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The Two Darwins: Erasmus and Charles on Evolution

Ron Good, Professor Emeritus, Louisiana State University, rgood@lsu.edu

Provide the following information to most people and they will identify the person as Charles Darwin, the author of *On the Origin of Species*.

- Father's name is Robert Darwin;
- Attended Cambridge University in England and Edinburgh Medical College in Scotland;
- Abhorred slavery;
- Loved plants;
- Recognized common descent of organisms from a single living filament;
- Became skeptical of religion and its supernatural claims;
- Understood that life probably originated in water and then evolved to land;
- Saw that selective breeding of domesticated animals is analogous to natural selection;
- Wrote about the expression of emotions in animals;



- Became a member of The Royal Society in England;
- Loved and wrote poetry.

However, the correct answer is Erasmus Darwin, Charles' grandfather who lived in England from 1731 to 1802. Eliminate "Loved and wrote poetry" from the list of characteristics and Charles Darwin would be a correct response. Much is known and has been written about Charles Darwin as the father of the scientific theory of evolution, but few know of his father's father, Erasmus. Although it has been 160 years since the publication of Charles Darwin's *On the Origin of Species*, it is curious that his grandfather remains unknown by most people today.

Erasmus Darwin scholar Desmond King-Hele (1999) says, "It has been said of Erasmus Darwin (1731-1802) that no one from his day to ours has ever rivaled him in his achievements in such a wide range of fields." This is quite a statement, considering the many outstanding people who have achieved so much in so many fields, but as one reads King-Hele's account of Erasmus Darwin it becomes clear that Erasmus accomplished many outstanding things in a wide variety of fields, including evolution. Among some of those accomplishments are the following:

1. Recognized as one of England's leading physicians during the latter part of the 18th century;
2. One of the intellectual leaders of England's industrial age;
3. Scientific poet without equal;
4. Inventor of numerous mechanical devices;
5. Spokesman for equal rights, including education, for women;
6. Spokesman against slavery;
7. A leading scientific thinker in numerous fields;

8. A leading naturalist who embraced evolution and free-thought, rejecting superstition and supernatural myths.

In reference to 7. and 8. above, King-Hele says, “The most striking of Darwin’s many talents was his extraordinary scientific insights in physics, chemistry, geology, meteorology and all aspects of biology—his deepest insight being his evolutionary theory of life.” It is his insight in evolution, and how it compares to that of Charles Darwin, that is the focus of the remainder of this paper.

The common story associated with Charles Darwin’s discovery of natural selection as the mechanism that explains evolution of life on Earth goes something like this: During a five-year voyage aboard the H.M.S. Beagle they stopped at the Galapagos Islands and Darwin noticed certain interesting characteristics among finches, tortoises, and other animals and then, a few years later, while reading a book by Thomas Malthus on population, he realized that natural selection explained the origin of species. Apart from his long voyage aboard H.M.S. Beagle, the influences on Darwin that prepared him to be able to recognize the importance of Malthus’ ideas for evolution of species are seldom discussed in most accounts of his life. Included among these influences are Charles’ love of the outdoors, his family’s influence on his habits of mind, his university years at Edinburgh and Cambridge, the reading he did prior to Thomas Malthus’ *An Essay on the Principle of Population*, and the discussions he had with people like Robert Grant at Edinburgh, John Henslow and Adam Sedgwick at Cambridge, and Charles Lyell and John Gould in London.

The influences of grandfather Erasmus on Charles’ ideas about evolution were more indirect since their lives did not overlap. As a late teenager Charles read and admired *Zoonomia*, his grandfather’s best-known book (vol. 1, 1794; vol. 2, 1796) that included a great number of facts about animal classification and diseases as well as ideas on evolution. A quote from *Zoonomia* (vol. 1, p. 504) regarding evolution helps one to see how it could have influenced Charles’ later ideas in his theory of evolution:

Some birds have acquired harder beaks to crack nuts, as the parrot.

Others have acquired beaks adapted to break harder seeds, as sparrows. Others for the softer seeds of flowers, or the buds of trees, as of finches...All which seem to have been gradually produced during many generations by the perpetual endeavour to supply the want of food.

Erasmus also noted that many species have adapted to ensure better security (e.g., camouflage, speed, hard shells) and that the males of many species developed adaptations to compete for the attention of females. Similar ideas on evolution also appeared in his earlier work (*The Botanic Garden*, 1789) and later work (*The Temple of Nature*, 1803, published a year after his death). In both books, *Botanic Garden* and *The Temple of Nature*, Erasmus uses poetry to express his feelings and his thoughts about the living world:

Organic Life beneath the shoreless waves
Was born and nurs'd in Ocean's pearly caves;
First forms minute, unseen by spheric glass,
Move on the mud, or pierce the watery mass;
These, as successive generations bloom,
New powers acquire, and larger limbs assume;
Whence countless groups of vegetation spring,
And breathing realms of fin, and feet, and wing.
(*The Temple of Nature*, Canto I, lines 295-302)

In related notes throughout *The Temple of Nature* Erasmus explains in more conventional terms what his poetry means, in this case the meaning of the previous eight lines: "The earth was originally covered with water, as appears from some of its highest mountains, consisting of shells cemented together by a solution of a part of them, as the limestone rocks of the Alps. It must be therefore concluded that animal life began beneath the sea."

By using the combination of poetry and related notes that provide explanation and

background, Erasmus is able to convey his feelings as well as his thoughts about nature in its wonderful complexity, beauty, and mystery.

King-Hele (1999, p. 363) finds many parallels between Erasmus and his grandson Charles: “Belief in evolution, passed on to his son Robert and reincarnated in his grandson Charles, can be seen as the finest of Erasmus’s legacies.” Although their outward lives were very different, King-Hele (1999, p. 363) notes, “The mental affinity between Charles Darwin and his grandfather emerges most clearly from their books. The first similarity is that for both of them the scientific book was their favoured vehicle of expression: Erasmus published more than a million words in eleven volumes; Charles two million in twenty-three volumes. For both, these books are ‘a faithful monument and true mirror’ of their minds.”

Many specific examples of parallels between Erasmus and Charles are identified by King-Hele, including the following:

- Both were fascinated by the fertilization processes in plants;
- Both suggested a kind of ‘sensibility’ in plants;
- Both wrote about geology and the living rocks of worm-built coral;
- Both saw that their ideas about evolution ran counter to the prevailing religious dogma of their times;
- Both saw that sexual selection was an important part of evolution;
- Both saw that geographical dispersal was an important part of evolution;
- Both were somewhat confused about the possible role of the inheritance of acquired traits in evolution.

As one reads the books by both Darwins it is not difficult to see the parallels that King-Hele talks about, even though Charles says in his *Autobiography* he was not influenced by his grandfather’s ideas in *Zoonomia*. Perhaps he was not consciously aware of Erasmus’ contributions to his own ideas on evolution, but there are too

many similarities between the ideas of these two Darwins to accept Charles' comment without question. It is clear that Charles read *Zoonomia* carefully, making many notations in his own copy, and that he was aware of Erasmus' other contributions related to evolution. Moreover, Charles was familiar enough with his grandfather's life and writing to write and publish his biography, *The Life of Erasmus Darwin*, in 1879. In his excellent 1997 article, 'Steps on the Path to the Origin of Species', Richard Keynes notes that a letter from [Charles] Darwin to Charles Lyell in 1863 supports Keynes' claim when Charles says:

Plato, Buffon, my grandfather, before Lamarck and others, propounded the obvious view that if species were not created separately they must have descended from other species, and I can see nothing else in common between *The Origin* and Lamarck. (Keynes, p. 468)

There is no doubt that Charles amassed many more facts regarding evolution than did his grandfather and Charles' ideas about natural selection were far more detailed and better argued. Of the many books and articles written by scientists and other Darwin scholars, *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought* (1991) by noted evolutionary biologist, Ernst Mayr, is my favorite for its detailed look at Charles' ideas on evolution. In chapter seven, "What Is Darwinism?" Mayr explains the nuances in Charles' ideas about evolution, saying "Darwinism is not a monolithic theory that rises or falls depending on the validity or invalidity of a single idea" (p. 90). Mayr points out that Darwin was not always consistent in his writings about such things as the role of Lamarckism (inheritance of acquired traits) in explaining descent with modification. To help clarify the various meanings of "Darwinism," Mayr describes nine different ways in which Darwinism was used:

1. As *Anti-creationism*. Much of the argument in the *Origin* is directed against special creation rather than for natural selection. Mayr notes, "In his correspondence Darwin referred to his manuscript always as his 'species book,' not his book on natural selection.

2. As *Anti-ideology*. Not only were special creation and intelligent design beliefs opposed by Darwinism, other ideologies like essentialism and finalism or teleology were refuted as well, at least within the scientific community. We can see that even today, 150 years after the *Origin* was published, there are many believers who continue to embrace ID/creationism.
3. As *Selectionism*. Mayr notes that although modern biologists understand that Darwinism "...stands for a belief in the importance of natural selection in evolution" (p. 97), it took until about 1940 before all serious biologists fully embraced natural selection as the main mechanism.
4. As *Variational Evolution*. Many scientists, including some of Charles Darwin's collaborators like Lyell and Sedgwick, continued to embrace aspects of essentialism after the *Origin* appeared, making it difficult to accept wide variation within populations that eventually led to new species.
5. As the *Creed of the Darwinians*. Although there were many important differences in how Charles' fellow scientists like Lyell, Wallace, Huxley, and Hooker viewed Darwinism, the one thing they agreed on was their rejection of creationism. They agreed, in general, that evolution is a natural phenomenon. However, Mayr observes that even here a few of Darwin's supporters like Lyell and Wallace wanted to exclude humans from the natural selection theory. Surely, they thought, if a god exists, he would treat his most important "creation" differently.
6. As a *New Worldview*. Some philosophers and sociologists in the 1860s and '70s saw Darwin's *Origin* as the beginning of a new worldview that focused on competition and struggle in the human arena. Herbert Spencer is probably the best known within this group but Darwin apparently did not share this worldview. Spencer's ideas about evolution included teleology and an inheritance of acquired traits and Mayr concludes, "To claim that Darwin and Spencer supported the same paradigm is a clear falsification of history" (p. 103).
7. As a *New Methodology*. Darwin used different methodologies in the *Origin* to support his conjectures. Sometimes he followed hypothetico-deductive

methods and at other times he used inductive methods. However, at all times he understood the importance of having evidence to support his ideas. As Mayr observes, "...the ultimate validation of most of Darwin's theories did not result from the victory of his methodology but from additional facts and the gradual refutation of opposing ideologies" (p. 105). This was Darwin's "one long argument."

8. As *Evolutionism*. As a historical theory evolution was already in existence, when the *Origin* was published, in fields like linguistics and sociology, but not in physics or mathematics. Mayr says, "Clearly, Darwin was not the father of evolutionism, even though he brought about its victory" (p. 93).
9. As *Darwin's Theory of Evolution*. When this phrase was used it could have referred to a number of things, not simply natural selection. Among Darwin's theories, in addition to natural selection, were pangenesis, effects of use and disuse, blending inheritance, and the frequency of sympatric speciation (Mayr, p. 92).

It is not difficult to see why there was confusion after 1859 about the "real" meaning of Darwin's theory of evolution. Some of these sources of confusion were common during Erasmus Darwin's time as well and even though the *Origin* offered convincing evidence for natural selection, it took another 75 or so years before biologists agreed on the various meanings of Darwinism. Charles Darwin was the main source of natural selection theory but his own uncertainty and confusion over such ideas as effects of use and disuse (Lamarckism) helped to maintain existing misconceptions.

Summary

Charles Darwin deserves the title of greatest biologist of the 19th century and perhaps of all time. Some scientists, like Ernst Mayr, say he was the greatest scientist of all time, in part because of the reach of evolutionary theory into so many fields. However, as Isaac Newton observed long ago, all scientists stand on the shoulders of others who have gone before them and Erasmus Darwin deserves more credit for generating ideas about evolution than he usually gets, which is close to none.

It was the theory of common descent that linked humans to the rest of the animal world and this is what many people saw as highly objectionable in the *Origin*. As a freethinker, Erasmus Darwin was not constrained by the common religious dogma of his time so he was able to interpret evidence in a way that allowed him to see the obvious relationships between humans and other primates, for example. Once religious blinders are removed the tree of life is much easier to see.

In *Zoonomia* and *Temple of Nature* it is clear that Erasmus understands the inter-relatedness of all life and as a freethinker the causes had to be natural not supernatural. Until Charles was no longer constrained by creationist dogma, he was not free to see that Malthus' ideas on populations held the key to natural selection. When Charles first read Erasmus' *Zoonomia* he said he was not influenced by it, but that is very likely because his thinking was constrained by his religious beliefs and his lack of real-world experiences. It took encounters with freethinkers like Robert Grant, a five-year voyage where he encountered many kinds of evidence for evolution, reading books like Lyell's on geology of an old Earth, and finally the catalyst of Malthus' book on populations before he was ready to see that natural selection was the cause of the origin of species and the great diversity of life on Earth. In one sense, Charles Darwin was finally where his grandfather had been over 50 years before him. It is what Charles did after he arrived at this point in 1838 that really sets him apart from his science colleagues and his grandfather. From 1838 until the *Origin* was published in 1859 he worked on and thought continuously about his big idea, natural selection.

Like all of us Charles Darwin was influenced by his life experiences and the most important was his voyage aboard the H.M.S. Beagle, including his trips across the countryside when he was not on the vessel. Without that voyage it is very unlikely he would have been prepared to see the importance of Malthus' book on populations. Also, had he continued to wear the blinders of creationist dogma, it is unlikely that he would have seen that supernatural explanations are unnecessary to explain the origin of species and common descent. The exact nature of the influence of his grandfather's ideas on evolution and on free-thought will probably never be known, but it is reasonable to conclude that Charles Darwin's theory of

evolution by natural selection was influenced by those ideas and Erasmus Darwin deserves more recognition than he typically receives.

References and Related Reading

Coyne, Jerry. 2009. *Why Evolution Is True*. New York: Viking.

Darwin, Charles. 1839. *Voyage of the Beagle*. London: Henry Colburn.

———. 1859. *On the Origin of Species*. London: Murray.

———. 1887. *Autobiography*. London: Murray.

Darwin, Erasmus. 1789. *The Botanic Garden*. London: Johnson.

———. 1794. *Zoonomia*. London: Johnson.

———. 1803. *The Temple of Nature*. London: Johnson.

Desmond, Adrian & James Moore. 1991. *Darwin: The Life of a Tortured Evolutionist*. New York: Warner.

Keynes, Richard. 1997. *Steps on the Path to the Origin of Species*. *J. Theor. Biol.* 187: 461-471.

King-Hele, Desmond. 1999. *Erasmus Darwin: A Life of Unequalled Achievement*. London: DLM.

Malthus, Thomas. 1798. *An Essay on the Principle of Population*. London: Johnson.

Mayr, Ernst. 1991. *One Long Argument: Charles Darwin and the Genesis of Modern Evolutionary Thought*. Cambridge, MA: Harvard.

Numbers, Ronald. 1992. *The Creationists: The Evolution of Scientific Creationism*. Berkeley, CA: University of California.

Wilson, David. 2007. *Evolution for Everyone*. New York: Delta.

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