is to awaken the attention of children and create a desire to obtain further information. Like Maria Edgeworth, Hack falls within the remit of scientific literacy, providing the general population with the means to achieve an understanding and attitude of mind that will enable citizens to comprehend how the natural and designed world work; and to enable them to think critically, and to deal sensibly with problems that involve evidence, numbers, patterns, logical arguments and uncertainties.

Quaker children were expected to become adult citizens who were able to participate fully in the industrial, commercial and social concerns of their Society. For Quakers, there was no distinction between the study of science and God the two were synonymous. Religion and rationality were not in conflict. This was one reason why Quakers were so keen to provide a scientific education for women as well as men. If it was possible to become closer to God through a study of science, it was not right to deny this opportunity to women.

1 Geoffrey Cantor has recently argued that the evidence supporting this figure is highly problematic (Cantor 2003).

2 William Allen was elected a member of the Chemical Society at Guy's Hospital in 1795 and a Fellow of the Royal Society in 1807 (Allen 1846, p. 24 and p. 89).

3 From 1672, the Quakers published Yearly Epistles and Advices to its members to provide guidance as to how they should conduct their lives: *Book of Christian Discipline of the Religious Society of Friends in Great Britain; consisting of extracts on DOCTRINE, PRACTICE AND CHURCH GOVERNMENT from the Epistles and other Documents issued under the Sanction of The Yearly Meeting held in London from its First Institution in 1672 to the Year 1883.* London: Samuel Harris and Co. 1883.

4 In 1675 George Fox, one of the founders of Quakersim, suggested that botany and languages might well be studied together and in his will he bequeathed a piece of land left to him by William Penn in Philadelphia to be used «for a garden, and to be planted with all sorts of physical plants, for lads and lasses to learn simples there and the uses to convert them to» (Fox, cit. in: Vipont 1959, p. 15).

5 In 1682 William Penn (1644–1718) wrote to his wife regarding the education of their children: «For their learning let it be liberal but let it be useful knowledge, such as is consistent with Truth and Godliness I recommend the useful parts of mathematics, as building houses or ships, measuring, surveying, navigation; but agriculture is especially in my eye, let my children be husbandmen and housewives; it is industrious, healthy, honest and a good example, like Abraham and the holy ancients, who pleased God and obtained a good report».

6 A sample of the titles of her works is indicative of the knowledge Wakefield perceived to be necessary for the education of children and adolescents: *Mental Improvement* (1797); *A Family Tour through the British Empire, containing Some Account of its Manufactures, natural and artificial Curiosities, ... Particularly suited to the Amusement and Instruction of Youth* (1804); *Domestic Recreation; or Dialogues illustrative of Natural and Scientific Subjects* (1805); *The Traveller in Asia: or a Visit to the most celebrated Parts of the East Indies and China; with an Account of the manners of the Inhabitants, Natural Productions and Curiosities* (1817). In: Smith 1867.

7 Her pedagogical texts included: *Winter Evenings; or Tales of Travellers* (1818); *Geological Sketches and Glimpses of the Ancient Earth* (1832); *Lectures at Home: Discovery and Manufacture of Glass: Lenses and Mirrors: The Structure of the Eye* (1834), Smith (1867).

8 *Domestic Recreations*, written by Wakefield in 1807, was published by Darton and Harvey in two volumes. Volume I included chapters on: Insects, Instinct, Gradation of Being, Aphids and Ichneumon, Solar Microscope, Animalcules, Sea Anemonies, Meteors, Light and Colours, The human Eye compared with those of animals, The Gnat, Singing of Birds, Natural History of the Cuckoo, Progress of Civilisation in Society and Art. In Volume II were: On the Ear, On Sound, On Music, A general view of the Human Body, On the Bones, On the Muscles, On the Heart and Blood Vessels, On Digestion, On the Brain, On Subjects relative to Comparative Anatomy, On the Seeds of Plants. There are no chapters in either volume which debate religion or the existence of God.

9 Prior to writing *Excursions in North America* (1806), Wakefield had read Wild's *Travels in America*, Michaud's *Travels in the United States*, Jefferson's *Notes on Virginia*, the Duc de Rochefoucauld's *Travels through the United States* and Volney's *View of America*. For further examples of Wakefield's reading see Friends House Library, Hazel Mews Collection, Temp MSS284 Box 1 (Hill 1997).

10 This list included: Charles Lyell: *Principles of Geology* (1830); James Parkinson: *Organic Remains of a Former World* (1804); William Ellis: *Polynesian Researches* (1829); Georges Cuvier: *Essays on the Theory of the Earth* translated by Robert Kerr (1813); Robert Jameson: *Elements of Geognosy* (1808) and William Conybeare: *Outlines of the*

Geology of England and Wales (1822) (Hack 1832, p. iv).

11 Quaker women and business are beginning to be studied (see McDowell 2000).

Sources

Curtis family records, Hampshire Record Office, 12M58/1
Friends House Library, London, Vol K/6A
Friends House Library, London, MS Box 10 (13) 2

References

Allen, William: Life of William Allen, with Selections from his Correspondence, vol 1. London: Charles Gilpin 1846

Braithwaite, William C.: The Beginnings of Quakerism. London: Macmillan and Co. 1919

Cantor, Geoffrey: How successful were Quakers at science? In: Quaker Studies 7(2003)2, pp. 214–226

Clarke, Norma: The cursed Barbauld crew, women writers and writing for children in the late eighteenth century. In: Mary Hilton/Morag Styles/Victor Watson (eds.): Opening the Nursery Door: Reading, Writing and Childhood 1600–1900. London: Routledge 1997, pp. 91–103

Cooter, Roger/Pumfrey, Stephen: Separate spheres and public places: reflections on the history of science popularisation and science in public culture. In: History of Science (1994), pp. 237–267

Edgeworth, Maria/Edgeworth, Richard Lovell: Practical Education. London: J.Johnson 1801

Gates, Barbara T.: Kindred Nature, Victorian and Edwardian Women Embrace the Living World. Chicago: The University of Chicago Press 1997

Golinski, Jan: Science as Public Culture: Chemistry and Enlightenment in Britain, 1760–1820. Cambridge: Cambridge University Press 1999

Hack, Maria: Geological Sketches and Glimpses of the Ancient Earth. London: Darton and Harvey 1832

Hack, Maria: Lectures at Home, Discovery and Manufacture of Glass; Lenses and Mirrors; The Structure of the Eye. London: Darton and Harvey 1834

Hack, Maria: Harry Beaufoy; or, The Pupil of Nature. London: Darton and Harvey 1836

Hallam, Anthony: Great Geological Controversies. Oxford: Oxford University Press 1989

Hill, Bridget: Priscilla Wakefield as a writer of children's educational books. In: Women's Writing 4(1997)1, pp. 3–15

Lightman, Bernard (ed.): Victorian Science in Context. London: The University of Chicago Press 1997

Marcet, Jane: Conversations on Chemistry: in which the elements of that science are familiarly explained and illustrated by experiments. London: Longman, Hurst, Rees and Orme 1806

McDowell, Paula: Women and the business of print. In: Vivien Jones (ed.): Women and Literature in Britain 1700–1800. Cambridge: Cambridge University Press 2000

Ogilvie, Marilyn B.: Women in Science, Antiquity Through the Nineteenth Century: A Biographical Dictionary. London: The MIT Press 1993

Phillips, Patricia: The Scientific Lady: A Social History of Women's Scientific Interests 1520–1918. London: Weidenfeld and Nicolson 1990

Pym, Horace N.: Memories of Old Friends, Being Extracts from the Journals and Letters of Caroline Fox from 1835–1871. London: Smith, Elder and Co. 1882

Punshon, John: Portrait in Grey: A Short History of the Quakers. London: Quaker Home Service 1984

Raistrick, Arthur: Quakers in Science and Industry. Newton Abbott: David and Charles Holdings Limited 1950

Richardson, Alan/Bowden, John (eds.): A New Dictionary of Christian Theology. London: SCM Press Ltd. 1983

Shapin, Steven: «The audience for science in eighteenth century Edinburgh». In: History of Science xxii(1974), pp. 95–121

Smith, Joseph: A Descriptive Catalogue of Friends' Books or Books Written by Members of The Society of Friends, Commonly called Quakers. London: J. Smith 1867

Topham, Jon R.: Scientific Publishing and the Reading of Science in Nineteenth-Century Britain: a Historiographical Survey and Guide to Sources. In: Studies in History and Philosophy of Science 31(2000)4, pp. 559–612

Vipont, Elfrida: Ackworth School. London: Lutterworth Press 1959

Wakefield, Priscilla: An Introduction to the Natural History and Classification of Insects, In a Series of Familiar Letters. London: Harvey and Darton 1816

Wedmore, Edmund Tolson: Monograph of Journal of the Friends Historical Society, Supplement 7. London: Headley Brothers 1908

The longer version of this article has been published in: History of Education Volume 35(2006), No 1, p. 69–90