

Classic Texts in the Sciences

Louis Agassiz

Introduction to the Study of Natural History

Edited and Annotated by
Christoph Irmscher

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Introduction to the Study of Natural History

Edited and Annotated by
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To the memory of Olaf Breidbach

Acknowledgements

This edition was suggested by the late Olaf Breidbach, a towering figure in the history of science, whose work on Ernst Haeckel was an inspiration to me when I wrote my biography of Louis Agassiz, the deeply problematic man Haeckel once called an “Industrieritter” or confidence man, although he, in the same breath, acknowledged Agassiz’s genius, too. Olaf’s editorial work has set a standard that few can match. Nevertheless, I hope he would have liked this edition, which is dedicated to his memory. Thanks are also due to my editors at Birkhäuser and Springer, Dorothy Mazlum and Clemens Heine, and the editors of “Classic Texts in the Sciences,” especially Jürgen Jost, who pushed me to clarify my argument in the introduction. I am also grateful to Springer’s exemplary production team, notably Uma Periasamy and Luca Sidler, for their painstaking work. Thomas Cronin, Professor of Biology at the University of Maryland Baltimore County, who was a constant interlocutor when I first began writing about Agassiz, again answered several of my questions, and my friend Sandy Gliboff read a first draft and caught several errors. Agassiz’s knowledge of the natural science of his time was encyclopedic. It is virtually impossible to track down all his references; some have faded with the passage of time, while others have proved difficult to recreate given our modern state of knowledge. My research assistant Ali Mirza, whose interests extend from paleontology to philosophy, helped me understand several passages that would have otherwise remained murky. Nathan Schmidt cleaned up the manuscript at a later stage. Chris Thomas made some valuable suggestions at an early stage of my work on Agassiz’s text. Needless to say, I take full responsibility for all remaining errors.

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Bloomington
May 2017

Christoph Irmscher

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Introduction

On a brisk November evening in 1846, Bostonians took their seats in the Tremont Temple to listen to a long-haired, large-bodied foreign professor with bright, brown, searching eyes and a charming French accent expound to them the mysteries of nature. His reputation had preceded Louis Agassiz. People were ready for a masterful performance, but what they witnessed, during six successive evenings, exceeded their expectations. Louis Agassiz became an overnight sensation. His pedagogical talent honed on teaching Swiss boys in Neuchâtel, Agassiz knew how to make his lectures exciting. He spoke freely, without notes, interrupting himself only when he pulled animal specimens out of his pocket or paraded them for his audience as they were swimming in glass bowls. He flashed large paintings of animals he had commissioned to emphasize a point he was making or he would, as he kept talking, turn to a large blackboard and sketch the outline of an entire animal or some important anatomical detail. As one of his disciples recalled, he would only have to mention the “adipose fin,” a soft flap behind the dorsal fin of many salmon species, and “with the words would appear an unmistakable outline of the fish.” Agassiz was a magician, said one of his younger students, remembering how he had drawn a tiny tadpole for her, at first nothing more than a single line, which would then grow before her very eyes until the finished animal stood before her.¹

In 1846, the 39-year-old Agassiz was at the height of his powers. Listening to him was an intoxicating experience. He was a magician, able to conjure the whole of nature for his listeners, from the lowliest infusoria to man himself, all beautifully ordered, a universe so complete that only a divine intellect could have come up with the idea of it. Few of his

¹Theodore Lyman, “Recollections of Agassiz,” *The Atlantic Monthly* 33 (1874): 221–229; 225. Clara Conant Gilson, “Agassiz at Cambridge: A Paper of Personal Reminiscences,” *Frank Leslie’s Popular Monthly* 32 (1891): 741–752; 746. On Agassiz’s pedagogical skills, see James David Teller, *Louis Agassiz: Scientist and Teacher* (Columbus: The Ohio State University Press, 1947).

colleagues had the ability to talk with such authority about so many things at once: the structure of the animal kingdom, its different branches, the way each organism reflects, in its embryological development, both the history of life on earth and its rank in the order of living beings. And lest that sounded too abstract, Agassiz populated his lectures with the creatures he knew best: starfish, jellyfish, sea cucumbers, squid—and, for the not so faint at heart, even some less appealing ones: one entire section was devoted to intestinal worms. For Agassiz, all living things were thoughts of the Creator made manifest. But these thoughts were local ones, as it were: in Agassiz’s universe, all living things, including humans, stayed where they had first been conceived and where they would develop, according to God’s divine plan, independent of external circumstances.

We don’t in fact have a verbatim record of what Agassiz said in Boston, but there is a transcript of lectures on the same topic that he gave in New York a few months later in the hall of the College of Physicians and Surgeons in New York City. While there might be some discrepancies between performances, it’s likely that Agassiz’s ideas hadn’t changed much in the interim, which he had spent traveling across the United States and not doing new research. And the New York transcript, made, for the most part, by a man considered the best stenographer of his time, gives us a sense of Agassiz’s transformative effect on his audiences. However, Agassiz’s *Introduction* is more than just a performance made permanent by his stenographer’s scribbling. It is, on the one hand, a retrospective, the last gasp of a kind of scientific idealism, for which the variety of living beings was nothing else but the expression of one fundamental thought.² Agassiz’s lecture series was a summary of the kind of natural history Darwin knew he had to dismantle as he was collecting “all sorts of facts” to prove that “each species had not been independently created, but had descended . . . from other species.”³ On the other hand, Agassiz’s *Introduction* is also forward-looking: it is the most succinct plea in American writing up to that date for the cultural importance and necessity of science.

The Lowell Lectures

As he was standing there in front of hundreds of Bostonians from all walks of life, sketching on the blackboard while explaining how precisely the reproductive cycles of the medusa fit into God’s plan for the world, Agassiz gained a celebrity status for himself that few American scientists before him or after him have been privileged enough to enjoy (Ill. 1). And he had an accent to die for. Like many Swiss, he was bilingual in French and German. English was still uncharted territory for him, but even without a compass he did

²See Louis Agassiz, *Essay on Classification*, ed. Edward Lurie (1857; Cambridge: Harvard University Press, 1962) 152.

³Charles Darwin, *On the Origin of Species: A Facsimile of the First Edition* (Cambridge, MA: Harvard University Press, 1964) 3.

III. 1 Louis Agassiz lecturing.
Autographed Carte-de-visite,
1862. Author's collection



well. Before his lectures, he would shut himself up for hours, not to review the scientific facts he was about to pass on but to go over all the English words he knew. Certain words he inevitably stumbled over, such as “development,” which he, apparently throughout his life, would pronounce as “devil-opement”—a rather appropriate twist, since he so disapproved of any change in nature that wasn’t already contained in or anticipated by the divine plan. Overall, though, by common consensus, Agassiz acquitted himself well that week.⁴

Agassiz acted as if he were the embodiment of that intellect, an earthly substitute for, and a manifestation of, the divine mind. When words failed him, he relied on his drawings, which were, as one observer said, “so graphic that the spoken word was hardly missed.”⁵ He also had a sense of humor, as when he, for example, ridiculed the attempt to classify mollusks by their shells: “it is not more reasonable than if we should attempt to form a

⁴Edwin Percy Whipple, *Recollections of Eminent Men, with Other Papers* (Boston: Ticknor and Co., 1887) 81.

⁵Elizabeth Cary Agassiz, *Louis Agassiz: His Life and Correspondence*, 2 vols. (Boston: Houghton Mifflin, 1886) 2: 405.

correct notion of the character of a people by looking at their coats!” (7).⁶ A poet at heart, he could be folksy when needed. And when he got angry—as would happen every time the topic of evolution came up, either because of his own reasoning or audience questions—his words became daggers, sharp with irony and contempt. Elizabeth Cabot Cary of Temple Place was in the audience, one of the most desirable young women of Boston blueblood descent, and she was smitten: “Never was Agassiz’s power as a teacher, or the charm of his personal presence more evident,” she recalled.⁷ Two years later, after Cecilie Braun Agassiz, lonely and sick, had died in Freiburg, Elizabeth became Agassiz’s second wife.

Also in the audience was Asa Gray (1810–1888), the Fisher Professor of Natural History at Harvard (Ill. 2). Born in Paris—not the one in France, but Paris Township in Oneida County, NY—he had also trained as a doctor.⁸ Unlike Agassiz, however, he had not studied at the most distinguished universities in the Old World. A devout Presbyterian, he disliked travel and didn’t do any work on the Sabbath. He had a razor-sharp mind and was not easily taken in by Agassiz’s showmanship. Yet he, too, felt the power of Agassiz’s presence and the instant connection this “fine, pleasant fellow” enjoyed with his audience, even though the Swiss professor had a cold and was hoarse. With Gray, a man not given to loud pronouncements, one needs to listen for nuance and subtext. Thus, when we read, in another one of his letters, that Agassiz’s lectures were “good lectures on natural theology” and that the course was “planned on a very high ground,” it is useful to remember that Dr. Gray was a botanist, someone whose professional life was spent with his eyes trained to look down.⁹

Gray knew the format of the lectures well, from his own previous participation in the series. The millionaire John Lowell, Jr. had endowed the Lowell Institute in his will, leaving a bequest of nearly \$250,000, which he hoped would be devoted to lectures explaining “historical and internal evidences in favor of Christianity.” But he had left the door open to other subjects such as “physics and chemistry, with their application to the arts; also on botany, zoology, geology, and mineralogy,” as long as the emphasis was on their “utility to man.” Lecturers were to be handsomely paid.¹⁰

This was a broad enough mandate for Mr. Lowell’s cousin, John Amory Lowell, the first trustee of the Lowell Institute, to invite an array of speakers he felt would interest the public. In 1840, Benjamin Silliman of Yale University had formally opened the series with twelve lectures on geology. The Lowell lectures quickly became *the* cultural event in town. When Silliman returned for a course on chemistry, the free tickets were in such demand that

⁶References to Agassiz’s text appear as parenthetical page numbers.

⁷Elizabeth Cary Agassiz, *Louis Agassiz* 2: 404.

⁸For more on Gray, see the still unsurpassed biography by A. Hunter Dupree, *Asa Gray: American Botanist, Friend of Darwin* (1959; Baltimore: The Johns Hopkins University Press, 1988).

⁹Asa Gray to George Engelmann, October 8, 1846; Asa Gray to John Torrey, January 24, 1847, *Letters of Asa Gray*, ed. Jane Loring Gray, 2 vols. (Boston: Houghton Mifflin, 1893) 1: 343, 345.

¹⁰Ferris Greenslet, *The Lowells and Their Seven Worlds* (Boston: Houghton Mifflin, 1946) 210–211.

III. 2 Asa Gray. Albumen print, ca. 1863–1864. Studio of John Adams Whipple. Collection of Daniel Weinstock, MD, Geneva, New York



the crowds broke the window at the “Old Corner Bookstore,” where they were distributed. Gray was hired in 1842 and promised \$1000 for a course on botany, as well as a more scientific, ticketed course for a select audience, for another \$500.¹¹

He threw himself into the preparatory work. Illustrations were a key feature of the Lowell lectures, and Gray paved the way for Agassiz’s appearances when he hired an artist to make a series of botanical paintings, six to eight feet high.¹² (When Agassiz returned to the Lowell Institute later with a course on glaciers, he topped his earlier performance by using a stereopticon¹³). Working with these illustrations proved to be more challenging than he had anticipated. Gray found it difficult to refer to his prepared text and the paintings at the same time, and the long pole he had to wield to point out significant details became somewhat of a liability. He felt, he wrote to John Torrey, “like a person who can hardly

¹¹Asa Gray to Eliza Torrey, December 14, 1842, *Letters of Asa Gray* 1: 259.

¹²Dupree, *Gray* 127–128.

¹³Harriette Knight Smith, *The History of the Lowell Institute* (Boston: Lamson, Wolfe, and Company, 1898) 35–36.

swim, thrown into the river, fairly in for it” and then had to “kick and strike to keep my head above water.” The science was good, the delivery not.¹⁴ “Dr. Gray is a poor speaker, but his facts are very interesting,” noted Anna Huidekoper Clarke.¹⁵ Nevertheless, Gray was recruited for two more courses, in 1845 and 1846.

In the fall of 1846, however, Agassiz came along, and Gray watched him perform with a mixture of admiration and envy. Agassiz’s broad-strokes approach to natural history was foreign to him, and Gray withdrew his support when Agassiz, at the end of his course, began to talk about geographical distribution and argued that a new act of creation had sparked into existence the world as we know it today. Gray correctly perceived the political implications of Agassiz’s model of geographical provinces, which reaffirmed rather than put an end to boundaries between distinct races, allowing the possibility that these were the results of separate acts of creation. “We should not receive it,” wrote Gray to Torrey, “rejecting it on other than scientific grounds, of which he does not feel the force as we do.”¹⁶ Agassiz was, after all, a European, concluded Gray, and not fully aware that such issues could not be discussed lightly. At the same time, what *daring!*

Agassiz and Gray represented diametrically opposed ways of doing science. If Gray spent his days in the herbarium carefully evaluating the specimens brought to him by others, Agassiz preferred to wander around outdoors, surrounded by eager disciples. In 1847, he told his future wife about an evening at his house, during which Agassiz and Joseph Henry became so enamored of each other’s ideas that Gray would not have been at all surprised to see them kiss.¹⁷ After Agassiz was offered a professorship at Harvard, Gray’s skepticism only deepened. He liked to talk to the rabble, as Gray put it dismissively.¹⁸

From Môtiers to Boston

Agassiz’s was an unlikely success story. Born on May 28, 1807 at the foot of the Swiss Alps, in Môtiers, canton of Neuchâtel, he seemed destined to become a doctor or a preacher, the professions of his father and grandfather, respectively. Science was not among the career paths Pasteur Rodolphe Agassiz, a meticulous, exacting, unforgiving man, had in mind for his son. But Louis, a capable swimmer and hiker who read Cuvier when he was a teenager, rebelled against parental authority and left the country, broadening his mind first at the University of Heidelberg and then at the University of Munich. There Carl Friedrich Philipp von Martius (1794–1868), one of the foremost botanists of his time,

¹⁴Asa Gray to John Torrey, February 17, 1844, *Letters of Gray* 1: 316.

¹⁵Anna H. Clarke to E[Lizabeth] G. H[uidekoper], [Jan.] 22, 1846, quoted in Dupree 130.

¹⁶Asa Gray to John Torrey, January 24, 1847, *Letters of Gray* 1: 346.

¹⁷Gray to Jane Lathrop Loring [1847?], *Letters of Gray* 1: 349.

¹⁸Gray to Francis Boott, January 15, 1860, Darwin-Lyell Papers, American Philosophical Society.