**Introduction**

In the mid-twentieth century, Dr. Emil Feuerstein (1912-1993) published through Sreberk Press in Tel Aviv a book entitled *Jewish Discoverers and Inventors*. Feuerstein, a native of Hungary, had begun his education in a traditional Jewish school, but went on to study in universities in London and Basel (Tidhar 1949, 1362). After his immigration to Palestine in 1935, Feuerstein published popular Hebrew-language science books, many of which were aimed at young readers. *Jewish Discoverers and Inventors* began with a dedication to the author’s son – “A gift to my firstborn son Benjamin on the occasion of his *bar mitzvah*” (Feuerstein [1953] 1955, 3) – and its publication by Sreberk, which specialized in children’s literature (Neiger 2017, 102-106), was in keeping with the book’s intended audience. A look at the book’s table of contents reveals a lengthy series of nineteenth- and twentieth-century Jewish figures, well-known and obscure alike, who contributed to the development of science and technology in the modern era. The list includes, among others, Siegfried Marcus (1831-1898), one of the first developers of the automobile; Isaac Merritt Singer (1811-1875), inventor of the sewing machine; Wolfgang Pauli (1900-1958) and Albert Einstein (1879-1955), winners of the Nobel Prize for physics; and Chaim Weizmann (1874-1952), the chemist and inventor who served as the State of Israel’s first president.

 Feuerstein extolled the role of Jews in the advancement of modern science and technology. In the book’s first chapter, “Jewish Genius Nobel Laureates,” Feuerstein describes at length the high percentage of Jews who have been awarded this prestigious prize. In his telling, the magnitude of this achievement had been obscured by the fact that prizes are listed according to the winners’ countries of origin. Feuerstein detailed how the Nazis had stolen the credit for the design of the first automobile model from the German-Jewish inventor Siegfried Marcus (Neiger, 60–64), and related the difficulty and poverty Albert Einstein endured in Switzerland because of his Jewishness (Neiger, 97).

 What were the goals of Feuerstein’s book? First, to spread scientific and technological knowledge, such as the function of penicillin, the structure of the atom, and the technological basis for such appliances as the loudspeaker and radio. In so doing, Feuerstein gave voice to the notion that scientific and technological knowledge was of great practical use to the young generation. The scientific revolution that took place between the sixteenth and eighteenth centuries in Europe gave birth to new fields of knowledge, leading to fundamental changes in the realms of religion, society, and economics. Technological innovations based on scientific knowledge reshaped contemporary daily life, and led to the creation of an educational literature that disseminated, detailed, and explained the fundamental principles of these innovations. The foundational work by John Amos Comenius (1592-1670), *Orbis sensualium pictus*, written in the seventeenth century and intended for children, included illustrations encompassing a wide range of scientific subjects, including the water cycle in nature, various animals, and the organs of the human body, even familiarizing its young audience with modern technologies such as the printing press (Comenius 1658). In the first half the eighteenth century, popular science books for children and young adults began to appear, some of which attained wide distribution, testifying to the importance of this particular medium to the dissemination of the ideals of modernity and enlightenment (Koepp 2006). The novel program presented by Jean-Jacques Rousseau in his 1762 book *Emile* dealt with changes not only to educational methods, but to educational content as well. According to Rousseau, children should be taught things relevant to their own world, and thus Emile experientially studies geometry, geography, astronomy, physics, and chemistry (Rousseau [1762] 2009, 306-330). Following in Rousseau’s footsteps, the Philanthropin movement, arising in northern Germany in the final third of the eighteenth century, sought to create a foundation of rational education, in the spirit of the Enlightenment, with an emphasis on the natural sciences. The German reformers stressed that the educational process should be interesting, enjoyable, relevant, and helpful to its young charges. They also devoted attention to professional and practical education, with special emphasis given to scientific topics. Natural and geographical studies were granted a central position, and the reformers’ schools included nature exhibits and laboratories, and augmented the course of study with the planting of educational gardens, nature tours, and other activities (Simon 1953; 151; Brüggemann und Ewers, 1982, 32; Wild, 1990, 53; Bowen 1981, 197-201; Schmitt, 1990, 165).

 But the dissemination of science and technology among children and young adults was not only meant to prepare them for a thorough integration into modern, industrialized society. Just as prominent was the role of science and technology in establishing the young person’s national identity. Scientific and technological education became an indicator of modern education itself. As the eighteenth century yielded to the nineteenth, Napoleon established an educational network of military academics, which supplanted the religious educational system. Prussia too, as one of France’s competitors, established a national, modern educational system (Bowen 1981, 244-257). During the nineteenth century, especially in its second half, knowledge of science and technology became an integral part of the formal educational curriculum in Europe and the United States, spreading through interaction with economic, political, and social necessities (see, for example: Donnelly 1991; Donnelly 2001, 14-20; Lerman 1997; Kohlstedt 2010, 11-36).

 Aside from reforms in formal education, which were often carried out with unsatisfactory sluggishness, other elements of culture, through the medium of recreational literature, provided children and young adults with scientific and technological knowledge. Pierre-Jules Hetzel (1814-1886), who for fifty years was the central force in the French publishing world, felt that his country’s loss in its war against Prussia (1870-1871) was the result of its inferiority in scientific knowledge. For many years, he edited a bimonthly children’s magazine that published entertaining stories about science, as well as texts extolling the virtues of scientists. Through his publications and his publishing house, he also provided an outlet for the important science fiction writer Jules Verne (1828-1905). Verne’s books were based on a deep scientific and technological knowledge of his era, and the majority of his readers were young people. The notion that France’s future success was bound up in scientific and technological domination, and that scientific knowledge held latent educational and patriotic themes, struck root in French culture in the latter third of the nineteenth century (Hendrick 1992; Unwin 2000, 46-48; Evans 2000). In nineteenth century England, too, youth publications served as an alternative channel to the official educational network, and worked to increase children’s curiosity and interest in the fields of science and technology. They included zoological knowledge, presented experiments in chemistry and electricity, and more. Some of these newspapers were widely distributed (Dixon 2001; Noak 2004; Kohlstedt 2010, 31; Sheets-Pyenson 1985, 560). Alongside religious and political leaders, and sometimes even in their place, scientists and inventors became figures of much admiration. Biographical or autobiographical texts on Isaac Newton, Benjamin Franklin, or Louis Pasteur became classics of educational literature (for examples of this, see Theerman 1990; Sinkoff 2000; Hendrick 1992, 149).

This phenomenon made its presence known in the Jewish world as well. Beginning in the final third of the eighteenth century and throughout the entirety of the nineteenth, the corpus of popular scientific literature for children and young adults in the Jewish world continuously expanded. This literature was largely written in Hebrew, or as bilingual texts in Hebrew and the state language. Its creators were chiefly adherents of the Haskalah, the Jewish Enlightenment movement, and it constitutes part of an expansive corpus of Hebrew scientific texts created in this period.[[1]](#footnote-1) This literature expressed the aspiration on the part of the Haskalah to reform Hebrew as the language of Jewish culture,[[2]](#footnote-2) as well as its desire to expand avenues of correspondence with non-Jews by enriching scope of scientific and technological knowledge for the young generation of Jews. The consciousness that the nation’s future was dependent on the emphasis of scientific and technological knowledge among the youth spread throughout the Jewish world as well.

The connection between scientific knowledge and nationalist perspectives is especially prominent in Feuerstein’s book *Jewish Discoverers and Inventors*, described above. As stated, Feuerstein referred to efforts by non-Jews, particularly the Nazis, to strip Jewish scientists and inventors of their achievements. Through his book, the author strove to bolster his young readers’ sense of national pride on the basis of the achievements of noteworthy Jewish scientists and inventors. Feuerstein depicted the Jewish scientists and inventors in his book as role models, worthy of imitation by the young generation of Israelis. Moreover, he emphasized that these figures’ achievements in science and technology were the result of the unique character of the Jewish people. Thus Feuerstein gave voice to a notion rooted in twentieth century Western culture: namely, that members of the Jewish people had exceptional intellectual abilities. This myth found its origin in the ideas of scientific and intellectual figures from the nineteenth and early twentieth centuries, who argued that, for good or for ill, the Jews were fundamentally different from other peoples on a biological-genetic level.[[3]](#footnote-3) The ascription of outstanding abilities to “the Jewish brain” or “the Jewish head” occurs in research studies (or pseudo-studies) and in the public discourse even today.[[4]](#footnote-4) The high percentage of Jewish Nobel Prize laureates, in particular, feeds this notion of the unique quality of the Jewish brain, while simultaneously demanding explanations from research science.

Looking at the success of Jews in the sciences in the modern age from a socio-historic perspective paints a complex picture. Jews’ distinction in the field came almost out of nowhere in the last third of the nineteenth century. A survey of the central figures in the scientific pantheon up until the beginning of the modern era reveals no Jews among them. Nicolaus Copernicus, Johannes Kepler, Galileo Galilei, William Harvey, Robert Boyle, Gottfried Wilhelm Leibniz, Rene Descartes, Isaac Newton – of all these trailblazers of the scientific revolution, not one is Jewish. From the Middle Ages until the early modern era, scientific studies were rejected by Jewish society, particularly in the Ashkenazi community. The desire to concentrate on religious studies left no room for those subjects not directly related to them, subjects that were sometimes even perceived as threatening, such as the heliocentric model of the solar system, to name one example.[[5]](#footnote-5) The rapidity and fervor of the Jewish conquest of the world of science since the end of the nineteenth century, and the titanic significance of some Jewish intellectuals’ research (such as that of Albert Einstein and Sigmund Freud), serve to obscure the fact that Jewish success in the sciences is a recent phenomenon. Considering the Jewish world’s remoteness from the world of science and its institutions prior to the last 150 years, it is this change that seems most surprising and in need of explanation.

Contrary to the attempt to ascribe these achievements to inborn genetic capabilities, some researchers find historical, social, and cultural explanations sufficient: the breakdown of the structure of the Jewish community, the strong desire on the part of Jews to integrate with their surroundings, the continuity of the tradition of scholarship, Jews’ significant investment in their children’s education, and the opening of universities to Jewish students (despite the academic establishment’s ambivalent attitude towards them). Botticinia and Eckstein, whose work covers the persistence of the Jewish people between the destruction of the Second Temple and the expulsion from Spain, argue that the Jewish minority developed into a “chosen few.” The mastery of reading and writing, which became a fundamental characteristic of Jewish culture, is, in their opinion, what was responsible for Jewish success in the modern era. Nevertheless, these researchers also delve into the difficulty of explaining Jews’ limited contribution to the scientific and technological revolution that occurred in the pre-modern and modern eras.[[6]](#footnote-6) Shulamit Volkov, who studies a group of Jewish scientists who lived at the end of the nineteenth century and the first third of the twentieth, described the social circumstances in which they worked and the methods they adopted in order to succeed in the academic sphere. The main contributing factors of their success were, according to her argument, the strong familial encouragement they received to choose an academic career and succeed therein; their scientific style, which integrated innovation and conservativeness; and the necessity of finding creative ways of finding success at the margins of German academic, to which, as Jews, they were confined.[[7]](#footnote-7) Charpa and Deichmann point to the importance of the tradition of religious instruction in understanding Jews’ dominance of the sciences. This instruction was founded on principles of criticism and creativity, and exerted a profound influence on the scientific styles of Jewish scientists.[[8]](#footnote-8) According to Noah Efron, however, there should be no connecting this phenomenon with the tradition of scholarship. On the contrary, he argues that this Jewish attraction to the sciences was engendered by the “universal” character of science, which makes no distinction between nations and shrugs off religious baggage. Efron asserts that Jews in the modern era identified the latent potential of the sciences to bring them to the level of equality with non-Jews, thereby bringing about an improvement in their social condition.[[9]](#footnote-9)

This book will examine the spread of the new Jewish educational ethos, in which science acquired a central position. Modern Jewish education was an active participant in the dissemination of scientific knowledge, and especially in the dissemination of the notion that scientific and technological knowledge should serve as a cornerstone in the education of modern Jewish youth. Haskalah-aligned Jewish primary schools, which cropped up in various locations across central and eastern Europe from the late eighteenth through the nineteenth centuries, adopted a modern curriculum that included instruction in the sciences, thus clearly contributing to the change in the Jewish attitude towards science, and Jewish students’ affinity for it. But this phenomenon was apparently limited in its influence, as the actual number of students reached by the Haskalah educational network was small.[[10]](#footnote-10) From the mid-nineteenth century and onward, the phenomenon of Jewish children’s integration into public schools in Eastern Europe grew increasingly common,[[11]](#footnote-11) which doubtless contributed to the spread of scientific knowledge among the young Jewish generation. The opening of central and western European universities to Jewish students allowed young Jews to hope for a prestigious career in a scientific field. They enrolled in universities en masse, despite the many barriers placed between them and their dreams.[[12]](#footnote-12) The basic profile of the successful Jewish scientist in the German-speaking sphere at the end of the nineteenth century and the beginning of the twentieth was that of a bourgeois striver working to find belonging within general society.[[13]](#footnote-13)

By studying the autobiographies of central European Jewish scientists born in the nineteenth century, it is possible to recreate the life paths that led them to success in the sciences. What stands out in these autobiographies is the importance of speaking the state language, the parents’ urge to acculturate, and a certain distance from the Jewish framework and its traditional education. Thus, for example, Ferdinand Julius Cohn (1828-1898), the child of a Jewish family from Breslau who with time became a lecturer in biology at his city’s university, recounts in his autobiography a childhood devoted to study. By age two, he already knew how to read, and his interest in the natural sciences was apparent even then. His sources of knowledge, as well as his formal studies, were outside the Jewish realm. Cohn tells of how at the age of three, he read Georg Christian Raff’s textbook *Naturgeschichte für Kinder*.[[14]](#footnote-14) Cohn read the book in German, as opposed to one of the various Hebrew translations that had been published more than two decades prior (this topic will receive more attention later). His formal education took place within the state public educational system.[[15]](#footnote-15) As Charpa and Deichmann argue, it is difficult to determine to what extent the tradition of Jewish scholarship influenced his patterns of scientific work.[[16]](#footnote-16) The course of study of the Jewish chemist Fritz Haber (1868-1934), also a native of Breslau and the winner of the Nobel Prize in 1918, was entirely within the public educational system.[[17]](#footnote-17) Richard Willstätter (1872-1942), a native of Karlsruhe and winner of the Nobel Prize in chemistry in 1915, acquired his scientific knowledge at a young age from postage stamps and books in the state language. His formal studies were conducted at a pre-secondary public school, then at a secondary school in Nuremberg.[[18]](#footnote-18) The biography of Albert Einstein (1879-1955), winner of the 1921 Nobel Prize in physics, testifies to his distance from the Jewish realm. One of the foundational texts he read in his youth was *Naturwissenschaftliche Volksbücher.*[[19]](#footnote-19) The author of this popular scientific text was Aaron Bernstein (1812-1884), a Jewish native of Gdansk. His books, originally published in German, were partially translated into Hebrew, appearing in Warsaw in the 1880s. Einstein, of course, read the work in the original (the Hebrew translation of Bernstein’s scientific series in Eastern Europe will be discussed later).

It appears that the paths that led central European Jewish youths to the scientific world were largely non-Jewish in nature. These youths had been born to Jewish families undergoing rapid acculturation, who effectively took advantage of the opportunity to integrate into the public educational system. Even if Jews’ successes in scientific fields reflect the influence of the Talmudic tradition and their own personal biographies as Jews, as Charpa and Deichmann argue,[[20]](#footnote-20) it was their studies in Europe’s public educational systems that apparently had the most decisive impact. These young Jews internalized the modern educational ethos that favored the sciences – which had been spread through public primary schools, secondary schools, and the university.

The dissemination of the educational ethos of science and technology among Jewish groups in eastern Europe, however, followed a more circuitous route. This ethos was part and parcel of the process of modernization in Jewish education, and seeped into young people’s world through their use of the state’s public educational tracks as well. It can be assumed that the schools of the Haskalah, established across eastern Europe beginning in the early nineteenth century, contributed to some extent to the spread of scientific and technological knowledge. Even if these schools did not offer courses on the subject per se, the acquisition of foreign languages[[21]](#footnote-21) alone could allow students to acquire scientific knowledge from non-Jewish literature. These schools, however, were not broadly distributed. Much like the Maskilic schools in central Europe, these schools failed to attain a central position, and the percentage of Jewish students who attended them was not high. An additional path by which Jewish youths made their way into the world of science in eastern Europe ran through the rabbinical schools in Zhitomir and Vilna.[[22]](#footnote-22) Students in these institutions studied modern professions, including in the sciences. How up-to-date the scientific knowledge was, however, depended on the quality of the teacher.[[23]](#footnote-23) Another path for acquiring scientific and technological knowledge was state public schools, but this too had its limitations. Unlike in central Europe, the process of integrating Jewish students into the state educational network in nineteenth century eastern Europe was fraught with pitfalls. In Russia, for example, these difficulties stemmed from the Jewish community’s opposition to educational decrees in the first half of the century, as well as the trend towards the establishment of quotas limiting Jewish integration into the educational system in the century’s final two decades.[[24]](#footnote-24) Given this state of affairs, scientific literature in Hebrew constituted an important stage in the spread of the ethos of science and technology among Jewish youths. Through it, they could be exposed to their first scientific concepts and satisfy their curiosity about the technological innovations they encountered around them.

Reading the childhood memoirs of eastern European Jewish intellectuals and scientists instructs as to the circumstances by which they were exposed to the sciences, as well as to their fierce desire to be immersed in them and study them. Chaim Weizmann recalls his teacher in the public primary school in Pinsk, who was a gifted chemist, and indicates that he felt he owed all he knew to him.[[25]](#footnote-25) Still, Weizmann recounts a still earlier encounter with the sciences that occurred while he was still in traditional Jewish school. An outstanding teacher, with whom Weizmann remained in contact for his entire life, was behind it:

He was the typical “maskil,” that is to say, he was touched by the spirit of the Haskalah, which by then was widespread throughout the major centers of Russian Jewry. He would nimbly insert a few efforts at secular education in the breaks between religious studies. I remember how he brought into the classroom, both covertly and excitedly at once, a Hebrew textbook on the natural sciences and chemistry, the first book of its type to arrive in those places. How he came by such a treasure, I do not know, but without ever having seen a chemistry lab, and with no knowledge whatsoever of the natural sciences, typical of the ghetto Jews of Russia, he would delve into it and share its secrets with select pupils. He would even agree to loan it out to one student or another to read in the evenings. And sometimes – not without risk, since discovery of the deed would lead to his immediate dismissal – he would read to us a few pages in which he had found something of interest. Obviously, our reading was out loud and in the traditional sing-song of Gemara study, to the point that someone passing by outside would never suspect that we were not engaged in religious studies.[[26]](#footnote-26)

It is possible that the book Weizmann mentions here is the chemistry text *Book of Composition and Division* (Vilna, 1876), part of the series *Treasury of Wisdom and Science* by Zvi Hacohen Rabinowitz (who will be subsequently discussed in further detail). Eliyahu Hacohen claims that in an address before a conference held in Kharkiv (apparently in October 1902[[27]](#footnote-27)), Weizmann told of how the book had captured his imagination and led him to the scientific world.[[28]](#footnote-28) The Haskalah-touched teacher described by Weizmann was Rabbi Avraham Yitzhak Motolinsky,[[29]](#footnote-29) who also appears in the memoirs of Weizmann’s sister, Chaya Weizmann-Lichtenstein (1879-1959). In Weizmann-Lichtenstein’s telling, Motolinsky presented his students with contemporary Hebrew literature, including periodicals and scientific literature. He taught them the secret of the telegraph and explained to them how a train worked. Weizmann’s sister was of the opinion that this teacher had derived most of his knowledge from a book by the Berlin Jew Dr. Aaron David Bernstein, a few of whose books, as previously mentioned, were translated into Hebrew under the title *Knowledge of Nature*.[[30]](#footnote-30) She further indicates that her, her brother’s, and her sister Miriam’s years of study under Motolinsky, when they were between the ages of ten and twelve, left an indelible impression on their lives.[[31]](#footnote-31) This shows us that students could occasionally develop an affinity for scientific education through the traditional Jewish educational system, even if such an affinity was not regarded as an educational goal, and even considered subversive.

 Another testament to the importance of Maskilic teachers to the spread of the sciences was offered by the Russian-born Jewish historian Ben-Zion Dinur (1884-1973). Dinur recalls how his teacher would read aloud to his students on every Shabbat before the first of the month from Kalman Schulman’s books of Biblical geography *Shulamit, Harel*, and *Walking Eastward*. In the school Dinur established with his friends, which operated during breaks in their regular curriculum, they read modern Hebrew literature, including Schulman’s book *Foundations of the Earth*, which covered European geography.[[32]](#footnote-32)

 For those who demurred from the opportunity to take advantage of modern educational channels and were not lucky enough to have a teacher who exposed them to the subject, there remained a way to autodidactically acquire scientific knowledge through Hebrew scientific literature. As early as the eighteenth century, Salomon Maimon (1753-1800), a native of Lithuania who made a name for himself in the European philosophy of his time, described how he introduced himself to modern cosmology by pilfering a Hebrew textbook from his father’s bookcase.[[33]](#footnote-33) The trend of using popular scientific literature as an avenue for the acquisition of general knowledge continued even in the second half of the nineteenth century. As Ahad Ha’am (Asher Zvi Hirsch Ginsberg, 1856-1927) recounts in his memoirs, as a child of about eleven he dedicated his afternoon study breaks, which he was supposed to use to review Gemara, to instead study mathematics and engineering from the Hebrew book *Masterwork*.[[34]](#footnote-34) This particular book had been published in Berlin about a century prior (1765), and is ascribed to the author Elias of Pińczów. Ginsberg described his study of it as a true addiction, one by which he successfully freed himself from a unhealthy former habit – cigarette smoking. His actions were discovered when he began to scratch mathematical tables into the doors and windows of his house, and the book was taken away from him. He depicted *Masterwork* as the foundation for the rest of his autodidactic studies of mathematics: “I must admit, I acquired the first of my mathematical knowledge thanks to this event. And years later, when I studied mathematics from books more suited to the purpose, the knowledge I had acquired in the schoolroom still served me well.”[[35]](#footnote-35) Ginsberg recalls that among the other books that formed the basis of his mathematical knowledge, one that he would read in the bathroom for fear of his father and others was *Fundaments of the Understanding of Measuring*.[[36]](#footnote-36) This was a book by Hayyim Selig Slonimski, known by the Hebrew acronym Chazas, published in 1865 in Zhitomir. Slonimski, whose life and character will be described in more detail later in this book, operated in diverse channels dedicated to the spread of scientific knowledge, and became one of the chief popularizers of science for Jewish youth.

 Thus the cultural function of the sciences was different for Jewish youth in central and eastern Europe. The majority of Jewish children and young adults living in central Europe received their scientific knowledge in the state language, and were integrated into the public educational networks that propagated it. They perceived science as an avenue for social mobility. In eastern Europe, due to the dominance of tradition Jewish education and the sluggish integration of Jewish children into the general educational system, scientific attitudes and knowledge would be assigned a different function. Science served mostly as an agent of modernization and education. The text best exemplifying this is one by Yehuda Leib Katzenelson (1846-1917), known by the pen name “Buki Ben Yogli,” an important popularizer of the sciences in his era, and a children’s author beloved by Jewish youth (he will be subsequently addressed in greater detail). His testimonies to the influence Slonimski’s writings had exerted on him, long quoted in research literature,[[37]](#footnote-37) bear witness to science’s explosive potential to undermine young people’s universe and alter their relationship to the traditional framework. In his memoirs, Buki Ben Yogli describes an unsettling experience that befell him at age fifteen, upon reading Slonimski’s book on astronomy, *The Comet*.[[38]](#footnote-38) The heliocentric model it described, which was contrary to the ancient astronomical model common to the Jewish world, is what so shocked him.[[39]](#footnote-39) His reading of an article on the telegraph, published in the Hebrew scientific periodical founded and edited by Slonimski, *Hatzfira*, is described in almost ecstatic terms (this will be subsequently discussed in further detail).

 Slonimski’s book, as well as the periodical he founded, were not explicitly aimed at children and young adults. Yet documentary evidence shows that many Maskilic texts were consumed, and even written, by members of the young generation.[[40]](#footnote-40) This phenomenon is particularly apparent in Maskilic periodicals, which were officially aimed at the general public but were in fact appropriated by the youth. For example, Isaac Euchel, initiator and editor of the first Maskilic periodical, *Hame’assef* (which will be subsequently discussed in greater detail), saw the periodical as a project by young people, for young people: “For we were once young, and most of the men of our group who struggle in their labors after their meager daily bread, some who work in educating the young, some in matters of business […] and being published in sections each month, a sensation of novelty will stir in the young person’s heart and he will hurry to read it.”[[41]](#footnote-41) Almost eighty years after Euchel’s words were first published, the Maskil Kalman Schulman (1819-1899) asserted: “*Hame’assef* did much good for young people, much more than the schools themselves could.”[[42]](#footnote-42) Meir Letteris’ *Hatzfira* (1823) was also aimed at young readers.[[43]](#footnote-43) Joseph Perl (1773-1839), among the foremost educational reformers in Galicia (who will subsequently be discussed in greater detail), charged the periodical *Kerem Hemed* with the main task of spreading positive virtues among Jewish youth.[[44]](#footnote-44) Perl himself produced a periodical entitled *Tzir Ne’eman* for his primary school students in the 1820s, which will be subsequently discussed in greater detail. Maskilic literature was not only consumed by young people, but they were important participants in its creation, as Euchel pointed to when describing the mission of *Hame’assef* in the late eighteenth century. This trend continued until the end of the nineteenth century. Thus the correspondents relied upon by the Hebrew newspapers in late nineteenth-century Russia were, to a conspicuous degree, young people.[[45]](#footnote-45)

 The thirst for scientific and technological knowledge, and the motivation to acquire it and gain mastery over it, became the defining characteristic of the young Jewish generation. An analysis of Buki Ben Yogli’s description of how *Hatzfira* first came into his possession illustrates this:

One of my relatives, a politician by nature, while in Warsaw for purposes of commerce, upon hearing that a Hebrew gazette had begun publication there, rushed to subscribe himself to it, and brought back with him to Bobruisk three issues at once. “What a lousy deal I made,” he complained to me. “A lousy deal. I thought it would be about important people, Napoleon the Third and the Queen of England, and instead of that they print the devil knows what, bizarre things with pictures and drawings, like the drawings in tractates Kilayim and Eruvin that I was always afraid of. I regret wasting my money on it, and I paid for a whole half-year. You can have these issues. Maybe you, expert in Eruvin that you are, can find something worthwhile in them.”[[46]](#footnote-46)

Buki Ben Yogli’s adult relative, interested in politics, sees engaging with science and technology as a waste of time. The young Buki Ben Yogli, on the other hand, describes reading about them as a formative experience. This divide between old and young finds further expression in comments made by Isaac Weinert, the editor of the periodical *Hatzir*, published in Lviv from 1861 to 1862. Weinert made a similar editorial distinction: he directed political subjects towards the general populace, but approached technological innovations as being of particular interest to young readers (this will subsequently be discussed in greater detail).

 Young people’s attraction to science and technology naturally transformed them into emissaries of this knowledge in their native environments. After Buki Ben Yogli learned from *Hatzfira* how the telegraph worked, he taught its secrets to older attendees of the religious study hall, who were interested in politics. He stresses this singular experience, in which he, “the youngest in the group,” bequeathed knowledge upon his elders:

The little group that discussed politics had already gathered around the long table by the furnace. With trembling legs I approached them, and called out in a proud and bright voice: “Gentlemen! The secret of the telegraph is revealed, the secret of the telegraph is revealed!” “Really?” the members of the group said as one, and rose from their seats in astonishment. “Yes, yes, and I’m going to explain it to you.” At that moment, Napoleon and the Queen of England too were forgotten, and I, who already knew Slonimski’s article by heart, took a piece of coal from the furnace and drew on the white table the electrical battery and the key, the magnet and the writing machine – everything as it should be. The notion that I, the youngest in the group, was the main speaker today empowered me with the vocabulary to explain every detail explicitly and intelligently. As long as I spoke, everyone sat amazed and speechless so as not to interrupt me […].[[47]](#footnote-47)

Unlike older people who revered traditional literature and discussed political matters, Jewish youth thirsted after scientific and technological knowledge. A literary expression of this distinction appeared in a serial story entitled “A Story of a Time Gone By” in the periodical *Ivri Anokhi* in 1890.[[48]](#footnote-48) The protagonist of the story, sixteen-year-old Michael, immerses himself in Haskalah literature, and eventually this shameful fact is revealed in public. In a dramatic scene, Michael is judged for possessing Haskalah literature, among them a book called *Surely the Lord*,[[49]](#footnote-49) devoted a description of the theory of evolution:[[50]](#footnote-50)

In a great and lengthy hall […] sits Rabbi Hern in his greenish coat in his big chair, spreading open a small book with a scornful look in his eyes. Around the white table, to his left and right, old men encircle him*,* among them Shmuel the Seer and Yisrael Katina […] silence reigned in this dreadful place, no speech and no words, and the faces of those seated were all craned towards a poor, weak youth, standing with his eyes cast downwards at the table’s edge before the terror-inducing face of the rabbi, his brow furrowing and unfurrowing, a cloud seeming to cover his face […] as if he had no spirit of life in him whatsoever […]

 Rabbi Hern began speaking with fury: “Have you, Michael, in a garden of things holy, turned apostate? Has your heart grown bitter? You read books from the outside and seek to know what is above and below? Oh, fool and cretin!”

 Michael’s face fell, and the rabbi’s cheeks went red with blood as he continued to bitterly rebuke him in his burning rage: “I was young, and now am old, and never have I seen the righteous forsaken nor his seed begging for research. Look, fellows. Here we have a book, *Surely the Lord*. ‘Surely the Lord,’ with ironic intent – woe to the ears that hear such a thing!”[[51]](#footnote-51)

The description of Michael as a “poor, weak youth” before the old men judging him highlights the dichotomy between young and old, the borders of which are delineated by their respective areas of interest: the youth who wants to immerse himself in scientific knowledge is a symbol for the future of modern Jewish society, while the adults represent the ancient world of tradition, which has no place for modern science and technology.

 Thus, over the course of the nineteenth century, science and technology gradually became fundamental components of the modern Jewish educational ethos in Europe. The foundation of this new Jewish educational ideal had been laid by the Haskalah in the late eighteenth century, and it was assimilated into the ethos of the national revivalist movement roughly one hundred years later. Scientific and technological knowledge was spread via two interrelated routes: through Maskilic teachers who saw science and technology as vital to their students,[[52]](#footnote-52) and through popular Hebrew-language scientific literature that appeared in various books and periodicals, making this knowledge accessible to teachers and students alike. Jewish educational reformers adopted the importance they ascribed to scientific and technological subjects from the modern European educational model. This model emphasized the profound importance of the acquisition of scientific knowledge for the development of the young individual, as well as for the reinforcement of national identity. The overwhelming successes of central Europe-born Jewish scientists in the early twentieth century strengthened the scientific educational ethos and provided it with a firm basis for adoption by the founders of Zionism.[[53]](#footnote-53)

 This book details the process by which the scientific educational ideal crystallized within the Jewish world, from the late eighteenth until the late nineteenth century. It presents the various channels by which scientific and technological knowledge spread among children and young adults: through modern Jewish education; through direct contact with popularizers of science and technology in the Jewish world; or by consuming Hebrew-language popular science literature. Special emphasis will be placed on the consolidation of Hebrew-language scientific literature written especially for children and young adults, a phenomenon that became ever more widely established from the nineteenth century onward. The goal of this book is to delve into the cultural role ascribed during this era to scientific and technological knowledge in the construction of a modern Jewish identity for Jewish children and young adults, and in the establishment of a clear delineation between them and their elders.

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1. Shavit and Reinharz 2011. [↑](#footnote-ref-1)
2. Shavit 1993; Grossman 2000, 116-119. [↑](#footnote-ref-2)
3. For more on this issue, see Gilman 1996, 33-51; Schaffer 2008. [↑](#footnote-ref-3)
4. Katz 2002; Cochran and Harpending 2006. [↑](#footnote-ref-4)
5. For a comprehensive discussion of the gradual acceptance of the heliocentric modern in the Jewish world, see Brown 2013. Later in this book, I shall return to this discussion in the context of scientific texts aimed at Jewish children. [↑](#footnote-ref-5)
6. Botticinia and Eckstein 2012, 270-273. [↑](#footnote-ref-6)
7. Volkov 2001, 265-266; 269-270; 278-280. [↑](#footnote-ref-7)
8. Charpa and Deichmann 2007/2008, 81-82. [↑](#footnote-ref-8)
9. Efron 2007, 158-159, 165-174. [↑](#footnote-ref-9)
10. Eliav 1960, 173-174, 204-208; Zalkin 2000, 80-81; Zalkin 2000-2001, 244-246; Stanislawski 1993, 135; Levin 1976. [↑](#footnote-ref-10)
11. Fahn 1919, 71-74; Michman 1978-1979, 128-138; Rotman 1999, 57-92; Wistrich 1990, 24; Kieval 1987, 96. [↑](#footnote-ref-11)
12. Efron 2007, 171-173. [↑](#footnote-ref-12)
13. Volkov 2001, 261-263. [↑](#footnote-ref-13)
14. Cohn 1901, 16. [↑](#footnote-ref-14)
15. Cohn, 16. [↑](#footnote-ref-15)
16. Charpa and Deichmann 2007/2008, 98. [↑](#footnote-ref-16)
17. Stoltzenberg 2004, 12-20. [↑](#footnote-ref-17)
18. Willstätter 1949, 18-28. [↑](#footnote-ref-18)
19. Charpa 2007, 174. [↑](#footnote-ref-19)
20. Charpa and Deichmann 2007/2008, 108. [↑](#footnote-ref-20)
21. Zalkin 1997. [↑](#footnote-ref-21)
22. Dohrn 2001; Zalkin 1995; Slutsky 1993. [↑](#footnote-ref-22)
23. For more on this issue, see the description given in the memoirs of Haim Zev Margolis (1840-1911), a student at the rabbinical academy in Zhitomir, of his scientific studies under both an expert teacher well-versed in the subject matter and teaching in general, and one deficient in both. [↑](#footnote-ref-23)
24. See Edwards 1982; Stanislawski 1993; Kreuz 1994; Goldstewin 1986, 148-149; Nathans 2002, 261-266. [↑](#footnote-ref-24)
25. Weizmann 1953-1954. [↑](#footnote-ref-25)
26. Weizmann 1953-1954, 11. [↑](#footnote-ref-26)
27. See Weizmann 1986, 402-405. [↑](#footnote-ref-27)
28. Hacohen 1986, 36. I was unable to locate the speech in question and verify Hacohen’s assertion. In the same place, Hacohen indicates that Rabinowitz’s books opened a window onto the sciences for many long-time residents of the Jewish community of pre-state Palestine. [↑](#footnote-ref-28)
29. See Rose 1990, 13. [↑](#footnote-ref-29)
30. Bernstein 1881-1886. [↑](#footnote-ref-30)
31. Weizmann-Lichtenstein 1952-1953, 49-50. [↑](#footnote-ref-31)
32. Dinur 1958, 37; 40. [↑](#footnote-ref-32)
33. Maimon 1793, 37-40. [↑](#footnote-ref-33)
34. Ahad Ha’am 1958-1959, 481-482. [↑](#footnote-ref-34)
35. Ahad Ha’am 1958-1959, 481-482. [↑](#footnote-ref-35)
36. Ahad Ha’am 1958-1959, 482. [↑](#footnote-ref-36)
37. Zalkin 2005, 250; Soffer 2007, 56. [↑](#footnote-ref-37)
38. Vilna, 1835. [↑](#footnote-ref-38)
39. Katzenelson 1947, 71-76. [↑](#footnote-ref-39)
40. Feiner 2004, 214-215; Shavit and Ewers 1996. [↑](#footnote-ref-40)
41. Euchel, Isaac. 1787-1788. “Introduction.” *Hame’assef* 12-13 (my numbering). [↑](#footnote-ref-41)
42. Schulman 1866, 26. [↑](#footnote-ref-42)
43. Mahler 1961, 60. [↑](#footnote-ref-43)
44. Mahler 1961, 158. [↑](#footnote-ref-44)
45. For more detail, see Segev 2015, 149-160. [↑](#footnote-ref-45)
46. Katzenelson 1912, 73. [↑](#footnote-ref-46)
47. Katzenelson 1912, 75. [↑](#footnote-ref-47)
48. The story appeared in installments in issues fourteen to nineteen of *Ivri Anokhi*, from April to June 1890. [↑](#footnote-ref-48)
49. Vilna, 1875. [↑](#footnote-ref-49)
50. The book was written by Josef Jehuda Löb Yehiel Michael Sossnitz. For more information on the author, see Shavit and Reinharz 2009, 84-85. [↑](#footnote-ref-50)
51. ???, 4 April 1890, 213. [↑](#footnote-ref-51)
52. For more on the great importance of Maskilic teachers in spreading modernity and education, see Zalkin 2006, 155-157. [↑](#footnote-ref-52)
53. Chaim Weizmann’s aspiration to integrate Zionist activity with the establishment of scientific institutions in Palestine is an expression of this fact. For further detail, see Kedar 2015. [↑](#footnote-ref-53)