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Scientists, teachers and the 'scientific' textbook: Interprofessional relations and the modernisation of elementary science textbooks in nineteenth century Sweden

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Abstract

The nineteenth century saw a range of science-related professions develop. These professions did not form in isolation from one another, but were shaped through interprofessional relations, competing to gain control over overlapping fields of practice. The nineteenth century elementary science textbook, which is the focus of this study, constitutes such a field of practice, and in relation to which these groups could position themselves and their expertise. While popularisers and scientists established the genre, elementary teachers are found to be the prime movers in developing the genre. This complements research on the development nineteenth century elementary science, where initiatives by scientists or people thoroughly trained in science has been emphasised, while the writings, roles and initiatives of elementary teachers are normally just mentioned in passing. The interprofessional perspective can help increase our understanding of how school subjects have been constructed at different levels of the school system at different times.

Introduction

The nineteenth century saw a range of science-related occupational groups and professions develop, such as engineers, popularisers of science, grammar school teachers and government officials. Elementary teachers can be considered part of these groups that Sven Widmalm has coined 'carriers of science' (*vetenskapsbärare*), i.e. a professional group – not scientists, but with some training in science – who in various ways brought out or used scientific knowledge in society.² These groups/professions did not form in isolation from one another or from

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² Sven Widmalm, 'Introduktion', in *Vetenskapsbärarna: Naturvetenskapen i det svenska samhället 1880-1950*, ed. Sven Widmalm (Hedemora: Gidlunds, 1999), 8–22, 11. On the

scientists, but were shaped through interprofessional relations, competing - more or less overtly - to gain control over overlapping fields of practice.³ The nineteenth century elementary science textbook, which is the focus of this study, constitutes such a field of practice, to which both these groups contributed, and in relation to which both these groups could position themselves and their expertise.

The science textbook has had a low status as an object of research in both the history of education and the history of science.⁴ The main focus in research has been on how textbooks codify and transmit knowledge to students, and especially how they reproduce ideology.⁵ The image of science textbooks has been that of books presenting passive reflections on broad

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professional status of nineteenth century scientists, see Paul Lucier, 'The Professional and the Scientist in Nineteenth-Century America', *Isis* 100, no. 4 (2009), 699–732. On the relation between scientists and popularisers of science, see Bernard Lightman, *Victorian Popularizers of Science: Designing Nature for New Audiences* (Chicago: The University of Chicago Press, 2007), 494–5.

³ Andrew Abbott, *The System of Professions: An Essay on the Division of Expert Labor* (Chicago and London: The University of Chicago Press, A. 1988).

⁴ John Issitt, 'Reflections on the Study of Textbooks', *History of Education* 33, no. 6 (2004): 683–96, 683; Antonio García-Belmar, José Ramón Bertomeu-Sánchez, and Bernadette Bensaude-Vincent, 'The Power of Didactic Writings: French Chemistry Textbooks of the Nineteenth Century', in *Pedagogy and the Practice of Science: Historical and Contemporary Perspectives*, ed. David Kaiser (Cambridge: The MIT Press, 2005), 219–51, 219. Also see Anders Lundgren, 'The Transfer of Chemical Knowledge: The Case of Chemical Technology and its Textbooks', *Science & Education* 15, no. 7–8 (2006): 761–78, 761.

⁵ John L. Rudolph, 'Historical Writing on Science Education: A View of the Landscape', *Studies in Science Education* 44, no. 1 (2008): 63–82, 68; Issitt, 'Reflections on the study of textbooks', 688.

cultural and scientific developments and of state regulations.⁶ But science textbooks have attracted growing attention amongst historians lately.⁷ The textbook as an anonymous and mass-produced text has been challenged through studies of how authors adapted their textbooks to their audiences and how new ideas within science were incorporated in new editions.⁸ Textbooks have through this research been shown to contribute to developments in science pedagogy as well as in science.⁹

The importance of the publishing business in the shaping of science textbooks has been another growing strand in science textbook research. Even though science textbooks to some

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⁶ Marga Vicedo, 'Introduction: The Secret Lives of Textbooks', *Isis* 103, no. 1 (2012): 83–7, 83; García-Belmar, Bertomeu-Sánchez, and Bensaude-Vincent, 'The Power of Didactic Writings', 227.

⁷ A recent review of research on science textbooks is found in Rudolph, 'Historical Writing on Science Education', 2008, 68. Rudolph focuses on science textbook research from 2005 and 2006. For principal discussions on science textbook research, also see Issitt, 'Reflections on the Study of Textbooks'; For recent studies on science textbooks, see 'Focus: Textbooks in the Sciences', special issue, *Isis* 103, no. 1 (2012).

⁸ For example Adam R. Shapiro, *Trying Biology: The Scopes Trial, Textbooks, and the Antievolution Movement in American Schools* (Chicago: University of Chicago Press, 2013), 42; José Ramón Bertomeu-Sánchez and Antonio García-Belmar, 'Pedro Gutiérrez Bueno's Textbooks: Audiences, Teaching Practices and Chemical Revolution', *Science & Education* 15, no. 7–8 (2006): 693–712; Anja Skaar Jacobsen, 'Propagating Dynamical Science in the Periphery of German Naturphilosophie: H. C. Ørsted's Textbooks and Didactics', *Science & Education* 15, no. 7–8 (2006): 739–60; Raffaella Seligardi, 'Views of Chemistry and Chemical Theories: A Comparison between two University Textbooks in the Bolognese Context at the Beginning of the 19th Century', *Science & Education* 15, no. 7–8 (2006): 713–37.

⁹ For example García-Belmar, Bertomeu-Sánchez, and Bensaude-Vincent, 'The Power of Didactic Writings'; Vicedo, 'Introduction'; Kathryn Olesko, 'Science Pedagogy as a Category of Historical Analysis: Past, Present, and Future', *Science & Education* 15, no. 7–8 (2006): 863–80.

extent represent various developments in science, Adam Shapiro has argued that they are ‘also deeply shaped by the structure of textbook production and distribution’.¹⁰ Shapiro studies the early twentieth century, and focuses among other things on the tension between salesmen and authors in the production of biology textbooks. It is clear that these different professions have sometimes disagreed about the content of textbooks. The role of the editor was often to mediate contact and negotiate differences in views on textbook content.¹¹ However, much happens in terms of textbook production and distribution from the nineteenth century – the focus of this study – to the early twentieth century. With time, many textbooks have come to see a much higher degree of editor involvement, and much more feedback from those who used or sold them than was normally the case in the nineteenth century.¹² The related field of popular science gives insights into the publishing conditions of the time. Some scholars regard nineteenth century elementary science textbooks as part of popular science as the two genres were closely related during much of this time; in fact early nineteenth century elementary textbooks could be used both as works of popular science and as textbooks in schools, and authors of elementary textbooks also wrote popular science.¹³ Bernard Lightman, a leading scholar in the field of nineteenth century popularisers of science, has argued that ‘the chief source of power and authority’ in relation to popular science lay not in the institutions of science but in those of publishing’.¹⁴ This research implies that

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¹⁰ Shapiro, *Trying Biology*, 43.

¹¹ Ibid., 43–5.

¹² Bo Peterson, *Boktryckaren som förläggare: Förlagsfunktion och utgivningspolitik hos P.A. Norstedt & söner 1879-1910* (Stockholm: Norstedt, 1993), 161–165.

¹³ Johan Kärnfelt, *Mellan nytta och nöje: Ett bidrag till populärvetenskapens historia i Sverige* (Eslöv: Symposion, 2000), 167. The thin line between textbook and popularisation can be seen also in relation to twentieth century textbooks, see David Kaiser, ‘A Tale of Two Textbooks: Experiments in Genre’, *Isis* 103, no. 1 (2012): 126–38.

¹⁴ Lightman, *Victorian Popularizers of Science*, 16.

considerations of market conditions and publishing perspectives are of importance to textbook research.

An important aspect of the publishing perspective concerns interprofessional relations and competition. In his studies, Lightman, like Shapiro, stresses the interplay between professionally related groups in the shaping of the content of published texts. The nineteenth century publishers' main concern was not whether the populariser was a scientist or not, but whether he or she could communicate effectively with the audience. This created competition amongst professional groups. Scientists, led by Thomas Huxley, claimed that they and no one else should have the authority to popularise science. But:

Huxley and his allies had only limited success in gaining control of the market for books designed to circulate in the public sphere, and in their efforts to drive the popularizers working in the clerical and maternal traditions out of the field.¹⁵

Thus nineteenth century popular science was a publishing field where not only individual authors competed over who should write these books, but also, and perhaps more so, different professional groups, and for good reasons according to Lightman: 'those who could claim to speak on behalf of science gained immense cultural authority and intellectual prestige'.¹⁶ Thus, if a profession could get control over a science genre, this could lead to a gain in professional status for that profession.

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¹⁵ Ibid., 421

¹⁶ Ibid., 5.

This is a study of the elementary science textbooks used in nineteenth century Sweden, their market, publishers and the authors that wrote them. Even though neither mass education nor popular science were new phenomena in early nineteenth century Sweden, they were largely unrelated during the first decades of the century, which means that textbooks on science to use in elementary schools were established and developed during this century. But who wrote textbooks, and why? And how did interprofessional competition affect the elementary science textbook content and market in the nineteenth century? These are the questions that this study will try to answer. Studies on elementary science textbooks are scarce in the international literature. Although there have been a few studies of nineteenth century elementary science textbooks, in which the more general changes in the genre have been described, we know little about those who wrote these textbooks, and why.¹⁷

Sixteen authors have been identified (Table 1, also see Figure 1 and 2). Some of these had little success with their textbooks, others considerably more. Some published under their own name, others under the name of major publishing houses. Amongst the writers were scientists, popularisers of science, clergymen, grammar school teachers, school inspectors,

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¹⁷ Ulla Ekvall, *Formativt, figurativt, operativt i läroböcker för barn : Hur syn på kunskap och kunskapstillägnande påverkat innehåll, språk och struktur i naturkunskapsböcker : Del 1 : Utvecklingen under 1800-talet : Rapport nr 12 från Svensk sakprosa* (Lund: Institutionen för nordiska språk, 1997); Magnus Hultén, *Naturens kanon: Formering och förändring av innehållet i folkskolans och grundskolans naturvetenskap 1842–2007* (PhD diss., Stockholm Institute of Education, 2008); Magnus Hultén, 'I naturvetenskapernas skugga: Teknikteman i 1800-talets läromedel i naturlära', in *Teknik som kunskapsinnehåll i svensk skola 1842-2010*, ed. Jonas Hallström, Magnus Hultén, and Daniel Lövheim (Möklinta: Gidlunds, 2013), 21–54; Jørund Falnes, 'Vi begynner saaledes stadig med eksperimentet og utleder derav 'loven'' (working paper, Høgskolen i Vestfold, 2007).

elementary teachers etc.¹⁸ The line between what constitutes a textbook and what does not, and what textbooks were used in teaching science and which were not is of course not clear-cut, and sometimes textbooks aimed at grammar schools could actually be used in elementary schools, even though they were far more voluminous and approached the subject somewhat differently, for example laying much more emphasis on taxonomy. In this study, only textbooks aimed at elementary science have been considered. These textbooks include all of those that are mentioned in school inspection reports and in advertisements in teachers' journals (see Figure 2) and a few more. Throughout the period 1860-1900 no more than four textbooks dominated the textbook market in a given period, sometimes with one best-seller outcompeting the others, which I will come back to.

Table 1. Authors of elementary science textbooks in the nineteenth century. ‘**’ indicates that the textbook is based on a translation and adaptation of a German textbook. ‘-’ indicates that information is missing. The above list does not include all versions of elementary science textbooks published by the authors. In the case of best-sellers, reduced versions were also made, and sometimes also competing series by the same authors.

Author	Main occupation*	1st ed./publisher	Late ed. and prints
Johan Georg Hoffmann (1715–1769)	German clergymen	1828/Haeggström* *	2nd ed., see Hartman
Carl Johan Hartmann (1790–1849)	Scientist, doctor	1836/Haeggström	Only one edition
Johan Ferdinand Schlez (1759–1839)	German scientist	1846/-**	1849 (3rd ed.)
Thomée Gustaf (1812–1867)	Author, translator (trained scientist)	1850/Bonnier**	1859 (2nd ed.)
Oskar Elis Leonard Dahm (1812–1883)	Vice chancellor, grammar school	1850/-	Only one edition
Nils-Johan Berlin (1812–	Scientist	1852/Gleerup	1917 (15th ed.,

¹⁸ The list of authors has been constructed through searches in the Swedish library collections, which are wide and comprehensive for this period in history, and through complementary studies of school inspection reports, teacher memories, journal reviews and advertisements, see Figure 2.

1891)		1852/Gleerup	6th print). 1924/25 (10th ed. 6th print)
Jonas Bäckman (1832–1906)	Elementary teacher	1864/Haeggström	1871/73 (3rd ed.)
Axel Emanuel Lundequist (1831–1880)	Elementary teacher	1865/Adolf Johnson	-
Carl Wilhelm von Paijkull (1836–1869)	Grammar school teacher and school inspector	1868/Norstedts	Only one edition
Gustaf Magnusson Celander (1835–1917)	Elementary teacher	1872/ Lars Johan Hierta	1917 (13th ed. 3rd print)
Johan Fredrik Peterson (-)	-	1879/-	Only one edition
Lars Johan Wahlstedt (1836-1917)	Grammar school teacher	1879/Hjalmar Möller	1905 (10th ed.)
Albrekt Julius Segerstedt (1844–1894)	Publisher, author, belonged to the gentry, active in relation to public schools	1873/Hjalmar Petersson & K:nis	1923 (20th ed.)
C. A. Ahlström (-)	-	1886/-	Only one edition
Hjalmar Berg (1859–1953) Anders Lindén (1853–1925)	Elementary teachers	1889/Norstedts 1915/Norstedts	1919 (6th ed. 11th print) 1949 (6th ed. 6th print)
Johan Anders Svensson (-)	Elementary teacher	1894/Published by the author	Only one edition

Figure 1. Two widely used elementary science textbooks of the late nineteenth century, *Folkskolans naturlära* from 1879 by the grammar school teacher Lars Johan Wahlstedt (left) and *Lärobok i naturkunnighet* from 1889 by the elementary teachers Hjalmar Berg and Anders Lindén (right).

Figure 2. Example of textbook adverts. Taken from *Svensk Läraretidning*, 1891. To the left: Gustaf Magnusson Celanders's and Albrekt Julius Segerstedt's Celanders's (no. 5, page 56). To the right: Axel Emanuel Lundequist's textbook (no. 2, page 19).

Textbook reviews have been an important source for this study. Several of the textbooks in Table 1 were reviewed in teacher journals of the time, although such journals did not exist to cover the early period of elementary science textbook production. The most influential of these journals was *Svensk Läraretidning*, the journal of the General Association of Sweden's Elementary School Teachers (Sveriges Allmänna Folkskolläraryörelse, SAF). The first edition of this journal came out in 1881. It was a weekly journal, with around 15 pages per issue in the 1890s.¹⁹ The editorial team consisted of six members, of which four were also members of

¹⁹ In January 1900, the journal had 3248 subscribers, and to take one point of reference, there were approximately 14000 elementary teachers in Sweden at that time. Anna Sörensén, *Svenska folkskolans historia III: Det svenska folkundervisningsväsendet 1860–1900* (Stockholm: Albert Bonniers förlag, 1942), 329. Christina Florin, *Kampen om katedern: Feminiserings- och*

the board of the association. The journal became an important vehicle for the development of the associations' main aim, to form and strengthen the elementary teacher profession. Even though the journal aimed to contribute to a broad discussion on the elementary school, the editors wanted it to have a clear voice and standpoint of its own. In relation to textbook reviews, they can be seen as a genre where such a voice was expressed, and thus as part of the elaboration of standpoints that were seen as important to the elementary teacher profession. Another journal of the time was *Folkskolans vän* [The friend of elementary school], the journal of the teachers' association Friends of Swedish elementary education [Svenska folkskolans vänner], an association that attracted Christian teachers. It was not nearly as voluminous, widespread or influential as *Svensk Läraretidning*. The journal mostly reviewed textbooks on Swedish, Songs, Geography and Christianity.

The state organised school inspection has been another important source for this study, regarding both the role of the inspection in relation to the spread and content of elementary science textbooks, and how teaching in elementary science developed with time. The main reason for the creation of an inspection was the slow pace at which the elementary school system developed. In 1861, twenty inspectors were appointed by the state, each of them covering a different region of Sweden. Only one of them, an elementary teacher, had this as a full-time occupation. Among the others, nine were clergymen, six were grammar school teachers, one was a director of a teacher training college, one a military man and one an elementary school teacher. As inspectors, they were government officials and also acted as such in relation to teaching and teachers. Reading these reports we find yet another profession that had opinions on teaching materials such as textbooks, which I will come back

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professionaliseringsprocessen inom svenska folkskolans lärarkår 1860–1906 (Stockholm: Almqvist & Wiksell, 1987), 84.

to. The work as inspector was a part-time occupation, and inspectors had an average of five to six weeks of inspection a year and an inspectorate that covered 75 to 200 schools, which means that they normally had to inspect several schools a day. Amongst school aspects they were to report on were teaching methods, teaching materials, the amount of teaching of different subjects and students' knowledge of the subjects taught. They were also to encourage improvement, for example by promoting new teaching methods and suitable textbooks. The inspectors filed reports to the church and to the department of ecclesiastical affairs. Their reports were published in collected volumes each third to fifth year. The reports give insight into the teaching of elementary science as well as the textbooks used.²⁰ Overall, the inspections have been considered as important to the modernisation of elementary education in the nineteenth century, in Sweden as well as in other countries where such systems were introduced.²¹

To allow for a more detailed analysis of changes in textbooks, it is normally necessary to examine drafts, diaries or letters where authors have expressed their standpoints and considerations. Such sources are scarce in this study.²² While the content and changes in

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²⁰ Sörensen, *Svenska folkskolans historia III*, 13–14; *Folkundervisningskommitténs betänkande 3 : Angående förändrad anordning av folkskoleinspektionen : Avgivet den 30 januari 1913* (Stockholm, 1913), Bilaga 1, 135–37; Bodil Wallin, 'Att forma en skolform: Svensk folkskolepolitik vid mitten av 1800-talet', in *Ideologi och socialpolitik i 1800-talets Sverige: Fyra studier*, ed. Ingrid Hammarström et al. (Uppsala: Historiska institutionen vid Uppsala universitet, 1978).

²¹ Jakob Evertsson, 'History, Nation and School Inspections: The Introduction of Citizenship Education in Elementary Schools in Late Nineteenth-Century Sweden', *History of Education* 44, no. 3 (2015): 259–73; Jakob Evertsson, 'Folskoleinspektionen och moderniseringen av folkskolan i Sverige 1860-1910', *Historisk Tidskrift* 132, no. 4 (2012): 624–51.

²² Whilst there exist numerous letters written by Nils Johan Berlin and Carl Johan Hartmann in the archives, and there are archives of publishers such as Zacharias Haeggström, Gleerups

content can be far more specifically analysed when it comes to textbooks written by famous scientists²³, as they often, knowing their importance, have left a rich body of material, this is not the case with nineteenth century elementary textbook writers. Therefore, instead of linking specific changes in specific textbooks to ideas expressed by the author when writing that textbook, a more general approach is taken in this study where larger structural changes are in focus. Rationales for the dissemination of textbooks could be found for example in prefaces and in reviews. Other important sources have been biographical sketches of occupationally important teachers, found in obituaries and birthday announcements in teacher journals.

Processes of professionalization and changes in the textbook market have been analysed. In doing this, a new perspective on nineteenth century elementary textbooks has emerged. While popularisers and scientists established the genre, elementary teachers are found to be the prime movers in developing the genre in late nineteenth century Sweden. This complements research on the development of a nineteenth century 'science for the people', where initiatives by scientists or people thoroughly trained in science has been emphasised, while the writings, roles and initiatives of elementary teachers are normally just mentioned in

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and P. A. Norstedts, there are few collection of letters by elementary teachers. The only large archive is that of Hjalmar Berg, which is in private custody. However, not much of this archive gives any additional information in relation to other sources concerning why he started to write textbooks, how the first textbook developed, which choices were made and why. He and his co-author Anders Lindén lived next to each other and often met and worked together, thus they did not send any letters or manuscripts to each other; at least no such manuscripts have been saved.

²³ For example García-Belmar, Bertomeu-Sánchez, and Bensaude-Vincent, 'The Power of Didactic Writings'.

passing.²⁴ Although I will not be able to convey the full potential of an interprofessional perspective, due to lack of good sources from this period, I will argue that interprofessional competition can help to explain how school subjects have been constructed at different levels of the school system at different times. In the current study, how science is portrayed in a textbook is also a result of professional strivings of different and at times competing groups of professionals involved in producing these books.

Science for the people

The overall development of a 'science for the people' in Western countries cannot be understood without considering the broader context of industrialisation, state formation and state intervention in public education that took place in the nineteenth century in many countries.²⁵ Public education was in itself not a new phenomenon. For example, in Sweden, public education had been established in the 17th century, mainly through home education controlled by the church and regulated in laws requiring parents to ensure that their children learned to read the Bible and understood the message of Christianity, something that was mainly accomplished through studies of the Bible. This type of public education is seen as the

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²⁴ For example Sally G. Kohlstedt, 'Scientists and the Origins of the Nature-Study Movement in the 1890s', *Isis* 96, no. 3 (2005): 324–52; David Layton, *Science For the People: The Origins of the School Science Curriculum in England* (London: George Allen & Unwin Ltd., 1973); Richard A. Jarrell, 'Visionary or Bureaucrat? T. H. Huxley, the Science and Art Department and Science Teaching for the Working Class', *Annals of Science* 55, no. 3 (1998): 219–40. An interesting exception is Friedrich Junge (1832–1905), the famous German elementary teacher. See Lynn K. Nyhart, *Modern Nature: The Rise of the Biological Perspective in Germany* (Chicago: University of Chicago Press, 2009), 173–97.

²⁵ Johannes Westberg, *Att bygga ett skolväsende: Folkskolans förutsättningar och framväxt 1840–1900* (Lund: Nordic Academic Press, 2014), 23–9. John Boli, 'Folkskolan som teoretiskt problem i Sverige och i västvärlden', in *Årsböcker i svensk undervisningshistoria volym 170*, ed. Stig G. Nordström (Uppsala: Föreningen för svensk undervisningshistoria, 1992), 9–16.

main factor behind reading skills being good in early nineteenth century Sweden. With the introduction of modern public education during the nineteenth century – conducted in schools, not at home, and controlled by the state – writing skills clearly increased, and by the late nineteenth century almost all Swedes could write.²⁶

It was in the nineteenth century that mass education became a state concern in many countries. That functions that belonged to the Church were transferred to the state is usually seen as part of the emergence of modern society. A wide range of theories have been presented in order to explain this phenomenon: as a means of state formation, as a logical effect of the democratisation of societies, as a means to control the lower classes, as a preparation of the industrial workforce etc. Research has emphasised both conflict and consensus amongst the groups involved in forming the public school system, and tensions between national and regional control. As all of these theories can be falsified, researchers have come to emphasise the need for a multitude of explanations and necessary conditions for the evolution of the public school system.²⁷ This means that we cannot assume an overall development that the case studied here must fall under.

Early in the nineteenth century, science was discussed as a component of public education in Sweden. It was established as a school subject in Sweden through the Elementary School Act of 1842, an act that is considered to mark the starting point of state involvement in public schooling in Sweden. The act specified a ‘minimum curriculum’ consisting of reading, the

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²⁶ Egil Johansson, *The History of Literacy in Sweden: In comparison With Some Other Countries* (Umeå: Umeå Universitet, 1977), 63–4.

²⁷ Westberg, *Att bygga ett skolväsende*, 2014, 23; Also see Johannes Westberg, ‘The Funding of Early Care and Education Programmes in Sweden, 1845–1943’, in *History of Education* 40, No. 4 (2011): 465–79.

study of the catechesis, biblical history, song (psalms), writing and simple counting. On top of this, geography, history, science (*naturlära/naturkunnighet*), geometry, gymnastics and linear drawing were mentioned, which in reality meant that few schools addressed these subjects. The position of the pastor as head of the local school board is seen as one factor behind the minimum curriculum having such a strong position. The state inspection aimed to change this. In the Riksdag of the Estates (*Ståndsriksdagen*), the clergymen had been opposed to the introduction of the inspectorate. In time, a more elaborate curriculum gained ground. Some factors contributing to this were, apart from the inspection and the general developments of the elementary school system, increased access to textbooks on the different subjects, and the national curricula in 1878 which specified the content to be taught in elementary schools. A change in teaching methods may also have paved the way for a more elaborate curriculum: Until the 1860s, mutual instruction (*växelundervisning*) had dominated elementary teaching, but through an act in 1860, this type of instruction was forbidden and class teaching was introduced.²⁸ By the late nineteenth century the public school system as a whole was well established in Sweden. At this time, elementary schools were in general seen as important institutions by the peasantry, although the value of specific subjects such as science was still doubted by many parents. A clear majority of children, 85%, regularly attended elementary schools in late nineteenth century Sweden.²⁹ An exemplary teaching in late nineteenth century Swedish elementary schools, from the perspective of school inspectors, covered the four topics of animals, plants, the human body and natural phenomena and devoted about one school year to each of these topics.³⁰

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²⁸ Sörensen, *Svenska folkskolans historia III*, 346–360.

²⁹ Ibid., 142.

³⁰ Ruf Fjetterström, 'Berättelser om folkskolorna inom Linköpings stift. III. Gullbergs och Bobergs, Aska, Dals samt Vifolka och Valkebo kontrakt', in *Berättelser om folkskolorna i riket för åren 1887–1892* (Stockholm: P.A. Norstedt & Söner, 1894), 47.

In the following, the development of elementary science will be described first and foremost from the perspective of textbooks used, and the different professions involved in writing these textbooks. But also the general developments in the teaching of elementary science will be commented upon in order to create a better understanding of the context in which developments in elementary science textbooks can be understood.

Scientists, popular science and the first textbooks on elementary science

In the 1840s, the decade of the Elementary School Act of 1842, several well-known scientists promoted science as a vital part of elementary education in Sweden.³¹ But arguments in favour of a science for the people had been raised before that. One of the pioneers behind the nineteenth century wave of popular science in Sweden was the publisher Zacharias Haeggström. He received a price for his publications in the field of popular science by the Royal Swedish Academy of Sciences (*Kungliga vetenskapsakademien*).³² Like many small publishers of that time, he managed most of the publishing tasks himself. In 1828, Haeggström translated and published what seems to have been the first textbook on natural science intended for public elementary education, *Johan Georg Hoffmanns Populära naturkunnighet* [Popular elementary science by Johan Georg Hoffman], based on a German

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³¹ Example Hans C. Ørsted, 'Tale ved Aabningen af den femte skandinaviske Naturskareforsamling. Af Conferentsraad H. C. Ørsted', in *Förhandlingar ved de skandinaviske Naturforskeres femte Møde, der holdtes i Kiøbenhavn fra den 12te till den 17de Juli 1847* (Kiøbenhavn: Gyldendalske Boghandling, 1849), 29; Carl A. Agardh, 'Förslag till utgifvandet af en populärt vetenskaplig tidskrift för alle de tre Nordiska rikena', in *Förhandlingar ved de skandinaviske Naturforskeres femte Møde, der holdtes i Kiøbenhavn fra den 12te till den 17de Juli 1847* (Kiøbenhavn: Gyldendalske Boghandling, 1849), 38.

³² S. Rinman, 'Hæggström, Zacharias', in *Svenskt bibliografiskt lexikon : Band 18 : Hallardt-Hammarlund*. Stockholm, ed. E. Grill (Stockholm: P. A. Norstedt & söner, 1969), 708–10.

textbook.³³ There is no mistaking his enthusiasm about the potential importance of a science for the people. In the preface Haeggström describes, among other things, a hope that elementary science will help humans to 'return to harmony with themselves and the world'.³⁴

The textbook was based on the 22nd edition of a textbook written by the clergymen Johan Georg Hoffmann. The scientific review had been performed by the botanist and district medical officer Carl Johan Hartman, a member of the Royal Academy (from 1838). In addition to minor revisions of the botanical parts, Hartman added a section on morality and respectability (*sedlighetslära*) of seven pages. In the second edition, Hartman conducted a more extensive reworking of the book, so that Hartman himself was listed as the author.³⁵

Hartman was probably the first scientist to engage in the writing of textbooks for the elementary school in Sweden, although science books directed towards children as such were not a new phenomenon.³⁶ Haeggström praised Hartman in letters for his 'great power to say much in few words', an important trait for a successful populariser.³⁷ However, Hartman's real engagement seems to have been in botany. The first edition of his *Scandinavian flora* was

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³³ Johan G. Hoffmann, *Johan Georg Hoffmanns Populära naturkunnighet* (Stockholm: Zacharias Haeggström, 1828).

³⁴ Ibid., II.

³⁵ Carl J. Hartman, *Utkast till populär naturkunnighet: Ett försök till lärobok för de lägre undervisningsverken* (Stockholm: Zacharias Haeggström, 1836), IV.

³⁶ Jürgen Oelkers, 'Elementary Textbooks in the 18th Century and Their Theory of the Learning Child', in *Scholarly Knowledge. Textbooks in Early Modern Europe*, ed. Emidio Campi (Genève: Droz., 2008), 409–32.

³⁷ Olle Franzén, 'Hartman, Carl Johan' in *Svenskt bibliografiskt lexikon : Band 18 : Hallardt-Hammarlund*, ed. E. Grill (Stockholm: P. A. Norstedt & söner, 1971), 295–7.

published in 1820 and it 'came to be the Bible for several generations of Swedish botanists'.³⁸ In letters written by Hartman, the textbook is only mentioned once, in a letter to the scientist Johan Erhard Areschoug.³⁹ In the letter, signed 11 April 1836, Hartman excuses his long silence, saying it was due to 'a winter-long work with my *Family doctor* and *Hoffman's elementary science*, both of which now are available in new editions'.⁴⁰ Despite several requests from Haeggström, Hartman never conducted a third revision of the textbook.

The first scientist to write an elementary science textbook on his own initiative was Nils Johan Berlin. Berlin was a great scientist. He was a disciple of Jöns Jacob Berzelius (1779–1848), the famous Swedish chemist, and came to hold two professorships at Lund University. Moreover, from 1844 he was a member of the Royal Swedish Academy of Sciences, vice Chancellor of Lund University in the mid-1850s and he later became the director general of the Swedish health bureau (*Sundhetskollegiet*).⁴¹ His textbooks on elementary science, published by Gleerups in Lund, are considered to have been a major catalyst for the establishment of the subject of science in elementary schools.⁴² The first editions won a prize in a contest that the

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³⁸ Ibid., 296; Gunilla Törnqvall, *Botaniska bilder till allmänheten: Om utgivningen av Carl Lindmans bilder ur Nordens flora* (Stockholm: Atlantis, 2013), 71–2.

³⁹ Areschoug became professor of botany in Lund in 1859 and was one of the many botanists with whom Hartman exchanged plant specimens and discussed botanic matters. Historical archives of the Royal Swedish Academy of Sciences (KVA): Letters to and from Carl Johan Hartman; Manuscript collection of Carolina Rediviva: Letters to Carl Johan Hartman.

⁴⁰ KVA: Letters to Areschoug no. 78.

⁴¹ K. A. H. Mörner, 'Nils Johan Berlin: Minneteckning', in *Lefnadsteckningar öfver Kungl. Svenska vetenskaps akademien efter år 1854 aflidna ledamöter: band 4, häfte 4* (Uppsala & Stockholm: Almqvist & Wiksell. 1909): 158–90.

⁴² K. Aquilonius, *Svenska folkskolans historia II: Det svenska folkundervisningsväsendet 1809–1860* (Stockholm: Albert Bonniers förlag, 1942), 429.

parliament had arranged in order to improve the level of textbooks available to elementary education.

The first edition of Berlin's textbook was published in 1852 and covered 180 pages and 60 woodcuts.⁴³ In 1913, 22 years after Berlin's death, the textbook was published in its fifteenth edition⁴⁴, having been reworked since 1890 by another author. He also wrote a reading book in science, which was much more extensive. The seventh edition from 1871 covered 478 pages and contained 137 woodcuts.⁴⁵ All in all, about 400,000 copies of Berlin's textbook were printed, and 150,000 copies of the reading book.

Berlin's textbooks were highly praised. In a letter to Berlin dated July 30, 1853, A. Grafström, a pastor heading a school board in the areas around Umeå in northern Sweden, congratulated the 'professor that has enriched our literature with these masterpieces'.⁴⁶ In relation to nineteenth century Swedish elementary textbooks, much of the power lay in the local school boards, who were responsible for the choice of textbooks to be used in local schools. Sweden did not yet have state approval of textbooks; such a system was not introduced until 1938.⁴⁷ The local school boards were led by the pastor, something that was contested in the late nineteenth century by liberal forces as it was perceived to be a factor that hindered the development of the elementary school, but it was not until the early twentieth century that

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⁴³ Nils J. Berlin, *Lärobok i naturläran för folkskolor och folkskollärare-seminarier* (Lund: Gleerups, 1852).

⁴⁴ Nils J. Berlin, *Lärobok i naturlära för folkskolan: Efter skolans nuvarande krav omarbetad av Sven Leonhard Törnquist* (Lund: Gleerups, 1913).

⁴⁵ Nils J. Berlin, *Läsebok i naturläran för Sveriges allmoge* (Lund: Gleerups, 1871).

⁴⁶ KVA: Letters to Nils J. Berlin.

⁴⁷ Anna Johnsson Harrie, *Staten och läromedlen: En studie av den svenska statliga förhandsgranskningen av läromedel 1938-1991* (PhD diss., Linköping University, 2009).

the organisational bonds between the elementary school and the church were dissolved.⁴⁸ The tensions between the clergy and the professional efforts of teachers in the nineteenth century were not unique to Sweden, but were characteristic of a secularising Europe.⁴⁹

It is not unlikely that the numerous references to the Bible in the textbook contributed to its success and strong position among chairmen of local school boards such as the pastor Grafström. The textbook both opened and ended with citations from the Bible and included several references to the Bible as a source of knowledge about nature.⁵⁰ Johan Kärnfelt, who has studied nineteenth century Swedish popularisers, describes the qualities of Berlin's books as follows: 'The religiosity of Berlin's textbooks simmered along, his remarkable tales tickled the imagination and all this enabled the reader to cope with a few pages more'.⁵¹ Berlin's father was a vicar, and in Berlin's will from 1874, Berlin underlined that 'Science and the thorough testing of its problems and results has never given me reason to doubt the truths of religion'.⁵² Given the strong position of religion in elementary schools in the nineteenth century, a firm religious base was probably a necessary factor for the success of an elementary textbook. In the nineteenth century, scientists could portray science as proof of God's existence. This gave science legitimacy at a time when its utility still remained to be

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⁴⁸ Sörensen, *Svenska folkskolans historia III*, 32–44; Lennart Tegborg, *Folkskolans sekularisering 1895–1909: Upplösning av det administrativa sambandet mellan folkskola och kyrka i Sverige* (Uppsala, 1969).

⁴⁹ For example John T. Smith, 'Merely a Growing Dilemma of Etiquette? The Deepening Gulf Between the Victorian Clergyman and Victorian Schoolteacher', *History of Education* 33, no. 2 (2004): 157–76; Peter V. Meyers, 'Primary Schoolteachers in Nineteenth-Century France: A Study of Professionalization through Conflict', *History of Education Quarterly* 25, no. 1/2 (1985): 21–40.

⁵⁰ See Berlin, *Lärobok i naturläran*, 21, 91.

⁵¹ Kärnfelt, *Mellan nytta och nöje*, 167.

⁵² Mörner, 'Nils Johan Berlin', 190.

proved. This biblical tone of a science textbook is not seen in late nineteenth century elementary science textbooks. Neither Gustaf Magnusson Celander's nor Hjalmar Berg and Anders Lindén's textbooks (to be elaborated on later) contained references to the Bible, or the authority of God; on the contrary, in them we find the more objective tone of science that was to become common in twentieth century textbooks.⁵³ This means that even if the whole of the nineteenth century has been described as inscribed in a biblical, moral and authoritative world view, this was certainly not true for all school subjects for all of this time.⁵⁴

Scientific practices in change

Science saw a growing specialisation in the nineteenth century and the laboratory method became a cornerstone of both the academic training of scientists as well as in research. In Sweden this development was headed by the Royal Academy of Sciences, especially during the time of Jöns Jacob Berzelius, when he directed the work of the academy in the period 1819-1848.⁵⁵ During that time, the academy shifted the direction of its activities and downplayed the dissemination of useful and publicly important findings focusing on specialised science published in scientific journals. This development paved the way for a more autonomous popular science genre, a genre that the first elementary textbooks in Sweden in the

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⁵³ Shapiro, *Trying Biology*, 42.

⁵⁴ The moral curriculum code of the nineteenth century elementary school, and the strong position of a religious world view and authority, has been described in Herbert Tingsten, *Gud och fosterlandet: Studier i hundra års skolpropaganda* (Stockholm: P. A. Norstedt & söners förlag, 1969); Ulf P. Lundgren, *Att organisera omvärlden: En introduktion till läroplansteori* (Stockholm: Liber, 1979).

⁵⁵ Kärnefelt, *Mellan nytta och nöje*, 97–102; Per Sörbom, *Läsning för folket: Studier i tidig svensk folkbildningshistoria* (Stockholm: Norstedts förlag, 1972), 107.

nineteenth century have been described as belonging to.⁵⁶ When the Royal Academy of Sciences had been founded in 1739, the aims of the Academy had been twofold: to promote research, but also to disseminate useful knowledge to the Swedish general public, which could lead to national prosperity.⁵⁷ Science was to be used in the service of man as Linnaeus, one of the founders, claimed.⁵⁸ However, the position of being both a scientist and populariser of science became harder to hold as science developed and specialised. When the pastor Grafström wrote to Berlin, he also described the sacrifices he believed that Berlin must have made in order to write these books, and which, Grafström insisted, were much greater than those required for writing about other school subjects: 'Not only must the scientific language be kept, but also from the rich stores of science, a great sifting must be undertaken, and yet, no important field could be ignored. To accomplish this is extremely difficult'. To be sure, to succeed as both a scientist and a popular writer was not an easy task, on the contrary, being a populariser could actually threaten your position in science.⁵⁹

What we see during the nineteenth century in Sweden is the genre of the elementary science textbooks diverging as a genre in its own right, corresponding to the establishment of

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⁵⁶ Kärnefelt, *Mellan nytta och nöje*, 117, 290–1. Cf. Lightman, *Victorian Popularizers of Science*, 13, 17. On the development of science in late nineteenth century Sweden, see Gunnar Eriksson, *Kartläggarna: Naturvetenskapens tillväxt och tillämpningar i det industriella genombrottets Sverige 1870–1914* (Umeå: Umeå universitet, 1978).

⁵⁷ Kärnefelt, *Mellan nytta och nöje*, 74–77; Tore Frängsmyr, 'Introduction', in *250 Years of Science. Science in Sweden: The Royal Swedish Academy of Sciences 1739–1989*, ed. Tore Frängsmyr (Canton, MA: Science History Publications, 1989), 1–22, 1

⁵⁸ Karin Johannisson, 'Naturvetenskap på reträtt. En diskussion om naturvetenskapens status under svenskt 1700-tal', *Lychnos* (1981): 109–54, 122.

⁵⁹ Thomas F. Gieryn, *Cultural Boundaries of science: Credibility on the Line* (Chicago: University of Chicago Press, 1999), 42–3.

elementary teachers as writers of textbooks.⁶⁰ All in all, a more aligned elementary science canon develops. In mid-nineteenth century, textbooks on elementary science could vary from 20 to 400 pages, to take one perspective on the variation in the genre in its early decades. Also, the content of elementary science textbooks became more harmonized. With time, sections on psychology, arts and crafts, and separate sections on technology (how nature is transformed into useful products) were removed. Practical tips such as how to store wood for the stove, the right time to cut wood etc. were removed and the portrayal of nature changed while a laboratory-based view of nature displaced more general descriptions of phenomena in nature. Descriptions of plants and animals became more object-focused, aligned with developments in elementary pedagogy focusing on the training of the eye (*åskådningspedagogik*), which followed with the rise of mass print in the nineteenth century and the use of wall-charts and significantly increased the number of images in textbooks.⁶¹ Furthermore, the textbooks became more focused on modern technology and on technology as applied science. This happened parallel to science establishing in nineteenth century Sweden, attaining a high status in Swedish society at the turn of 1900.⁶²

Kärnfelt linked the change in the elementary science genre to new regulations and to a loss in literary qualities: 'Unfortunately you have to conclude that if these directives made textbooks more trustworthy, more scientific, it also meant that they lost all of their charm'.⁶³ But

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⁶⁰ For the emergence chemistry textbooks as a distinct genre in France, see García-Belmar, Bertomeu-Sánchez, and Bensaude-Vincent, 'The Power of Didactic Writings'.

⁶¹ See Hultén, *Naturens kanon* and Hultén, 'I naturvetenskapernas skugga' for more elaborate descriptions of the development of the elementary science textbook genre. On the evolution on printed and mass-produced images and wall-charts in Sweden, see Lena Johannesson, *Den massproducerade bilden* (Stockholm: Carlssons, 1997), 143–55.

⁶² Eriksson, *Kartläggarna*, 203.

⁶³ Kärnfelt, *Mellan nytta och nöje*, 167.

directives such as the national curriculum, covering a few pages where subject areas, animals, plants etc. were listed, did not touch on how nature should be portrayed, and there were several school inspectors, representing the governmental view, that actually opposed the development of the elementary science genre in this more 'strict scientific' direction, deprived of the anecdotal stories and patronising voice that could be found in early elementary science textbooks.⁶⁴ To understand why a 'scientific' elementary science developed, I argue that we have to add the interprofessional perspective, not the least the professional aspirations amongst elementary teachers and what they saw as a chance to leave their own mark on the genre, and thereby gain in social and cultural status.

Elementary teachers

The elementary school teaching profession was evolving rapidly, not least because of the teacher training colleges where the elementary teachers received their teacher education. The regulations concerning requirements of elementary teacher education in 1842 had, among other things, led to the spread of teacher training colleges, which had been scarce and only privately organised before this. These colleges came to lay the foundation for a 'community of interests and shared values', a base through which elementary teachers could develop their profession.⁶⁵

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⁶⁴ For example Ernst Westberg, 'Hälsinglands östra, västra nedre och öfre samt norra nedre och öfre kontrakt', in *Berättelser om folkskolorna i riket för åren 1899 – 1904* (Stockholm: P. A. Norstedt & Söner, 1906); Nils Karl Herman Wihlborg, 'Berättelser om folkskolorna i Lunds stift. VII. Blekinge län', in *Berättelser om folkskolorna i riket för åren 1887–1892* (Stockholm: P.A. Norstedt & Söner, 1894).

⁶⁵ Agneta Linné, *Moralen, barnet eller vetenskapen? En studie av tradition och förändring i lärarutbildningen* (PhD diss., Stockholm Institute of Education, 1996) 135f, 163–4.

The elementary school teaching profession drew mainly women and men from the peasantry. For most people the profession allowed them to climb up the social ladder. But their status was not easily won. Academics regarded them as semi-literate. The low wages prevented them from building any financial capital. But the profession did win success in the public arena. Many teachers became local or national politicians. Within the local community, they often had a strong position in that they were active as organists, cantors, cashiers in savings banks, librarians, etc.⁶⁶ They were also active publishers. Apart from the journal mentioned, the General Association of Sweden's Elementary School Teachers published *Pedagogiska skrifter* (Educational Writings) from 1898.⁶⁷ In *Pedagogiska skrifter* central works to the profession were translated and published, for example, works by Friedrich Junge, John and Evelyn Dewey, J. Liberty Tadd and Johann Heinrich Pestalozzi. From 1860, general Swedish elementary teacher meetings were organised, and Nordic teacher meetings from 1870.⁶⁸ At these meetings, common issues were discussed, something that strengthened the profession. Just a handful of the discussions, however, were directed towards issues concerning elementary science. Just returned from a Nordic teacher meeting in Copenhagen in 1890, elementary textbook author Hjalmar Berg wrote to his brother Fridtjuv with slight resignation: 'Christianity and temperance seem to be the only issues that can set the teacher meetings on fire'.⁶⁹

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⁶⁶ Florin, *Kampen om katedern*, 90.

⁶⁷ Joakim Landahl, *Den läsande läraren: Pedagogiska skrifter som bildnings- och moderniseringsprojekt 1898-1984* (Stockholm: Stiftelsen SAF i samarbete med Lärarförbundet, 2009).

⁶⁸ Åke Isling, *Kampen för och mot en demokratiskt skola. Del 1: Samhällsstruktur och skolorganisation* (Stockholm: Sober förlags AB, 1984), 142.

⁶⁹ The National Archives (RA): Archives of the family Berg from Fellingsbro. Letter dated Stockholm August 9, 1890.

Establishing the range of legitimate activities for elementary teachers was not a clear-cut process. Elementary teaching had been regarded as a 'semi-profession', and there had been problems identifying and establishing a monopoly of knowledge specific to the profession.⁷⁰ Regarding textbooks, some claimed that elementary textbooks should be written by academic experts and not elementary teachers.⁷¹ Axel Emanuel Lundequist was one of the elementary teacher pioneers in the genre of science textbooks (see Figure 2 for an advertisement). He was educated at the elementary teacher's college in Stockholm. In 1855 he moved to Jönköping where at first he served as an organist but soon resumed teaching. In Jönköping he was also editor of *Jönköpings tidning*, a local newspaper published twice a week in around 500 copies, editor of the school paper *Skolvännen*, and president of a local public school teacher union. He organised the fourth general Swedish schoolteacher meeting in Jönköping in 1863 and more. His short, cheap and widely distributed textbooks, *Hemlexor* (Homework), began publication in 1865 and covered different subjects, including elementary science.⁷² In one textbook review from the 1880s, Lundqvist's *Hemlexor* was given the following review: 'If the occasional notes are excluded, the botany section is mainly constituted of name enumerations'.⁷³ Another review said it was useless.⁷⁴ Certainly, there were more elaborate textbooks written by elementary teachers available in the early days, such as Jonas Bäckman's

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⁷⁰ Barry H. Bergen, 'Only a Schoolmaster: Gender, Class, and the Effort to Professionalize Elementary Teaching in England, 1870-1910', *History of Education Quarterly* 22, no. 1 (1982): 1–21.

⁷¹ 'Fördomar gentemot folkskoläretiteln', *Svensk Läraretidning* 19, no. 22 (1900): 350.

⁷² 'Axel Emanuel Lundequist', *Svensk Läraretidning* 18, no. 51 (1899): 843–4.

⁷³ Christofer Ludvig Anjou et al., *Granskning af läroböcker för folkskolan jemte grundsatser för deras uppställning* (Stockholm: P. A. Norstedt & söner, 1887), 162.

⁷⁴ Hjalmar Berg et al., *Granskning af läroböcker i naturkunnighet för folkskolan verkställd af komiterade utsedde af Stockholms folkskollärareförening* (Stockholm: P. A. Norstedt & söner, 1886).

Folkskolans naturlära (Science for elementary schools) published in 1864. Bäckman's elementary science did not sell and was only printed once. He had better success in other subjects, especially with his textbooks on biblical history.

The first elementary teacher to achieve success with a more elaborate science textbook was Celandér. Like many of the successful elementary teachers of that time, he was heavily involved in the local community. He was educated at the Växjö teacher's college and worked for most of his life in Arboga as an elementary school teacher, organist, bank employee, member of Arboga City Council and as editor of *Arboga tidning* (Arboga News). He also started a local teachers' association. He gained great success as a textbook author, primarily in the subjects of elementary science and geography.⁷⁵ His *Lärobok i naturlära för folkskolor* (Textbook in science for elementary schools) was published in 1872 by Lars Johan Hiertas publishers.⁷⁶ In the preface to his textbook Celandér wrote that he 'during years of work in the elementary school's has [...] like many another elementary school teachers found that what had hitherto has been published in this subject, in one or another respect has not corresponded to the needs [of the elementary school]'. He further noted a lack of systematisation in the more comprehensive elementary science textbooks available on the market, something that according to Celandér made it 'near impossible to bring "orderly knowledge" out of the content'. Regarding the more comprehensive textbooks of that time, Celandér remarked that they had 'been too scant or fragmentary, so that only certain parts of science are dealt with and others arbitrarily left out'.⁷⁷ In conclusion, he stated that those who had written textbooks had not sufficiently understood the conditions of elementary schools.

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⁷⁵ J. Paulan, 'Gustaf Magnusson Celandér', *Svensk Läraretidning* 34, no. 19 (1915): 352.

⁷⁶ Gustaf M. Celandér, *Lärobok i naturlära för folkskolor* (Stockholm: L. J. Hiertas förlagsexpedition, 1872).

⁷⁷ Ibid., preface.

An analysis of textbook prefaces provide show that while the prefaces of Hoffmann's, Hartman's and Schlez's textbooks include arguments in favour of science as part of elementary schooling, the prefaces of Celander, Berg and Lindén contain arguments on how such textbooks should be written. Wahlstedt, a grammar school teacher who achieved success with textbooks on elementary science in late nineteenth century Sweden, simply argued in his preface that the textbook followed the national curriculum of 1878.⁷⁸ All in all, the prefaces of nineteenth century elementary science textbooks see a development from scientists arguing for science as an important area of knowledge and as an important part of elementary education to elementary teachers arguing for how science should be portrayed in an elementary textbook.

Grammar school teachers

Apart from scientists and popularisers of science, elementary school teachers saw interprofessional competition from grammar school teachers in relation to the development of ideas on how science should be taught and portrayed in elementary science textbooks. But even though such a competition must have been a fact taken the textbooks used, the relation between the professions was not that harshly articulated in late nineteenth century, on the contrary. One of their 'occupational leaders' was Sigfrid Almquist (1844–1923).⁷⁹ He received his Ph.D. in Uppsala in 1869, became a senior lecturer in natural history and chemistry in

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⁷⁸ Lars Johan Wahlstedt, preface to *Folkskolans naturlära* (Christianstad: Boktryckeri- aktiebolagets tryckeri, 1879).

⁷⁹ Tracey L. Adams, 'Interprofessional Relations and the Emergence of a New Profession: Software Engineering in Canada, the U.S. and the UK', *The Sociological Quarterly* 48, no. 3 (2007): 507–32, 508.

1880 and worked, among other things, as the principal of a grammar school.⁸⁰ He also wrote science textbooks aimed at grammar schools, textbooks that were also used in some elementary schools.⁸¹ At the fourth general Nordic teacher meeting in 1880, Almquist gave a talk entitled 'On the teaching of science [Naturkunnighet]' where he expressed the opinion that the teaching of the subject was 'conducted in an unsatisfactory manner'.⁸² Almquist addressed the situation in grammar schools, but in a short passage he commented on the elementary school. The subject was still new there, he claimed, and still had not found its right expression. He warned those who developed the subject in elementary schools about copying grammar school teaching: 'there is a good deal here for the elementary school to fetch' but 'teaching there is far from any model'. To further emphasise the differences between the two types of schools, Almquist claimed that the elementary school should not be:

regarded as some lower division of the – or preparation for – the grammar schools, but as an independent institution with other conditions, and other provisions, and whose teaching should be as complete a whole as in the grammar school, and that therefore it is no good to simply apply to the former what has proven good for the latter.⁸³

That Almquist, a main representative of the science subject in grammar schools, so strongly highlighted a difference between the teaching that would apply to grammar schools and that

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⁸⁰ 'Sigrid Almquist död', *Svensk Läraretidning* 42, no. 43 (1923): 831.

⁸¹ Example: Sigfrid Almquist and Nils Lagerstedt, *Lärobok i naturkunnighet* (Stockholm: P. A. Norstedt & söners förlag, 1878).

⁸² Sigfrid Almquist, *Om undervisningen i naturkunnighet : Föredrag vid 4:e allmänna nordiska skolmötet i Stockholm sommaren 1880* (Stockholm: P. A. Norstedt & söner, 1883), 2, 5.

⁸³ *Ibid.*, 16.

which would apply in elementary schools, shows that there was room for elementary school teachers to develop their own approach to elementary science. The fact that the school system at this time in Sweden was strongly differentiated of course contributed to this division of labour between the teachers of different types of school. The children of the gentry were normally home-schooled in the years before entering grammar school. The state-controlled elementary education did not qualify pupils for grammar schools. It was not until the educational reforms of the early twentieth century that such possibilities were introduced. Another fact contributing to the lack of major conflicts between elementary and grammar school teachers was that it was not until late nineteenth century that grammar teachers started developed as a teaching profession, in mid nineteenth century they mainly saw themselves as physicists, chemists and biologists rather than as teachers, which had made them weakly organised as a community, and probably made them more interested in developing their own professional identity in relation to education, than starting to compete with other teaching professions.⁸⁴

Elementary teachers create ‘monopoly’ on the elementary science textbook market

The textbooks that in many ways epitomise the shift of science textbooks used in schools, from being mostly written by scientists to being mostly written by elementary teachers, were the textbooks by Berg and Lindén. The first edition of their textbooks appeared in 1889. In the 1940s the publisher celebrated that these textbooks had sold over two million copies. Just a handful of textbooks in Sweden have ever approached that level. Bestselling textbooks in the late nineteenth and early twentieth century typically sold between 500,000–800,000 copies

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⁸⁴ Christina Florin and Ulla Johansson, *‘Där de härliga lagrarna gro...’: Kultur, klass och kön i det svenska läroverket 1850–1914* (Stockholm: Tiden, 1993), ‘6’; Åke W. Edfeldt, *Lärarutbildning: Ämneslärarnas utbildning i psykologi och pedagogik* (Stockholm: Liber, 1961).

over their lifespan. Berg and Lindén's textbooks were so dominating that for decades they had what has been described as 'a monopoly position' in the field of elementary science.⁸⁵

Unlike Berlin, Berg and Linden grew up with the elementary schools as an established institution in Sweden. They were both teachers at Stockholm elementary schools and had been educated at the teacher's college. The first edition of their textbook was released in 1889 and sold out within a year. Like Berlin's textbook it was translated and used in Norway and Denmark (Berlin's textbooks were also translated into Finnish and German).

Berg came from an important family in the history of Swedish elementary education. His father, Anders Berg ran an experimental school in Finspång, where new ideas in education were tested. Hjalmar's brother Fridtjuv Berg (1851–1916) was one of the most influential elementary teachers in history. Fridtjuv was for a time a member of the editorial board of *Svensk Läraretidning*, minister of ecclesiastical affairs in 1905–1906 and 1911–1914, and one of the key figures behind the school reforms in 1918/19, reforms which paved the way for a more interconnected and thus more egalitarian school system, linking previously weakly linked school forms such as elementary schools and grammar schools through harmonizing curricula etc.⁸⁶ Hjalmar thus belonged to a family that came to hold an important position as occupational leaders of the profession.

Berg and Lindén's textbook came into being in the 1880s and in the context of the Stockholm elementary teacher association. In the words of Berg, it was a vibrant community that shared

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⁸⁵ N. O. Bruce, *Svenska folkskolans historia IV: Det svenska folkundervisningsväsendet 1900–1920* (Stockholm: Albert Bonniers förlag, 1940), 458.

⁸⁶ Tomas Englund, *Curriculum as a Political Problem. Changing Educational Conceptions with Special Reference to Citizenship Education* (Lund: Studentlitteratur, 1986).

an interest in the 'transformation of elementary school teaching, its syllabuses, textbooks, etc. and people willingly sacrificed time and energy to participate in such a purpose'.⁸⁷ At a meeting in 1883 with the Stockholm teachers' association, Berg and Lindén were selected among a group of four to conduct a review on elementary science textbooks. Berg claims he was surprised to hear his name suggested as he was one of the younger members of the association and had not been that active.⁸⁸ The importance of a vibrant community to a successful textbook has been underlined in previous textbook research.⁸⁹ That the textbooks were not the work of single men, but developed as part of a profession and through joint efforts certainly contributed to establishing a shared set of norms more highly anchored in the elementary teacher profession than would otherwise have been the case, and this was probably an important factor behind the success of Berg and Lindén's textbooks.

Berlin's textbook was one of the textbooks reviewed by the committee.⁹⁰ Apart from a few positive, general and respectful comments about the style and the scientific reliability the major part of their review focused on deficiencies: the lack of organising principles for the content, improper selection of content, lack of educational structuring principles, factual errors, language errors, and so on.⁹¹ Berlin's textbook, with time, become a symbol of the time when the subject of science had not been adapted for the elementary school, which says more about elementary teachers' strategy of positioning themselves as more suited to writing these

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⁸⁷ Hjalmar Berg, *Hågkomster från en lång levnad* (Stockholm: Magn. Bergvalls förlag, 1942), 204.

⁸⁸ Ibid., 204.

⁸⁹ Shapiro, *Trying Biology*, 57.

⁹⁰ Berg et al., *Granskning af läroböcker*, 20–5.

⁹¹ Ibid., 23–4.

textbooks, than about the actual content.⁹² Right there and then, Berlin's textbook was the major competitor, the point of reference. In a letter to his brother Fridtjov in August 1890, Hjalmar Berg expressed concern about the new edition of Berlin's textbook: 'Do you have any idea who is revising Berlin's elementary science? [...] it's going to appear in a new edition. [...] It is sad to hear about competitors'.⁹³ Berlin's revised textbook was published later that year and although it still re-appeared in new prints and editions until the 1920s, it was never a threat to the dominant position of Berg and Lindén's textbooks.

The initial intention of the textbook review did not seem to have been to construct a base for a new type of textbook. It was not until Berg got the mission from the Stockholm teacher association to see if the publisher P. A. Norstedt & Söner would be interested in publishing their textbook review that he received the proposal to write the textbook. When meeting Gustaf B A Holm, the CEO of Norstedt at that time, Berg told Holm about the review, whereupon Holm answered:

- And now you boys would like to have that statement printed and published?
- Yes, we want to inform other interested parties about what we found in our review.
- Then I think we'll agree that I will publish your statement free of charge, on the condition that you prepare a textbook on elementary science based on the principles you present here, and that Norstedt gets to publish it.⁹⁴

Although told through the memoirs of Berg, this may be a fairly accurate description of what happened. Norstedt was the dominant publisher of textbooks, a position they held until the

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⁹² Kärnfeldt, *Mellan nytta och nöje*.

⁹³ RA: Archives of the family Berg from Fellingsbro. Letter dated Stockholm August 9, 1890.

⁹⁴ Berg, *Hågkomster*, 209.

early twentieth century.⁹⁵ Textbooks constituted the bulk of books sold at that time in Sweden, and, especially for elementary textbooks, it was not uncommon for several hundred thousand to be printed. Norstedt actively conducted outreach activities during this time to fill gaps when it came to textbooks and non-fiction, and in some cases they also set up committees to develop guidelines for new textbooks.⁹⁶ In the late nineteenth century, the elementary textbook market was around 40 times as big as the grammar school textbook market. Fiction was at this time a minor market, and was only bought by the gentry. It was in the textbook market that publishers, booksellers and authors made money. In rural areas, books were sold by traveling salesmen. A so-called freed bookstore existed, but mostly books were sold through commission bookstores, in a system regulated through the Swedish publishers' association whereby publishers' books were sold on commission.⁹⁷ Regarding revenue, despite the huge differences in sales, a fiction author made about the same for a bestselling novel. To give a rough indication of what Berg and Lindén made from their enormously popular textbooks, they sold around 500,000 copies of different versions of their textbooks in the 1890s and received around 20,000 riksdaler in total in commission.⁹⁸ To give comparative figures, an elementary teacher made on average 700 riksdaler a year in the 1890s, and a university teacher around 4,000 riksdaler a year (a university professor more) and 3,000–6,000 riksdaler is what a bestselling novelist would get in the 1890s (as a lump

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⁹⁵ Johan Svedjedal, *Bokens samhälle: Svenska bokförläggareföreningen och svensk bokmarknad 1887-1943. Vol. 1* (Stockholm: Svenska bokförläggarefören, 1993), 254.

⁹⁶ Peterson, *Boktryckaren som förläggare*, 154–157.

⁹⁷ Svedjedal, *Bokens samhälle*, 37.

⁹⁸ Around 50,000 copies a year 1889-1898 were printed of their textbooks, and 115,000 in 1899 and 1900 respectively. The number of copies printed are found in Centrum för Näringslivshistoria; P.A. Norstedts & Söners tryckeri; D 2 B; Liggare över beställda tryck, 1888–1900.

sum, best-selling fiction had print runs of up to 5000-10,000 in the period 1890-1900).⁹⁹ That is, despite their huge success, Berg and Lindén did not make a fortune out of their textbooks, although they made a great deal compared to an elementary teacher's normal salary.

The textbook took Berg and Lindén three years to complete. Through the textbook review, they had laid a good foundation for their own writing. Weaknesses and strengths in textbooks had been highlighted and guidelines had been issued on how future textbooks should be designed. Their main thesis was that the selection of content should be made 'on the basis of the goal of teaching [...] and thus not solely or even chiefly on the basis on what from a purely scientific point of view may be more or less important'.¹⁰⁰ Here we see an argument that makes teachers and their experiences of teaching science vital to the writing of a good textbook on elementary science, and which distinguished their expertise from that of the scientist.

The first edition of their textbook was reviewed in the major teacher journals of the time, and these were long reviews, which extended over several issues. Such extended reviews on elementary science textbooks had never been printed before. The reviews were more than positive. The review in *Svensk Läraretidning* described the textbook as 'definite progress in the literary domain of elementary school textbooks'.¹⁰¹ The only criticism was that the textbook was perhaps too extensive for elementary school. A short version of the textbook was published in 1890, becoming as popular as the full version.

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⁹⁹ Svedjedal, *Bokens samhälle*, 221–237; Peterson, *Boktryckaren som förläggare*; 157–161; Sörensen, *Svenska folkskolans historia III*, 291–6.

¹⁰⁰ Peterson, *Boktryckaren som förläggare*, 8.

¹⁰¹ M. Nelander, 'Lärobok i naturkunnighet av Hjalmar Berg och Anders Lindén', *Svensk Läraretidning* 8, no. 21 (1889): 197–8, 198.

The specialisation of science seems to go in hand with Berg and Lindén's aspirations in this field, which meant that an individual scientist no longer had as broad an overview of science as a few decades before, which in turn made it hard for single scientists to master all of the fields of science. Berg and Lindén were probably aware of this since their textbook was distinguished from its predecessors in that the scientific review had been conducted by no fewer than three professors, two senior lecturers and two Ph.Ds. The collaboration with the scientists was highlighted in the review in *Svensk Läraretidning*:

The scientist cannot possess the particular experiences and insights needed in order to write good textbooks, and teachers can even less be in possession of the scientific knowledge, which alone can give the content full accuracy. But through cooperation between the two guardians a thing or two could be achieved.¹⁰²

The reviewer describes teachers and scientists as necessary actors in the making of good textbooks on elementary science. This was the way we needed to go, the reviewer continued, 'especially in the field of natural science; a field which is almost immeasurable'. No elementary science textbook had had as many reviewers; the normal number at that time was one or at the most two. At a time where science was seeing an increasing degree of specialisation, popularisers and teachers could argue that it was essential to portray science as a unified system of knowledge.¹⁰³ But this also points to another trait of teachers'

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¹⁰² Nelander, 'Lärobok i naturkunnighet', 197.

¹⁰³ Lightman, *Victorian Popularizers of Science*, 426, 461. Cf. John L. Rudolph, 'Turning Science to Account: Chicago and the General Science Movement in Secondary Education, 1905–1920', *Isis* 96, no. 3 (2005): 353–89; Lorraine Daston, 'The Academies and the Unity of Knowledge: The Disciplining of the Disciplines', *Differences* 10, no. 2 (1998): 67–86.

interprofessional development in nineteenth century Europe, although often born in conflict and extreme positions, they often ended in some kind of compromise.¹⁰⁴ In fact, they even had to cooperate with scientists, Holm, the CEO of Norstedt, explicitly stated that he did not publish textbooks by elementary teachers unless they had gone through a scientific review.¹⁰⁵

Folkskolans vän also reviewed Berg and Lindén's textbook. During the period 1885–1900, just a couple of other science textbooks were reviewed in this journal that otherwise mostly reviewed textbooks on Swedish, Song, Geography and Christianity. The length of the review of Berg and Lindén's textbook stands out, since it was ten times the length of other science textbook reviews – the review was divided up into three issues of the journal.¹⁰⁶ In sum, the sheer length of the teacher journal reviews points to something extraordinary, at least as portrayed by the journals and the reviewers.

The review in *Folkskolans vän* gives another point of view of the extent of Berg and Lindén's textbook. Actually, what *Svensk Läraretidning* deemed too extensive might very well have been an argument to buy the textbook: 'The textbook [...] will certainly prove to be able to satisfy the claims which are now set for elementary science'.¹⁰⁷ It seems like the textbook of Berg and Lindén was perceived by the reviewer as providing a vision of what was possible to achieve in elementary science. And the reviewer goes even further, stating the fact that the:

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¹⁰⁴ Meyers, 'Primary Schoolteachers', 38.

¹⁰⁵ Peterson, *Boktryckaren som förläggare*, 163.

¹⁰⁶ Compare to the review of new edition of Wahlstedt's textbook in 1897, a major competitor to Berg and Lindén's books. The review is short and good but does not contain any of the distinctions made in relation to Berg and Lindén's textbook. Unsigned, 'Lärobok i naturkunnighet', *Folkskolans vän*, 17, no. 44 (1897). Wahlstedt's textbooks sold in over 100,000 copies.

¹⁰⁷ C. J. A., 'Lärobok i naturkunnighet', *Folkskolans vän*, 5, no. 36 (1889): 210–11.

[...] elementary schools have had so few textbooks on this topic to choose between depends mainly on the fact that few writers have found themselves sufficiently versed in the wide field of science to dare to compete. A textbook in elementary science must contain the most important aspects from all branches of science, and moreover must portray everything in a well ordered instructional form and in an attractive and instructive manner to attain any value as teaching material, and these are criteria, which are by no means easy to fulfil.¹⁰⁸

All in all we get the impression of a systematically structured and logically founded textbook that sets the bar high for elementary schools, and that has been written by men of extraordinary ability. Even the typography was praised by the reviewer. But was this view of the textbook shared by others, for example by school inspectors?

The development of elementary science from the perspective of school inspectors

Given the developments described in the previous chapters, one might ask whether, and if so, how, the school inspection contributed to this. What was important to inspectors? After all, the inspection was created in the 1860s as a means to improve teaching in schools. Inspectors were governmental officials with the authority and ability to influence developments in schools.

Textbooks seem to have been one of the main first concerns of the inspectors, according to the accounts of the very first inspection periods in the 1860s. The textbooks of Berlin did not reach success overnight; as mentioned previously, even in the early 1860s, few teachers

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¹⁰⁸ C. J. A., 'Lärobok i naturkunnighet', *Folkskolans vän*, 5, no. 34 (1889): 194–5, 194.

taught more than the 'minimum curriculum'. And even in cases where science was taught in the 1860s, not much time was allocated to it and the use of science textbooks seems to have been scarce. But when a textbook is mentioned in inspector reports, it is Berlin's, and where no textbooks were being used, it is clear that several of the inspectors had recommended the use of Berlin's textbook.¹⁰⁹ All in all, the development of elementary science education as described in the reports seems to have followed the success of Berlin's textbooks in the 1860s. In one of the more elaborated reports from the second inspection period 1864–1866, the importance of Berlin's textbooks was underlined:

During the four to five years Berlin's reading book has been used in elementary schools, the knowledge and interest in the life and phenomena of nature has increased radically, and not only in schools but also through the spread among the peasantry of this eminent and popular book. Therefore, you can hear quite a lot about nature from children, although their knowledge still is not very wide or coherent.¹¹⁰

By the late 1870s it appears that elementary science was fairly well established. Time was allocated to the teaching of the subject in a high proportion of schools and the supply of textbooks was good, although far from the full curriculum was taught. Berlin's textbook was by far the most widespread, followed by those of Celanders and Segerstedt. According to

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¹⁰⁹ G. V. Shotte, 'Strengnäs stift', in *Berättelser om folkskolorna i riket för åren 1861–1863* (Stockholm: P. A. Norstedt & söner, 1865), 39. On the dominant position of Berlin's textbook, also see inspector report: A. G. Borgen, 'Strengnäs stift', in *Berättelser om folkskolorna i riket för åren 1861–1863* (Stockholm: P. A. Norstedt & söner, 1865), 92.

¹¹⁰ A. Rundbäck, 'Wexiö Stift', in *Berättelser om folkskolorna i riket för åren 1864–1866* (Stockholm: P. A. Norstedt & söner, 1867), 20.

inspector Herman Emanuel Herrmansson, these were found in 104, 15, and 11 of the visited schools respectively.¹¹¹

Given the important role of the inspectors in both spreading the use of and arguing for the excellence and importance of Berlin's textbooks one wonders about their role in relation to Berg and Lindén's textbooks? Did they play the same role as in the case of Berlin's textbooks? The short answer is no. Already in the inspector reports from the period 1887–1892, covering the years that the textbooks of Berg and Lindén were introduced, it is clear that Berg-Lindén's textbooks had attained a strong position. Four textbooks recur in the reports as being by far the most used in the period 1887–1892: Berg-Lindén's, Berlin's, Celandér's and Wahlstedt's, with the first two being the most dominant. But other than noticing the books used, the reports does not say much about this issue.

Over all, most inspectors seem satisfied with the textbooks used in the 1890s, no matter which of the four textbooks mentioned above were used – and none of these stand out. In fact, the main concern of the inspectors is not, as in the 1860s, textbook supply. The supply of textbooks in the 1890s seems to be good, except for some small rural schools and moving schools (*flyttande skolor*). Instead of being concerned with textbook supply, the inspectors point to other issues, such as misuse of textbooks. According to several inspectors, an example of bad teaching in elementary science is students reading from the textbook, with the teacher

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¹¹¹ H. E. Herrmansson, 'Del I: Upsala erkestift, avsnitt II: Hagunda, Lagunda, Trögds, Åsunda mm.', in *Berättelser om folkskolorna i riket för åren 1877–1881* (Stockholm: P. A. Norstedt & söner, 1883), 43.

at most making a remark here and there.¹¹² This only leads to rote memorisation and no meaningful learning, according to the inspectors. The real concern for inspectors during this period is to encourage the use of wall-charts, experimental equipment, plant specimens and other artefacts in the elementary science classroom. They argue for the importance of activity, and of training the perception of the children (*åskådningspedagogiken*, mentioned earlier), which will lead to meaningful learning and thorough knowledge.¹¹³ This emphasis on perception in pedagogy is also seen in changes in the textbook genre. In late nineteenth century textbooks, focus is more clearly on careful descriptions of plants and animals as objects, and not, as in the mid-nineteenth century, on other issues such as the usefulness of animals to men, in which part of the world they live etc. In the early twentieth century there is a further shift in this, as the focus moves to objects of nature in context; that is, the living community principle.¹¹⁴ In books, instead of plants and animals being pictured in isolation, they start to appear in their natural habitat, actively portrayed.¹¹⁵ Such changes in more general pedagogy were reflected in textbooks. But it is clear, as inspector Gustaf Insulander notes, that books and wall-charts alone do not produce good teaching in this subject; instead, science education demands a lot of the teacher.¹¹⁶

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¹¹² Johan Odin, 'Berättelser om folkskolorna inom Visby stift. I. Norra kontraktet mm.', in *Berättelser om folkskolorna i riket för åren 1877–1881* (Stockholm: P. A. Norstedt & söner, 1883), 16.

¹¹³ For example P. O. Lundkvist, 'Berättelser om folkskolorna i Hernösands stift. V. Säfvars, Bygdeå, Nysätra m.fl. pastorat', in *Berättelser om folkskolorna i riket för åren 1877–1881* (Stockholm: P. A. Norstedt & söner, 1883), 75.

¹¹⁴ Kohlstedt, 'Nature-Study Movement', '5'.

¹¹⁵ Hultén, *Naturens kanon*, 73–80.

¹¹⁶ Gustaf Insulander, 'Berättelser om folkskolorna inom Upsala Erkestift. IV. Gestriklands östra och västra kontrakt', in *Berättelser om folkskolorna i riket för åren 1893–1898* (Stockholm: P. A. Norstedt & söner, 1900), 101.

All in all we can conclude that the inspectors had no significant role at all in contributing to the vast spread of Berg and Lindén's textbooks. While the supply of textbooks was the main concern of inspectors in the 1860s, the supply of textbooks was good in the 1890s and focus had moved to how textbooks were used and that textbooks were not enough for achieving good teaching in elementary science. But the direction taken in elementary science textbooks of late nineteenth century Sweden was not appreciated by everybody, as mentioned earlier. Ernst Westberg, school inspector in Hälsingland, complains in his report published in 1906 about the elementary science taught in his district:

There should, to the extent to which independent elementary school literature can emerge, even in this school subject be a real difference between the more strict scientific and the more practical and public science education.¹¹⁷

Although not specifically mentioning Berg and Lindén's work, it is clear that there were other opinions about the direction of elementary science and that the 'strict scientific' direction was not appreciated by all.

Concluding remarks

This has been a study of how different professions positioned themselves in relation to the writing of elementary textbooks, and about changes in these positions and in the textbook market during the nineteenth century. While the practitioners and popularisers of science established the genre as such, writing the first textbooks on elementary science and arguing for its place in elementary education, and achieving vast spread of the books and high status through help from school inspectors, elementary teachers were prime movers in developing

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¹¹⁷ Westberg, 'Hälsinglands östra'.

the genre of elementary science textbooks in late nineteenth century Sweden, both pedagogically and scientifically. It was elementary teachers that addressed these questions and that received recognition for their efforts in textbook reviews. One key aspect of science textbooks that elementary teachers raised was the idea of portraying science as a unified field of knowledge, a striving that the elementary teachers shared with nineteenth century popularisers of science.¹¹⁸ In fact, at a time where science was seeing growing specialisation, the need for unity was a key concern, even for the scientists themselves.¹¹⁹ But whereas scientists addressed this as an epistemological problem, teachers such as Celander, Berg and Lindén reframed this from the perspective of the knowing child.

But still, one might ask, were the textbooks of Berg and Lindén as important as they seem from their reviews and their huge success and spread? Did the elementary teachers gain professional control over the elementary science textbook and did they manage to claim expertise in this field? From inspector reports, they did not seem that different from other textbooks used; no distinctions were made between textbooks made by scientists (such as Berlin), grammar school teachers (such as Wahlberg) or elementary teachers (such as Celander, Berg and Lindén) in reports of the 1890s. This question cannot be fully answered by this study. More material would be needed, such as teachers' views on the importance of these books, and why local school boards bought these textbooks and not others. All the same, Berg and Lindén's elementary science is one of the most successful textbook series in Swedish history. In their efforts, they not only contributed to further strengthening the cultural status of science in late nineteenth century Sweden but probably strengthened the elementary teacher profession as a whole, more clearly formulating an educational perspective on

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¹¹⁸ Lightman, *Victorian Popularizers of Science*, 426, 461.

¹¹⁹ Daston, 'The Academies and the Unity of Knowledge', 68.

elementary science, even though this did not lead to explicit jurisdictional control over textbook authorship or recognition for this amongst competing groups such as scientists, school inspectors or grammar school teachers.

It is of importance to note that the success of Berg and Lindén's textbooks was not due to low ambitions regarding the content of elementary science. As noted, the extensive ambition of their textbook in relation to science might very well have been an argument to buy their textbooks. The value and popularity of a textbook is not only judged in terms of what is reasonable and possible in relation to the curriculum, but also through the visions it can evoke. Instead of a patronising tone, elementary science could also be part of a more 'objective' world view, just as in grammar school science. From textbook reviews and prefaces it is clear that elementary teachers addressed the need to keep elementary textbooks up to date with the developments within science. And as teacher journals were widespread, they were read by most teachers, and it is likely that the tone of the reviews gave a certain aura of representing something new to the textbooks of Berg and Lindén. Jørund Falnes, writing in relation to the developments of elementary science in Norway during the first decades of the twentieth century, claimed that it was the context of experimental science that made the elementary science textbooks of Andreas Holmsen and Ole Andreas Strøm immensely popular.¹²⁰ It is not unlikely that the popularity of Berg and Lindén's textbooks in Sweden not only lay in pedagogical ambitions, but also lay in their scientific content.

That scientists with few exceptions left the elementary textbook arena during the second half of the nineteenth century is not surprising, given the rising status of science and the difficulties met by scientists in claiming authority over fields where other groups also made

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¹²⁰ Falnes, '*Vi begynner saaledes*'.

claims, such as popular science and elementary textbooks.¹²¹ Furthermore, nineteenth century elementary schools were not seen as an arena for future scientists due to the highly differentiated school system. But this does not mean that scientists left the field for good. In the post-war period the direction taken in primary and secondary science textbooks was seriously disputed by scientists. The West seemed to be lagging behind in terms of its scientific edge and the school system had to take the hit.¹²² This led to the launch of curriculum projects headed by leading scientists in the United States that came to have a wide impact on science education, including in Sweden.¹²³ On top of this, the supply of personnel for the scientific workforce had become a national concern by the mid-twentieth century.¹²⁴ This created new conditions for interprofessional competition, and thus for what could and could not be written, and by whom, in an elementary science textbook, which emphasises the thesis of this paper, that the content of textbooks must be understood in the context of changing interprofessional relations. Trying to understand such interplay can give new insights into how science is portrayed in textbooks and why.

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¹²¹ Lightman, *Victorian Popularizers of Science*, 496.

¹²² John L. Rudolph, *Scientists in the Classroom: The Cold War Reconstruction of American Science Education* (New York: Palgrave, 2002).

¹²³ Hultén, *Naturens kanon*, 169.

¹²⁴ Daniel Lövheim, 'Scientists, Engineers and the Society of Free Choice: Enrollment as Policy and Practice in Swedish Science and Technology Education 1960–1990', *Science & Education* 23, no. 9 (2014): 1763–84.