Benjamin D. Walsh: Nineteenth Century Defender of Darwinian Evolutionary Theory

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Honors Thesis
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PASS WITH DISTINCTION
TO THE UNIVERSITY HONORS COLLEGE:

As thesis advisor for Shannon Reine,

I have read this paper and find it satisfactory.

Carol Swetlana Dragun
Thesis Advisor

9/26/05
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Précis

This paper is the result of a cross-discipline interest in biology, history and philosophy. From an initial inquiry into the life and works of a few prominent 19th century scientists, the research expanded to include an in-depth analysis of the personal correspondences and publications of the entomologist Benjamin D. Walsh (1808-1869), in which he was highly critical of the published views of his contemporaries, Louis Agassiz and Samuel Scudder. The research question investigated concerns Walsh’s published defense of Darwinian theory, and the reactions to this advocacy of one of the most controversial theories in the scientific world to date.

To understand this topic it is important to elucidate the lives and scientific contributions of Walsh and those of his adversaries. It is also important to understand the reception of Darwinian theory shortly after the publication of the *Origin* in a historical context. Finally, to understand the relationship between Walsh’s private correspondence and his published criticisms of the creationist views advanced by Agassiz and Scudder, it is necessary to examine these works in detail.

I began my research by conducting a literature review of the historical figures that are central to my thesis. I also read the published literature of historians who specialize in Darwinian theory and reasons surrounding its controversy. Finally, I examined the historical literature of Walsh, Agassiz, and Scudder to understand the exact criticisms waged by Walsh. For each of the publications, I specifically noted the following: (1) date of the publication (2) specific criticism(s) leveled by Walsh in the publication (3) date of the publication of Agassiz and/or Scudder that Walsh is criticizing (4) any other pertinent references that Walsh may have made to the published literature.
Having established a specific time for each of these key Walsh publications, I then examined extant letters of correspondence of a number of scientists with whom Walsh corresponded. Then, using the publication date as a reference, I worked my way chronologically through a given correspondence, backward and forward, looking for specific references to the issue in question and made detailed notes when I found something pertinent. The methodology I chose to employ worked well for the type of paper I wrote. It allowed me to utilize the stacks of letters and publications to create a historical account of an extremely pertinent time of scientific development.

Through my research, I acquired a deeper understanding of the early days of evolutionary theory—specifically, what scientists argued about and why. I also learned a great deal about several notable 19th century scientists. Furthermore, I was able to acquire first-hand experience of how historians conduct original research. Through the examination of primary and archival source material, I systematically pieced together an informed picture of how and what Walsh thought about the scientific assertions of the two very notable scientists, Agassiz and Scudder. Overall, exploring the history of the personal responses and publications concerning Darwinian theory in the 19th century has given me a better appreciation of the current on-going controversy surrounding the teaching of evolutionary theory vs. Creationism and/or Intelligent Design.

Few scientists are acquainted with Benjamin Dann Walsh and his advocacy of, as well as contributions to, evolutionary theory. The following paper was written with intentions of placing Walsh in his rightful position among the more progressive and pioneering scientists of the nineteenth century.

"Why do you think he's not been as remembered as some of his contemporaries, the religious / New England / elite university-based scientists?"
Introduction to the Controversy

Charles Darwin (1809-1882) formulated his monumental theory of species origin by natural selection on September 28, 1838 (Mayr 1991); however, the world was not introduced to his long contemplated theory until twenty years later when Darwin finally published the *Origin of Species* (Darwin 1859). Historians suggest several reasons for Darwin’s procrastination (Mayr 1982), but they concur that Darwin was keenly aware of the controversial nature of his theory, which invoked a naturalistic explanation for all of earth’s life forms, past and present. Before Darwin, most scientists subscribed to Natural Theology, which had been popularized by William Paley (1743-1805) and held that God specially created all species and that all species had been perfectly designed for their lives on earth (Moore 1993). Prior to his conception of his evolutionary theory, Darwin himself held similar views to those of his contemporaries, as he wrote in his *Autobiography*:

The old argument of design in nature, as given by Paley, which formerly seemed to me so conclusive, fails, now that the law of natural selection has been discovered. We can no longer argue for instance that the beautiful hinge of bivalve shell must have been made by an intelligent being, like the hinge of a door by man... There seems to be no more design in the variability of organic beings and in the action of natural selection, than in the course which the wind blows. (Darwin 1892)

When he finally did publish his evolutionary theory, Darwin was interested not only in the validity of his theory but also in its acceptance by the scientific community (Hull 1973). He was not, however, eager to head his own battle over his theory (Mayr 1991), for several reasons, discussed below.

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1 Darwin’s evolutionary theory was initially published in 1858 in a brief paper coauthored with Alfred Russel Wallace (1823-1913).
First, many ideologies were challenged by Darwinian theory, the most deeply-rooted of these being the philosophy of essentialism (Hull 1973). As Mayr explains,

> Essentialism’s influence was great in part because its principle is anchored in our language, in our use of a single noun in the singular to designate highly variable phenomena of our environment, such as mountain, home, water, horse, or honesty. Even though there is great variety in kinds of mountain and kinds of home, and even thought the kinds do not stand in direct relation to one another (as do the members of species), the simple noun defines the class of objects. Essentialistic thinking has been highly successful, indeed absolutely necessary, in mathematics, physics, and logic (Mayr 1991).

Essentialist philosophy dates to Plato’s concept of essence and the geometric thinking of the Pythagoreans (Mayr 1991). It held that every species had an underlying, inherent “essence” from which members of the species did not vary in any meaningful way. For example, a triangle, regardless of the combination of angles, will always form a triangle. Furthermore, the triangle is distinct from any other kind of polygon, being one of a limited number of possible polygon forms. Similarly, the variety seen among a given species in nature, according to essentialism, is a reflection of a limited number of constant essences. Thus intraspecific variation, critical as the “raw material” of Darwinian evolution, is simply the manifestation of “imperfect reflections of the underlying constant essences” (Mayr 1991). In addition, the use of essentialistic language ignored the fact that every being is unique. Darwin’s theory of evolution by natural selection attempted to change the question from “What is good for the species?” to “What is good for the individual?” (Mayr 1991) Due to the deeply ingrained philosophy of essentialism, this was an especially difficult transition for scientists to make in the 19th century.
Second, all of Darwin's Professors at Cambridge University and his acquaintances were, more or less, essentialists (Mayr 1991) and thus, could not conceive of one species changing into another over time. The famous essentialist philosopher, William Whewell, stated that "Species have a real existence in nature, and a transition from one to another does not exist" (Whewell 1840).

Third, many if not most scientists subscribed to Natural Theology, and they saw Darwinian theory as a usurpation of God's role in creation (Mayr 1991). The far-reaching significance of this fact is reflected today in the on-going controversy surrounding the teaching of evolutionary theory vs. Creationism and/or Intelligent Design.

Fourth, the concept of natural selection, a non-directed and seemingly random force, was so strange to Darwin's colleagues when he proposed it as a mechanism for species origin that only a handful adopted it. It took three decades after the publication of the *Origin* before natural selection became accepted by even biologists (Mayr 1991).

Studies related to Darwinian theory were rare in the U.S. in the decades following the publication of the *Origin*; an exception was the work of entomologist Benjamin Dann Walsh (1808-1869) (Glick 1988). For the most part, American scientists seemed content with traditional interpretations of the natural world and God's hand in it. Walsh's steadfast support of Darwinian theory did not make him one of a crowd. The *Origin of

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2 William Whewell (1794-1866) was a leading Cambridge mathematician who was at Cambridge when Darwin was enrolled as an undergraduate student.
Species was published in November 1859, and through 1865 the only other American scientist who wrote consistently on Darwin’s behalf was Harvard University botanist Asa Gray (Glick 1988). Consistently writing to contradict Darwin, however, was the especially famous Harvard University naturalist, Jean Louis Rodolphe Agassiz. In an 1867 letter to his contemporary, Sir Phillip De Grey Egerton, Agassiz stated his strong feelings against Darwin’s theory of evolution:

My recent studies have made me more averse than ever to the new scientific doctrines which are flourishing now in England. This sensational zeal reminds me of what I experienced as a young man in Germany, when the physio-philosophy of Oken had invaded every centre of scientific activity; and yet what is there left of it? I trust to outlive this mania also... (Agassiz 1893).

Although very aware of Agassiz’s views concerning his theory, Darwin seemed to be at odds with going against Agassiz too strongly simply due to the fact that “… he has done so much for science” (Hull 1973). This view is reflected in an 1868 letter to Agassiz, in which H.W. Longfellow quoted Darwin:

In the Isle of Wright, Darwin said, “What a set of men you have at Cambridge [Massachusetts]! Both our universities put together cannot furnish the like. Why there is Agassiz – he counts for three” (Agassiz 1893).

With fearless advocacy reminiscent of that exemplified by T.H. Huxley (often referred to as “Darwin’s bulldog”), Benjamin Dann Walsh was more than willing to take on the daunting figure of Louis Agassiz. Darwin did not protest, as he wrote to Walsh in 1866:

I have followed Sir C. Lyell’s advice (who is a very wise man) and always avoided controversy; Mr. Lyell’s arguments... do not apply to any third party, who has energy and courage and wit enough to enter the arena (Field Mus. Nat. Hist. 1864-1869).

3 Henry W. Longfellow (1807-1882), a close friend of Agassiz’s, was an American poet, educator and linguist.
How did Walsh “enter the arena” and challenge the creationist views of the powerful Louis Agassiz and his student, Samuel Scudder? Specifically, how did he frame his arguments and support his criticisms? Did Walsh also challenge the non-Darwinian views of his colleagues? And finally, what evidence is there that Darwin valued Walsh’s efforts?

**Thesis Statement**

To answer these and related questions aimed at gaining a comprehensive understanding of Walsh’s defense of Darwinian theory, I examined the publications and private correspondence of Benjamin Dann Walsh. I focused specifically on writings that addressed the creationist views and anti-Darwinian sentiment advanced by Louis Agassiz and his student, Samuel Scudder, and Walsh’s response to them. I also examined Walsh’s extant correspondence with several prominent naturalists to see what Walsh said and to whom he said it, and compared his private comments with his published criticisms. My thesis begins with a brief biographical sketch and highlights of the scientific contributions of Walsh, Agassiz, and Scudder, to introduce readers to the major players in this controversy.

**Biographical Sketches of the Major Players**

**BENJAMIN DANN WALSH**

Benjamin Dann Walsh was born in Hackney, a then-small village in London, England in 1808 (Sheppard 2004). He graduated from St. Paul’s School, London⁴, and became a

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⁴ St. Paul’s school was founded in 1509 (http://www.stpaulsschool.org.uk/page.aspx?id=8302).
scholar of ancient Greek language and literature at Trinity College, Cambridge University, from which he received his B.A. (1831) and M.A. (1834) degrees (Sheppard 2004). In 1833 he became a fellow of Trinity, apparently with the intention of entering the ministry (Sheppard 2004). He remained at Trinity for a total of twelve years, eventually resigning his fellowship due to personal feelings of aversion toward his fellow theologians (Sheppard 2004). It is important to note that in the mid-1800s, religion, wealth, and social rank were extremely influential in determining one’s academic advancement at Cambridge University. Scholastically, Walsh consistently excelled; however, financially he struggled and family matters demeaned him socially\textsuperscript{5}. This led to Walsh’s position on the lower end of the social ladder at Cambridge. Just prior to leaving Trinity, Walsh addressed some of his criticisms concerning the university’s practices and policies in his 1837 treatise, \textit{A Historical Account of the University of Cambridge and its Colleges}. Interestingly, his then-radical suggestions for improvements were all eventually implemented (Searby 1997). This early display of Walsh’s progressive thought and ardent rhetoric were clearly precursors to the numerous contributions he would make to science later in life.

By 1838, Walsh had left Cambridge and married Rebecca Finn. The couple moved to the U.S. where they settled in a remote area of Henry County, Illinois, never to return to England (Sheppard 2004). In drastic contrast to his previous years at Cambridge, Walsh lived the grueling life of a self-sufficient farmer for twelve years until his land became malarious. As he would later explain in a letter to Charles Darwin:

\textsuperscript{5} When Walsh was a boy, his father slandered the family name by embezzling funds and attempting to flee to America, abandoning his wife and children. He was expelled from the House of Commons and the stock exchange, jailed and nearly hanged (Sheppard 2004).
I bought several hundred acres of wild land in the wilderness, twenty miles from any settlement that you would call even a village, and with only a single neighbor. There I gradually opened a farm, working myself like a horse... (letter quoted in Sheppard 2004)

After leaving the malarious area, Walsh opened a lumber business and built numerous rental units which brought in enough income to allow him to focus solely on the study of entomology until his death. His interest in entomology began much earlier in Walsh’s life; while he lived in England, he collected insects for years. He also had been observing insects and their habits for more than a decade while working on his farm in Illinois. But it wasn’t until 1857 that Walsh resumed his insect studies and truly became totally involved in numerous entomological endeavors (Sheppard 2004).

In 1858 Walsh became a founding member of the Illinois Natural History Society. Through his myriad speeches at the society meetings, Walsh began gaining more and more professional recognition. From the lobbying efforts of the Illinois State Horticultural Society, the office of State Entomologist was instituted in Illinois, and in 1867 Walsh was appointed the position. Much of Walsh’s work associated with the Illinois Natural History Society involved insects that were particularly injurious to farmers’ crops.

Throughout his career as an entomologist, Walsh labored without access to a public library or academic institution. Thus, he depended immensely on the correspondences he maintained with many notable scientists of his time. Walsh initially published a great

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6 At the time, New York was the only state that employed an entomologist.
7 e.g. Charles Darwin and the entomologists Samuel Scudder, John LeConte, Baron von Osten Sacken, and Hermann Hagen.
deal in farm-related periodicals, and by 1862 his writings began to appear in the highly regarded Proceedings of several scientific organizations (Sheppard 2004). From 1865 to 1866, Walsh served as associate editor of the Practical Entomologist, becoming its sole editor throughout 1867 (Sheppard 2004). In 1868, he became senior editor of the American Entomologist, working with C.V. Riley as junior editor. Walsh died suddenly due to a railway accident on Thanksgiving day, 1869.

JEAN LOUIS RODOLPHE AGASSIZ

Jean Louis Rodolphe Agassiz, the son of a minister, was born in 1807 in Montier, Switzerland (Goodale 1912). He was educated, like many naturalists of his time, in the medical tradition as a physician. Attending the universities of Switzerland and Germany, Agassiz studied under prominent biologists, including Oken, Dollinger, and Martius (Marcou 1896). He received his medical degree in 1830 from the University of Erlangen, and soon thereafter headed for Paris to study comparative anatomy under one of the most famous naturalists in Europe, Cuvier (Marcou 1896). Cuvier, impressed by Agassiz’s publication, Fishes of Brazil, turned over his own notes and drawings of fossil fish to Agassiz for further research (Marcou 1896).

Soon after Agassiz’s publication, Poissons fossiles, which covered his immense work on the fossil record of fish, he began to make a name for himself in the scientific community. He took up a professorship at the Lyceum of Neuchatel in Switzerland.

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8 e.g. Academy of Natural Sciences of Philadelphia, Entomological Society of Philadelphia, and Boston Society of Natural History.
9 Riley (1843-1895), widely considered one of the most important entomologists of the 19th century, was strongly influenced by Walsh.
where he remained for thirteen years working on various projects in paleontology, systematics, and glaciology (Marcou 1896). Agassiz, well-known even today for his great contributions to the study of glaciers, realized that there were signs of glaciation in many places where glaciers clearly did not exist in present-day (Goodale 1912). It was previously believed that these features were created by icebergs or floods; however, Agassiz took his observations to formulate a theory hypothesizing that a great ice age had once engulfed the earth (Marcou 1896). He published his theory in *Etude sur les glaciers* in 1840, as well as in his later book in 1847, *Systeme glaciare* (Marcou 1896).

In 1846, Agassiz came to the U.S. and soon after, in 1848, accepted a professorship at Harvard (Cooper 1945). From June 30 to August 15 1848, Agassiz explored Lake Superior which resulted in the 1850 publication *Lake Superior: Its Physical Character, Vegetation and Animals, Compared with those of Other and Similar Regions* (Marcou 1896). Shortly after arriving at Harvard, Agassiz set out to acquire funding for a great museum of natural history. By May 1860, the Museum of Comparative Zoology opened at Harvard and stands today as a world famous institution. In 1863, he became a founding member of the National Academy of Sciences, and was also appointed a regent of the Smithsonian Institution that same year (Marcou 1896). Unlike Walsh, Agassiz campaigned relentlessly for funds and resources in order to conduct his research projects, receiving a great deal of assistance from wealthy donors.

Much of Louis Agassiz's effort was put forth in an attempt to stop the sweep of Darwinism throughout the scientific world. Agassiz stayed loyal to Cuvier’s
classification of the animal kingdom, ranking species from lowest to highest, with *Homo sapiens* sitting at the top of the scale of life. He saw the divine plan of God among everything in nature, defining a species simply as a “thought of God” (*Essay on Classification*).

The combination in time and space of all these thoughtful conceptions exhibits not only thought, it shows also premeditation, power, wisdom, greatness, prescience, omniscience, providence. In one word, all these facts in their natural connection proclaim aloud the One God, whom man may know, adore, and love; and Natural History must in good time become the analysis of the thoughts of the Creator of the Universe... (Agassiz 1851).

Interestingly most of Agassiz’s students, including his own son, Alexander, eventually became evolutionists. Nevertheless, due to the numerous contributions Agassiz brought not only to the scientific community but to the layman as well, by the time of his death in 1873, Louis Agassiz was recognized publicly as “America’s leading scientist.”

**SAMUEL HUBBARD SCUDDER**

Samuel Hubbard Scudder was born in Boston on April 13, 1837 (Cockerell 1911).

Scudder attended the Boston Latin School and at sixteen was sent to Williams College, where he decided to make the study of insects his life’s work (Mallis 1971).

Graduating from Williams at the head of his class in 1857, Scudder went on to the Lawrence Scientific School of Harvard to study under Professor Louis Agassiz (Mallis 1971). As a preparation for the study of insects, Agassiz set Scudder at work for a protracted period studying fish. Agassiz’s training in the art of observing facts and their
orderly arrangement came in conjunction with the urgent warning never to be satisfied with them. Scudder spoke highly of his mentor’s teaching methods:

At the end of eight months, it was almost with reluctance that I left these friends [the *Haemulous* fish] and turned to insects; but what I had gained by this outside experience has been of greater value than years of later investigation in my favorite groups (Scudder 1873).

Scudder received his B.S. in 1862 and remained an assistant to Agassiz until 1864 (Kingsley 1911). In 1862, Scudder became secretary of the Boston Society of Natural History, and two years later became the custodian of the Boston Society. He continued to hold both positions until 1870 (Kingsley 1911). From 1870 to 1879, he held the position of librarian of Harvard University. In 1879, Scudder helped found the Cambridge Entomological Club10, and was a founder of the journal *Psyche* (still in publication), becoming the publication’s editor from 1883 to 1885 (Mallis 1971). In addition, from 1882 to 1887, Scudder served as president of the Boston Society of Natural History (Kingsley 1911). In 1886, Scudder was appointed paleontologist of the U.S. Geological Survey and held the position until 1892 (Kingsley 1911).

After holding numerous positions for the previous thirty years of his life, Scudder decided, in 1892, to refuse any officer positions offered his way in hopes of dedicating the rest of his life to the study of insects. Scudder became extremely active, at this point, in his studies on the Orthoptera (grasshoppers, katydids, crickets). According to Mallis (1971), “Scudder became a world authority on the Orthoptera.”

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10 The Cambridge Entomological Club met in Scudder’s house. There were only a few members but they were determined, as a group, to keep “the lamp alive and maintain the high traditions of an earlier time” (Mallis 1971).
Scudder had a rather tragic personal life. His wife of five years died in 1872, leaving behind a son. His son graduated with honors from Harvard and entered Harvard Medical School but became very ill with tuberculosis and died in 1896 (Mallis 1971). In the same year as his son’s death, Scudder began developing paralysis agitans, causing him to lose a great deal of physical and mental ability (Mallis 1971). The entomologist Cockerell spoke of meeting with Scudder in 1907: “It is one of the most pathetic facts in the history of science that for seven years this great naturalist remained paralyzed and helpless, with so much of the work he had planned to do still unfinished” (Mallis 1971).

Walsh Challenges Agassiz, Scudder, and Dana

As noted earlier (“Introduction to the Controversy”), following the publication of his book, the Origin of Species, Darwin avoided controversy whenever possible (Mayr 1991); Walsh, in contrast, reveled in the opportunity to debate, as he readily admitted in publications and private correspondence. For example, in November 1862, he wrote to Scudder:

Truth is the object at which we are all aiming, & there is nothing like free discussion for eliciting truth (Boston Mus. Sci. 1862-1869).

And again to Scudder, in 1864, Walsh wrote:

If you can prove that I am in error anywhere, nobody can be better pleased with your so doing than myself. I write for truth & not for victory (Boston Mus. Sci. 1862-1869).

Not surprisingly, Walsh’s criticism often courted controversy and angered fellow naturalists. J. Isle, a writer for the agricultural periodical, Prairie Farmer, accused Walsh of being unnecessarily long-winded and arrogant:
The immense circle he describes, either to baffle his antagonists or to recuperate his own courage, unhappily beats breath from his Rosinante, and compels his lance to fall sadly in its aim. ... This rotund prologue is, however, to be excused... when we reflect that he still retains some lingering memories of the status of his native peers, and that too sudden an approach to the brilliant mysteries of his Essay might impair our scientific vision, already so feeble, and destroy what little of vitality our optic nerve possesses (Isle 1861)

Whether arrogant or not, Walsh certainly used a great deal of sarcasm in his writing, which was easily construed as pretentiousness. In 1861, he lambasted Klippart for his mistaken interpretation of an infestation of variously sized armyworm larvae as evidence of larval vivipary (i.e., live birth of young):

So little indeed are the laws of Natural History understood in this country, that... ‘a naturalist in a western paper gravely states that this caterpillar may be viviparous, and may give birth to living baby caterpillars, which also, in due time, follow the great law of nature, and likewise become happy mothers to another caterpillar brood.’ Yes, and lambs may produce lambs, and calves may generate calves, and little girls of five years old may be mothers of fine thriving families. (Sheppard and Weinzierl 2002)

Walsh, fully convinced of Darwin’s theory by the spring of 1861 (Darwin and Seward 1903), set out to champion the Darwinian cause boldly and persistently in both his publications and private correspondences. Walsh wrote his first letter to Darwin on April 29, 1864 (Darwin and Seward 1903), excerpted here:

More than thirty years ago I was introduced to you at your rooms in Christ’s College [Cambridge University]... Allow me to take this opportunity of thanking you for the publication of your Origin of Species, which I read three years ago... though I had a strong prejudice against what I supposed then to be your views. The first perusal staggered me, the second convinced me, and the oftener I read it the more convinced I am of the general soundness of your theory.

Walsh, so convinced as he was of the validity of Darwin’s theory, was very eager to put his love for scientific discussion to use and began to refute the writings of those who

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11 J.H. Klippart (1822-1878) was Corresponding Secretary of the Ohio State Board of Agriculture.
were especially anti-Darwinian in nature. In his 1864 paper, *On Certain Entomological Speculations of the New England School of Naturalists*, Walsh took on the formidable naturalist and prominent lecturer, Louis Agassiz. He harshly criticized Agassiz for various aspects of his work as well as his professional convictions. In a letter to Samuel Scudder, Walsh warned of his strong criticisms against Agassiz, which were just about to appear in the scientific literature:

> The paper in the Proc. Ent. Soc. Phil. is now nearly printed... [It includes] 4 or 5 pages of horrible Darwinian heresies which will make Agassiz's hair stand on end. I have got his "Methods of Study." If, as appears from the preface, it is intended as an answer to Darwin, it is simply absurd (Boston Mus. Sci. 1863).

Walsh, clearly frustrated by Agassiz’s approach to science, wrote to Darwin in 1864:

> I do not know what the European Scientific World thinks of Agassiz, but here he is popularly considered as the incarnation of Science & as infallible as the Bible. He strikes me as a very much overrated man, who perpetually allows his imagination to get the better of his judgment, & who not infrequently argues for victory instead of for truth (Field Mus. Nat. Hist. 1864)

Agassiz was undeniably a much respected American scientist of the time. After reading Walsh’s criticism, Agassiz’s own son, Alexander\(^\text{12}\), wrote to Walsh in 1864 on behalf of his father:

> About father's religious views influencing his theories: Deists accuse him of being an Atheist, Atheists of being a [Deist]. [That] is rather good proof that he has endeavored to let his Religion influence him as little as possible (Mus. Comp. Zool. 1864)

Darwin, in a letter to his advocate Asa Gray, stated, “Agassiz’s name, no doubt, is a heavy weight against us” (Hull 1973). To say the least, Walsh had a great deal to contend with in the personage of Louis Agassiz.

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\(^{12}\) Alexander Agassiz (1835-1910) was the son of Louis Agassiz; he not infrequently made excuses for his father’s antievolutionary views.
Walsh began his lengthy 1864 paper by analyzing Agassiz’s earlier publication entitled *Lake Superior: Its Physical Character, Vegetation and Animals, Compared with those of Other and Similar Regions* (Agassiz 1850). In this book Agassiz had declared that the insects of the temperate zone of North America “differ specifically throughout” from those in Europe. Yet, as Walsh pointed out, Agassiz also had stated that many European insects have been introduced to America along with plants. In addition, he further articulated that many entomologists “very erroneously” considered these imported insects as “native Americans” (Walsh 1864). In rebuttal to Agassiz’s assertions, Walsh criticized the famous naturalist by pointing out that Agassiz had completely contradicted himself by accepting that there were many plants common to both Europe and America which were not introduced but rather were clearly indigenous to both regions. Walsh’s writings to Scudder expounded further on this issue:

In his book on Lake Superior, Agassiz roundly asserts that there are no species of insect (except imported species) common to Europe & North America-- an assertion which every well posted entomologist knows to be false. Yet he gives in that same book a long list of plants common to both countries. So if plants, but not insects? To cap the climax, the very same book contains a list of Coleoptera [beetles] by LeConte, in which numerous species are quoted as common to both countries!!! After 25 years absence from England, I recognized *Libellula quadrimaculata* L. [dragonfly] as the European species, and Dr. Hagen confirmed their identity & had received it from various parts of U.S. as well as from me. Two other large N.A. [North American] dragonflies occur in Asia… (Boston Mus. Sci. 1864).

In his 1864 paper, Walsh went on, noting that many birds were also common and indigenous to both geographic regions. Put in a very simplistic and presumably sarcastic manner, he continued to argue the point even further:
There is a mammal – *Homo sapiens* – common to both continents, though the American variety differs so remarkably from the European one, that if an American insect differed as much from a European one it would undoubtedly be considered as a distinct species... It might be reasonably inferred that out of the vast multitude of insects there would be at least a few species indigenous on both sides of the Atlantic. (Walsh 1864).

Walsh followed his argument against Agassiz’s publication with evidence from no less than 36 authors testifying “to the existence in the Old and New worlds of identical [insect] forms which cannot be supposed to have been introduced” (Walsh 1864). In keeping with his essentialist/creationist views, Agassiz had asserted in his *Lake Superior* publication that “animals must have originated where they live, and have remained almost precisely within the same limits ever since they were created, except in a few cases, where, under the influence of man, those limits have been extended over large areas” (Agassiz 1850). It noticeably frustrated Walsh that even with the seemingly clear evidence disproving Agassiz’s views, the scientific community, in Walsh’s opinion, either “tacitly acquiesced in his [Agassiz’s] theories” or became “devoted believers in them” (Walsh 1864). As Walsh’s private correspondence indicates, Scudder was one whom Walsh classified as a “devoted believer,” and Walsh scoffed at Scudder’s defense of Agassiz’s erroneous assertions:

I am utterly lost in astonishment at your saying that ‘granting the whole list of identical species to be correct, the statement would still be in a general way a fair one, that the insects of the two Continents differ specifically throughout.’ To my mind, if there is one single identical species, which is indigenous on both sides of the Atlantic, the statement is untrue, & if it is untrue it is not a fair statement. If your wife protested that she had been faithful to you 'throughout,' would you understand her to mean 'faithful, barring a few occasional peccadilloes?' Your sense of scientific truth has become debauched by allowing your imaginative faculties to get the better of your reasoning powers. (Boston Mus. Sci. 1864).
The second issue over which Walsh criticized Agassiz was his “misapprehended and misstated” version of the Darwinian theory. Walsh contended that Agassiz “appear[ed] never even to have given himself the trouble to read Darwin’s book through” (Walsh 1864).

The *Origin of Species* is a strong book, well weighed and carefully thought out, written by a strong man familiar with all the discoveries of modern science and himself the honored author of many new scientific discoveries. It is utterly impossible, even for a naturalist of such distinguished attainments as Prof. Agassiz, to upset this new theory, like a child’s house built out of cards, by the mere weight of his personal authority. Least of all will it answer to set up a man of straw, call it the Darwinian theory, and amuse himself with pulling it to pieces” (Walsh 1864).

In Walsh’s eyes, Agassiz erred critically in his inaccurate interpretations of Darwin’s theory. In an attempt to refute Darwin’s theory, Agassiz devoted multiple pages of his publication to argue that “animals [do not] owe their origin and diversity to the natural action of the conditions under which they live” (Walsh 1864). Walsh pointed out that this was a completely moot issue for Agassiz to be arguing because Darwin clearly concurred. Walsh presented numerous excerpts directly from the *Origin of Species* in order to exemplify his point in his 1864 paper:

Naturalists continually refer to external conditions, such as climate, food, etc., as the only possible cause of variation. In one very limited sense, as we shall hereafter see, this may be true; but it is preposterous to attribute to mere external conditions the structure, for instance, of the woodpecker, with its feet, tail, beak and tongue so admirably adapted to catch insects under the bark of trees (Walsh 1864).

Prior to the publication of his 1864 paper, Walsh had presented the argument to Scudder in a personal correspondence:

Darwin says five times over that he does not attribute the Origin of Species to the “conditions of life” except very partially, & Agassiz argues
against this last assumption throughout, & not a word about “Natural Selection” (Boston Mus. Sci. 1863)

The third issue over which Walsh took Agassiz to task concerned his views on the occurrence and nature of intraspecific variation. Agassiz had stated in his Methods of Study that “there is not a fact known to science tending to show that any being, in the natural process of reproduction and multiplication, has ever diverged from the course natural to its kind” (Agassiz 1863). Walsh asserted, however, that “every field entomologist knows that, in many species of insects, this [Agassiz’s statement] is not true” (Walsh 1864). In his 1864 paper, Walsh offered many examples using his own entomological research to refute Agassiz’s stance:

To illustrate from one single Order, Coleoptera: - Arrhenodes septentrionis Hbst. And Catogenus rufus Fabr., vary exceedingly in size, so that some individuals are full twice as long as others, and in the male of the former of these two species the snout is sometimes full as broad as long, and sometimes on the other hand full twice as long as broad, whence some foreign entomologists have been led to consider the varieties as distinct species. But... it is evident that the different forms are mere varieties (Walsh 1864).

Walsh also pointed out that Agassiz seemed to presume that variation and divergence from the “normal type” were exclusive to domesticated species. Agassiz affirmed in Methods of Study, “Nature holds inviolable the stamp that God has set upon his creatures” (Agassiz 1863). Walsh retaliated with:

The simple fact that naturalists are puzzled every day to decide in the case of wild species, whether differing forms are varieties or species, proves that in a state of nature extensive variations do occur. To say [as Agassiz did] that such variations are included in “the invariable limits of the species” is little else but an abuse of language (Walsh 1864).

In an 1863 letter to Scudder, Walsh, in his characteristically sardonic manner, not only criticized Agassiz’s way of thinking but his articulation of the matter as well:
I wish you [Scudder] would send him [Agassiz] to a good grammar school for a year, & cure him of writing such obscure and mystical English as this:—"if man is able to influence their organization in some slight degree, it is because the Creator has given to his [man's?] relations with the animals he [the Creator?] has intended for his [man's?] companions the same plasticity which he [the Creator?] has allowed to every other side of his [man's?] life." (p. 147) I suppose he means that God confers the quality of variability upon domesticated species, & not upon such as he intends to run wild; & therefore, as the guinea-fowl doesn't vary, God never intended it to be domesticated, & if I keep guinea-fowls I violate God's laws!! (Boston Mus. Sci. 1863).

Agassiz (1863) also had declared that species immutability could be proven through the comparison of living animals with those depicted on the walls of ancient Egyptian monuments. This view, along with Agassiz's other assertions, caused Walsh to conclude with a blunt analysis of Agassiz's inability to recognize the meaning held within the obvious facts of science:

Herbert Spencer\(^{13}\) has remarked of Hugh Miller\(^{14}\), that he “fell short of that highest faith, which knows that all truths must harmonize and which is therefore content trustfully to follow the evidence whithersoever it leads” (*Illustr. Universal Progress*). The more closely we examine the recorded opinions of Prof. Agassiz, the more inclined shall we become to believe, that there is the same radical defect in the constitution of his mind (Walsh 1864).

As mentioned earlier, throughout the 19th century a strict adherence to religious views created a tremendous obstacle to the acceptance of evolutionary theory. Walsh, firmly believing that religion needed to be kept separate from science, was very frustrated by what he referred to in his 1864 paper as the “New England School of Naturalists.” One distinguishing characteristic of these naturalists was their firm stance in the philosophy

\(^{13}\) Herbert Spencer (1820-1903) was a biologist and social philosopher during the 19th century. He was also a strong proponent of Darwin's evolutionary theory, applying its tenets harshly as Social Darwinism.

\(^{14}\) Hugh Miller (1802-1856) was a 19th century geologist who had strong creationist beliefs. His inability to reconcile his religious views with his scientific research, along with the strain from his work, led him to take his own life.
that God had specially created all species to be perfectly designed for their lives on earth.

In a letter to Scudder, written only a few months after his 1864 publication, Walsh expressed in exasperated tones his frustration:

...Who but a N.E. [New England] naturalist... would think of arguing that because the voices & motions of the same families are alike on both sides of the Atlantic, therefore the species belonging to those families in the two localities spring from an entirely different origin? (Meth. Study p.123) If it proves anything at all, it proves exactly the reverse of what he wants it to prove. Who but a N.E. naturalist would make God reproduce the Starry Firmament in the Ovarian Egg? Who but a N.E. Naturalist, when he was trying to prove a ridiculous theory that Man forms a class by himself distinct from the Apes & the Monkeys, would quietly say that the question of whether the Gorilla walks habitually on his hind legs & never climbs trees, as Dr. Chaillu says is the case, has nothing to do with the question of whether Man is or is not to be set apart as the only animal whose anterior limbs are Cephalized? But I could go on at this rate for a month (Boston Mus. Sci. 1864).

Thus Agassiz was not alone in receiving criticism from Walsh in his 1864 paper. Walsh also criticized the work of J.D. Dana15. Walsh noted Dana's then-recent publication of a new Classification of Insects, based upon "his new principle of Cephalization" (Walsh 1864). Walsh was very skeptical of Dana's "new principle" because nearly every aspect of the classification was divided into groups of three. As Walsh (1864) wrote, "Nothing is easier than by subdividing some natural groups and uniting others, and by giving prominence to certain characters and keeping others in the background, to form an artificial system of classification based upon any assignable arithmetical number from two up to ten. And when such systems are formed, what are they worth? Absolutely nothing." Walsh continued, expressing his utter disdain for Dana's system when he stated, "I protest, in the name of science, against this arithmetical monomania, which is perpetually seeking to fetter the limbs of Nature in mathematical formulae" (Walsh

15 James Dwight Dana (1813-1895) was a geologist and mineralogist at Yale University.
1864). Scudder, in his personal correspondence with Walsh, disagreed with Walsh’s finding commonality between Agassiz and Dana. Walsh, however, felt his assessment was quite accurate as he wrote to Scudder:

I do not agree with you in thinking that there is nothing in common between Agassiz & Dana but their living in N.E. & disbelieving in Darwin. I am aware that as individuals they are not on the most friendly terms possible with each other, but I trace in both of them the same peculiar modes of thinking—the same giving the reins to the imagination—the same utter contempt of close & accurate reasoning or what you call "logic"—the same love of symmetry & habit of sacrificing facts to symmetry which Herbert Spencer says is a peculiar characteristic of the modern French School of Philosophers—the same arithmetical monomania & torturing of Nature to fit the Procrustean bed which they have pre-determined in their minds she shall lie upon, whether or nay & finally, they are both of them in love with the same wonderfully mystical number—3, III, Δ. It is a second edition of St. Patrick converting the wild Irish of bygone times to Trinitarianism by showing them the Shamrock. Not only do I trace these peculiarities in the minds of these two men, but I trace the same, more or less, in all you N.E. naturalists. Excuse me for saying so, but you are none of you sufficiently pains-taking & accurate to suit my beau-ideal of a perfect naturalist. You are, truly & correctly speaking, a School, & I take it Agassiz is the founder of the School.

(Boston Mus. Sci. 1864).

Darwin seemed impressed by Walsh’s 1864 publication. He wrote to Walsh in December of 1864 to express his gratitude for his intolerance of Agassiz and Dana’s criticism:

I am delighted at the manner in which you have bearded this lion [Agassiz] in his den. I agree most entirely with all that you have written… I must confess, however, I did not fully perceive how he had misstated my views; but I only skimmed through his Methods of Study, and thought it a very poor book. I am so much accustomed to be utterly misrepresented that it hardly excites my attention. But you really have hit the nail on the head capitaly… I am glad that you have attacked Dana’s wild notions; [though] I have a great respect for Dana… (Darwin and Seward 1903)

Darwin undoubtedly recognized Walsh as an asset in the ongoing evolutionary debate. Darwin referred to much of Walsh’s research and findings in his own works, e.g. Descent of Man (Darwin 1871), and Variation of Animals and Plants under Domestication.
(Darwin 1883). Walsh reveled in this fact as indicated in this passage that he wrote to the notable entomologist, Dr. John LeConte:\(^{16}\)

Darwin writes me word that his health is now measurably recovered, & that he has been at work for some time on a new & enlarged edition of the *Origin of Species*. I am to be mentioned in it, it seems, so I am sure of immortality for I don't think that book will ever perish (Am. Phil. Soc. Lib. 1861-1869).

Walsh was, if nothing else, a man seeking the truth no matter whom or how many were against him. He was adamant that creationist viewpoints had no place in the scientific world, and he prided himself on his careful approach to science, which was criticized by Scudder as being "too logical:"

I feel very highly complimented by your finding fault with my pamphlet for being "too logical." I don't see how that is possible, seeing that it is on a scientific subject. A drama or a novel or a sermon may be too logical, for in the first two *imagination* is the main requisite, & in religion *faith* is the one grand essential. You must believe 3=1, not only in spite of its being very impossible, but because it is impossible, & if you don't, why the pious Athanasian Creed tells you that "without doubt you will perish everlastingly." But in my point of view, Science ought to have nothing to do either with faith or with imagination, but should be pure and undefiled reason, i.e. popularized logic don't know whether you are a married man, but if you are, I should expect you some morning to find fault with your lady for being "too chaste." You might just as well do that, as find fault with scientific papers for being "too logical." (Boston Mus. Sci. 1864).

**Walsh Challenges Younger Entomologists**

Benjamin Walsh very much enjoyed corresponding with the younger generation of entomologists as well. He communicated with A. Agassiz (27 years younger than

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\(^{16}\) John LeConte (1825-1883) was an American entomologist, specializing in Coleoptera (beetles), who was a student and supporter of Louis Agassiz.

\(^{17}\) Walsh is referring here to his 1864 publication *On Certain Entomological Speculations of the New England School of Naturalists*. 
Walsh), J.L. LeConte (17 years younger), B. Osten Sacken\textsuperscript{18} (20 years younger), and
H.A. Hagen\textsuperscript{19} (9 years younger) and collaborated closely with C.V. Riley (35 years
younger), to name a few. Walsh wrote in an 1862 letter to Osten Sacken how he, unlike
many of his colleagues, did his very best to keep up a correspondence with everyone who
wrote him:

I am constantly receiving letters from young men in various parts of the
country, who are commencing the study of Entomology, asking for
information on various points, & I have never yet failed, though they have
all been perfect strangers to me, to reply to their questions & give them an
encouraging word (Mus. Comp. Zool. 1862).

Walsh also evidently enjoyed keeping the evolutionary debate and rhetoric alive among
young, upcoming entomologists of his time, as these excerpts from his private
correspondence illustrate:

You say there is no philosophical necessity for the existence of
Darwinism, & that it is just as difficult to understand how the most simple
organic being is created as how the most complex one is created. Granted.
But if Darwinism is true, that is no reason why we should reject it. I
object to asking whether any discovery will explain or not the mystery of
life. Follow truth (wherever) she leads us, & don’t be afraid that one truth
will contradict another or will not decipher all the hieroglyphs of Nature
(Mus. Comp. Zool. 1864).

I told young [Alexander] Agassiz, who argued against your theory because
so many naturalists disbelieved it, that the wonder was, not that so many
disbelieved but that in six years from the date of its promulgation so many
believed; & I asked him how many naturalists believed in Cuvier’s great
theory six years after that was promulgated? (Field Mus. Nat. Hist. 1865)

Darwin writes me word that seven of the most distinguished German
Naturalists, whom he names… have recently come around or are coming
around to the Derivative Heresy… We shall be the true, orthodox church,
then we shall serve you heretics as the Athanasians served the Arians
when they got the upper hand in the primitive Christian times – i.e. roast

\textsuperscript{18} Baron von Osten Sacken (1828-1906) was a Diptera (flies) specialist.
\textsuperscript{19} Hermann Hagen (1817-1893) was a Harvard entomologist.
If a dozen good naturalists testified that they saw a Bear lay eggs & incubate them, would you believe them? I wouldn’t. Now I think I prove that Wagner’s theory is as much in the teeth of several great Natural Laws, as would be the Creation of a Mite by man or the oviposition of a Bear. Therefore, I not only wouldn’t, but can’t believe it. My lump of Faith is very poorly developed, that is in scientific matters. In religious matters of course Faith is the one thing needful, & we must believe with the Athanasian Creed that 3=1, or else “without doubt we shall perish everlastingly”. The more I know of science, the more convinced I am that about one half, or nearly [all] of the recorded facts are false & unreliable (Mus. Comp. Zool. 1865).

...In science we want to eliminate faith as much as possible, excellent as faith is in all religious matters... (Mus. Comp. Zool. 1868)

But alas, I am so skeptical (& Hagen, I find, is just as bad as I am) that I do not believe that genera have any real existence, but consider them merely as arbitrary distinctions established for convenience’ sake. You & Agassiz, will, of course, pity & excuse our want of faith. If a man could only believe whatever he chose, I might have stayed in England & have been by this time a Bishop in the Established Church there (I fear it is going to be “disestablished” shortly in Ireland) and perhaps even an Archbishop! (Am. Philos. Soc. Libr. 1868)

You suggest that it is scarcely worth while to refer to Wagner’s theory now “unless with the intention of drawing the attention of observers” to it, because it is now well known in Germany. But recollect it is not well known in N. A. [North America], & besides I am still utterly incredulous on the subject & wished to give my reasons. Therefore, if the theory is true, public discussion will only confirm its truth by letting men verify its truth. If it is false, it ought to be disproved & disbelieved (Mus. Comp. Zool. 1864).

**Conclusion**

Taking a look back at Walsh’s life, it is not difficult to understand why he was so receptive to Darwin’s evolutionary theory. Walsh’s Cambridge experience left him with strong antireligious feelings that were quite conducive to his acceptance of Darwinian Theory. Walsh’s protégé, C.V. Riley, wrote of him:

He was not theologically disposed, and naturally had such strong hatred of hypocrisy and of everything that had the semblance of wrong, that –
judging from what he told us – the inconsistent conduct of some of his colleagues who were studying for the ministry, in all probability prejudiced him against the church. At all events his tastes and inclinations were of an entirely different character from those which are necessary to make a minister of the gospel (Riley 1869).

Walsh, in a letter to John LeConte, recounted the source of his “strong hatred of hypocrisy”:

The shabbiest trick I ever had played on me in my life were uniformly at the hands of parsons. They are like monks – isolated from the rest of the community & not bound by the laws of honor. As a class, I hate, despise and eschew them. Nine-tenths of them are rascals – believing no more of what they preach than you & I do; & a large portion of the remaining fraction are fools. I have lived 12 years in the English factory (Cambridge) where they manufacture this kind of ecclesiastical beast; & having mixed familiarly with them on terms of social equality, I know all about them (Am. Philos. Soc. Libr. 1861-1869).

As this thesis has shown, through his publications as well as private correspondences, Walsh framed his arguments against the creationist views of Louis Agassiz and others in a very forthright and bold manner. He was extremely thorough in his work and even stronger in his convictions. His years at Cambridge served him well in the art of written debate, which he would make great use of in his scientific life. He was not, in any way, afraid of debate, as the entomologist William LeBaron20 wrote of him:

He evidently enjoyed a sharp controversy… [and] he was not content with a bare victory. He liked not only to conquer, but to utterly demolish his adversary… And yet there is no reason to suppose that in all his pungent writings he harbored a particle of personal animosity. He loved science, and he loved the truth (LeBaron 1872).

Walsh believed it was important to discuss science freely and openly, and to involve young scientists in the debate. It can undoubtedly be said of most 19th century scientists that they “loved science;” it seems, however, that it was rare to

20 William LeBaron succeeded Walsh as Illinois State Entomologist.
find an older scientist in the years immediately following the publication of the *Origin* who could set aside his preconceived ideas and demonstrate that he truly “loved the truth” as well. Walsh is unique in his position as the only entomologist of his and Darwin’s generation to staunchly support Darwin and his seemingly radical thinking. Although his entomological career spanned only a decade, he was truly a pioneer in his progressive scientific thinking and unwavering defense of and contributions to Darwinian evolutionary theory.
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