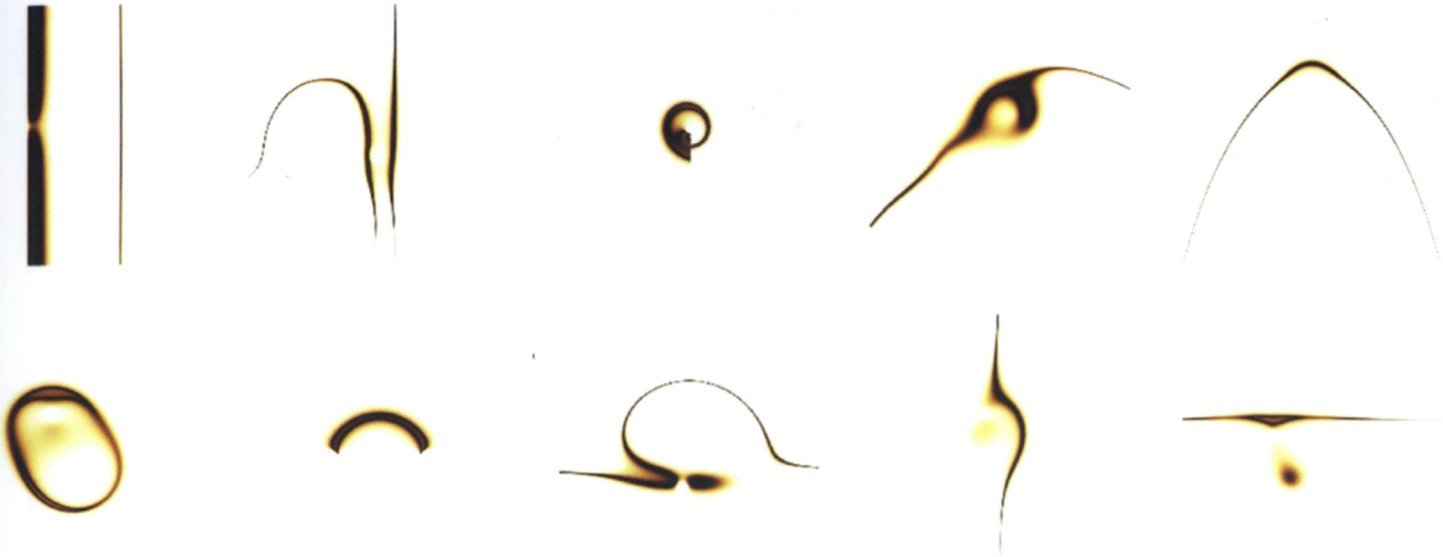

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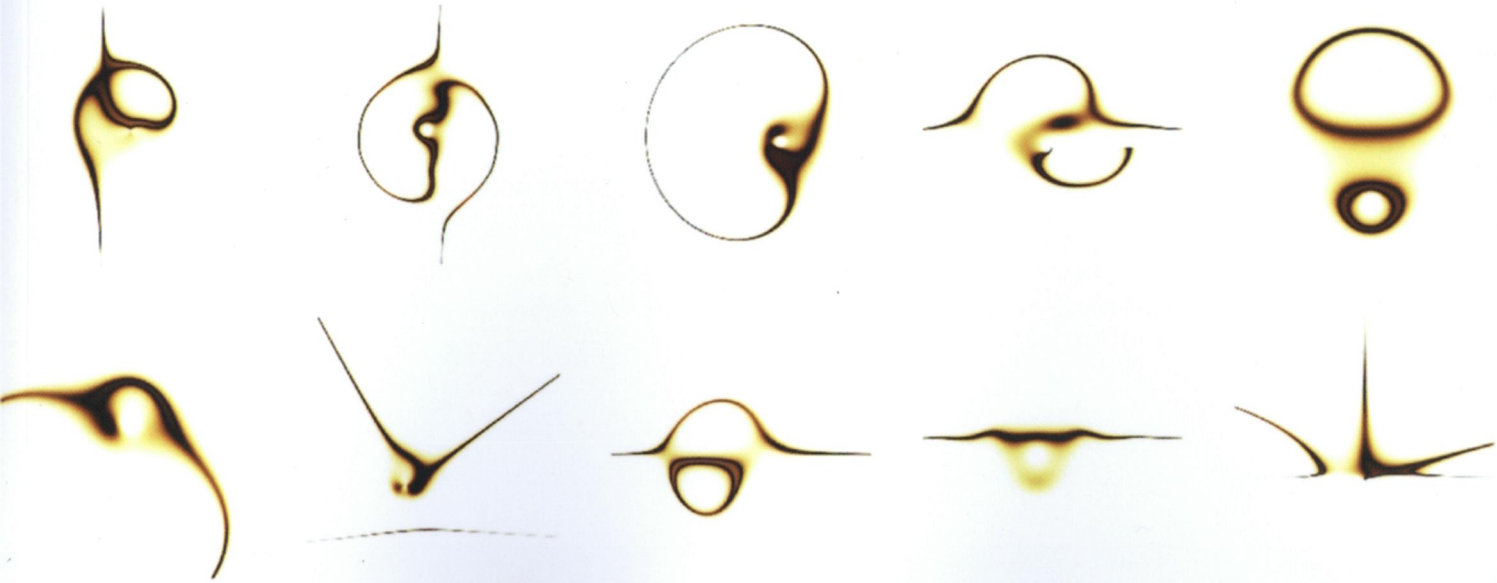


Where Do Darwin's Finches Come From?

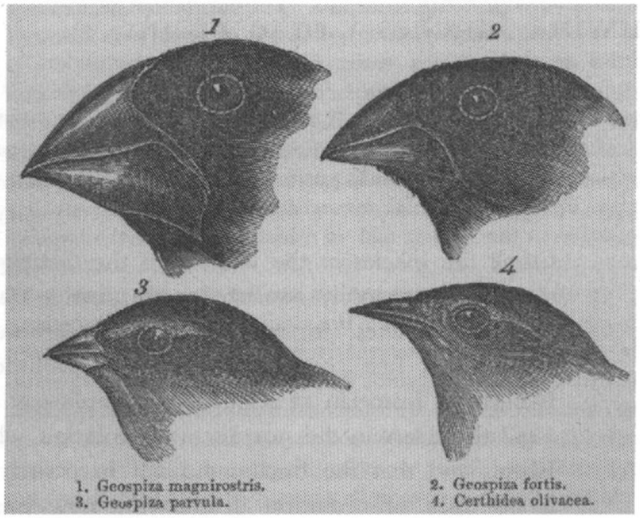
JOHN VAN WYHE

Of all the species in the world it is the Galapagos finches (*Geospiza*) that are most closely associated with Charles Darwin. Even known as "Darwin's finches," for many years it was believed that they were the catalyst that first convinced Darwin of evolution on the Galapagos Islands. Yet historian of science Frank Sulloway showed irrefutably in 1982 that Darwin did not discover evolution while on the Galapagos Islands and that the finches did not have such an influence.[1] There is no trace of evolution in Darwin's now missing *Galapagos Notebook*.[2] Although refuted in the specialist literature, various legends of Darwin, the Galapagos, and its finches continue to abound in popular media.

But if Darwin did not discover evolution when he saw the beaks of the finches on the Galapagos, then why are these perhaps the most widespread stories about Darwin? If they are not based on what Darwin actually did and wrote, then what are they based on? Where do these legends come from?

I began asking these questions in 2003. I first consulted many Darwin scholars. Where did these stories come from? No one knew. A few suggestions were David Lack's 1947 book *Darwin's Finches* or the illustration of Galapagos finches in the second edition of Darwin's *Journal of Researches* (1845).[3] Others suggested that the legend had always been around. Indeed many authors have mistakenly read the legend into the past by interpreting simple references to Darwin and the Galapagos as infused with a belief that Darwin discovered evolution there. As will be shown further on, the belief that Darwin discovered evolution on the Galapagos has not always been around.

Over several years I conducted an extensive survey of accounts of Darwin's life in every possible genre and medium to trace what was believed about the origins of his theory over the century following his death. It turns out that what was believed about Darwin and the beginnings of his theory has itself evolved over time.



Woodcut from Darwin, *Journal of Researches* (1845): 379. Reproduced with permission from John van Wyhe, ed., *The Complete Work of Charles Darwin Online* (http://darwin-online.org.uk), 2002–.

IN THE BEGINNING

If we want to understand how the story of the discovery of evolution has changed we need to be aware of what was available as source material at different times. It is important to remember that Darwin himself never said that he discovered evolution on the Galapagos. In the first lines of *Origin of Species* (1859) Darwin named instead South America as his inspiration: "When on board H.M.S. 'Beagle,' as naturalist, I was much struck with certain facts in the distribution of the inhabitants of South America, and in the geological relations of the present to the past inhabitants of that continent."[4] But many readers were familiar with one of his most evolutionarily suggestive passages in the second edition of *Journal of Researches* (1845):

> Seeing this gradation and diversity of structure in one small, intimately related group of birds, one might really fancy that from an original paucity of birds in this archipelago, one species had been taken and modified for different ends. In a like manner it might be fancied that a bird originally a buzzard, had been induced here to undertake the office of the carrion-feeding Polybori of the American continent.[5]

Darwin was unquestionably the naturalist most prominently associated with the Galapagos Islands because of his celebrated travel book with its wonderful chapter on the islands. Although Darwin was associated with the Galapagos from the early 1840s, it would be a mistake to assume that when the *Origin of Species* appeared readers believed the Galapagos was the location of Darwin's conversion or discovery.

POSTMORTEM

After Darwin died in April 1882 a torrent of obituaries appeared. It will surprise many to learn that the obituaries contain not a single mention of the Galapagos finches and more often than not, never even mention the Galapagos Islands. In fact, most accounts of the origins of Darwin's theory in the fifty years after his death never mention the Galapagos at all or attribute no particular significance to his visit there as compared to South America. The Galapagos and the finches were just not part of the Darwin story in the early years. For example, Alfred Russel Wallace recounted Darwin's life and work in the *Century Magazine* in 1883.[6] Although Wallace wrote of the *Beagle* voyage as the essential prerequisite for Darwin's evolutionary theorizing, the Galapagos were only mentioned as one of a number of important influences on Darwin.

There was a great deal of diversity in accounts of Darwin's life and theory in the early years, including occasional references to the Galapagos as of special importance. But no standard stories had yet developed and so each account seems to have been a largely original creation of its author based on firsthand readings of Darwin. In comparison, modern accounts are much more homogenous. The materials were always available to lend a greater role to the Galapagos. Darwin's somewhat ambiguous references to the islands were once read as only contributing to the development of his theory. But later generations used the same references as evidence that he had undergone a Eureka moment on the islands. Therefore it is not Darwin's writings themselves that explain the profusion of a particular version of discovery story in the latter twentieth century. The potential was always there, but this by no means determined what stories came to be told.

Darwin did write on numerous occasions that the facts of distribution of living things on the Galapagos were particularly important for convincing him that species become modified, but he did not say clearly where or when these facts had this influence on him. Thus the passages could be read a number of ways: the experience of collecting and observing in the Galapagos convinced him of evolution on the islands, or only started him thinking about it, or convinced him later in England. Most of his statements list the Galapagos fauna as one of three main influences that convinced him of evolution, as in his autobiography first published in *Life and Letters* in 1887:

> During the voyage of the Beagle I had been deeply impressed by discovering in the Pampean formation great fossil animals covered with armour like that on the existing armadillos; secondly, by the manner in which closely allied animals replace one another in proceeding southwards over the Continent; and thirdly, by the South American character of most of the productions of the Galapagos archipelago, and more especially by the manner in which they differ slightly on each island of the group; none of the islands appearing to be very ancient in a geological sense.
>
> It was evident that such facts as these, as well as many others, could only be explained on the supposition that species gradually become modified; and the subject haunted me. . . .
>
> After my return to England it appeared to me that by following the example of Lyell in Geology, and by collecting all facts which bore in any way on the variation of

> animals and plants under domestication and nature, some light might perhaps be thrown on the whole subject. My first note-book was opened in July 1837.[7]

This passage names fossils, geographical distribution, and the species of the Galapagos as suggesting the mutability of species. Letters to J. D. Hooker and L. Jenyns also named the American fossils and Galapagos organisms as sources for the theory. In other words, Darwin described the Galapagos as one of a number of important influences—never as the sole influence or as the locale of discovery.

The following year, 1888, Thomas Henry Huxley published an obituary notice of Darwin in the *Proceedings of the Royal Society*. Huxley argued that Darwin could not have begun to speculate about evolution until his specimens had been identified against institutional collections in Britain after the voyage. To further bolster his case Huxley cited Darwin's 1877 letter to the German zoologist Otto Zacharias:

> When I was on board the 'Beagle,' I believed in the permanence of species, but, as far as I can remember, vague doubts occasionally flitted across my mind. On my return home in the autumn of 1836 I immediately began to prepare my journal for publication, and then saw how many facts indicated the common descent of species, so that in July, 1837, I opened a note-book to record any facts which might bear on the question. But I did not become convinced that species were mutable until I think two or three years had elapsed.[8]

This important letter was included by Francis Darwin in *Life and Letters*. It was first published by Zacharias himself in German in 1882.[9] As far as is known, Zacharias was the only person who thought to ask Darwin directly whether he was an evolutionist during the voyage of the *Beagle*.

Huxley may have insisted on the necessity of comparison with institutional collections because of his feelings about institutional authority and the need for men in the field to delay speculating until consulting with experts in scientific institutions. Huxley treated the Galapagos as one of a number of crucial findings for Darwin including the similarities between South American fossils and modern species in the same region. For Huxley, scientific discovery was dependent on the institutional materials and support structure which only the metropolis of London could afford. Huxley seems never to have mentioned the Galapagos finches in any of his works.[10]

Francis Darwin thought differently. Although he did not stress it in *Life and Letters*, by the time he wrote the entry on his father for the *Dictionary of National Biography* (1888) he put it thus: "And above all [Darwin] came back [from the voyage of the *Beagle*] full of the thoughts on evolution impressed on him by South American fossils, by Galapagos birds, and by the general knowledge of the complex interdependence of all living things gained in his wanderings."[11] In 1892 Francis published a one-volume collection of his father's letters. Here Francis explicitly disagreed with Huxley: "How (that is to say) did [Darwin] begin to believe in evolution"? In answer Darwin's autobiography was paraphrased: "certain facts observed by him in South America seemed to be explicable only on the supposition that species gradually become modified." He goes on to say that the subject "haunted him."[12] Francis then cited the Zacharias letter. Yet the Galapagos were not mentioned in the discus-

sion. Francis aimed to stress the importance of the voyage and that his father's thoughts must have turned toward evolution before returning to England.

Francis and A. C. Seward returned to the question in *More Letters of Charles Darwin* (1903). The particular point that Huxley made in 1888 that Darwin could not have come to see evolution before the return of the *Beagle* was again contested:

> This seems to us inconsistent with Darwin's own statement that it was especially the character of the "species on Galapagos Archipelago" which had impressed him. This must refer to the zoological specimens: no doubt he was thinking of the birds, but these he had himself collected in 1835, and no accurate determination of the forms was necessary to impress on him the remarkable characteristic species of the different islands.[13]

Francis provided a footnote to the 1835 date: "He wrote in his 'Journal [2nd ed., 1845],' page 394, 'My attention was first thoroughly aroused, by comparing together the numerous specimens shot by myself and several other parties on board,' etc."[14]

Note that the finches had still never been related to the origins of Darwin's theory, only "the birds" of the Galapagos. Francis seemed to suggest that Darwin was first stirred to doubt constancy of species by what he saw on the Galapagos and only by 1837 had "so great a revolution in his conceptions" been completed.[15] These attempts may have had some impact on increasing the prominence of the Galapagos in accounts of Darwin's life in the following years.

For the time being, however, the story of Darwin's discovery continued to be explained in much the same way. The Galapagos were either not mentioned at all or were listed as only one of a number of sources for Darwin's theory and occasionally the theory was described as later derived from Galapagos evidence.

1909

The year 1909 was the centenary of Darwin's birth and the fiftieth anniversary of the publication of the *Origin of Species*. Major commemorations were held in Cambridge and elsewhere. In the many publications that resulted the Galapagos were still not a major part. Most accounts did not even mention them or listed them as important but in a list of other influences on Darwin such as uncovering fossils in South America. Yet there were also the first references which unambiguously described Darwin as discovering evolution while in the Galapagos. Probably the most influential of these was Francis Darwin's. Again he contested Huxley's view: "The Galapagos facts are strongly against Huxley's view, for Darwin's attention was 'thoroughly aroused' by comparing the birds shot by himself and by others on board. The case must have struck him at once,—without waiting for accurate determinations,—as a microcosm of evolution."[16]

Between 1909 and the 1930s accounts of Darwin remained much the same though now the Galapagos were mentioned in a much higher percentage of accounts of Darwin than before. In about a quarter of the publications in these years he was said to have uncovered evolution in the

islands, though more often evolution was derived from Galapagos evidence later on. And still there were numerous accounts of Darwin in which the Galapagos were never mentioned at all.

1935

As the Galapagos came to be described more often as a source for Darwin's theory a dramatic change occurred in 1935. This was the centenary of Darwin's 1835 visit to the islands. The event was celebrated because it was the most famous place visited by Darwin, not because it had long been generally believed that the Galapagos were the site of discovery.

Celebrations and commemorations of various kinds were independently organized around the world. It was the celebration of Darwin's visit, combined with the growing tendency to stress the role of the Galapagos of preceding years, that led different people in different contexts to independently modify the way they told the Darwin story in 1935.

Proposals for founding a research station on the islands were made and the Ecuadorian government passed laws to protect wildlife. A monument to Darwin was erected on the islands by a Darwin Memorial Expedition led by the American travel writer Victor von Hagen. The monument reads: "Charles Darwin landed on the Galapagos islands in 1835 and his studies of the distribution of animals and plants thereon led him for the first time to consider the problem of organic evolution. Thus was started that revolution in thought on this subject which has since taken place."

At the meeting of the British Association for the Advancement of Science (BAAS) in Norwich September 4–11, 1935 the zoological section offered papers under the heading "Centenary of the landing of Darwin on the Galapagos Islands, and of the birth of the hypothesis of the 'Origin of species.'"[17] Now, for the first time, Darwin was widely represented as discovering evolution *on* the Galapagos. The title of this section alone was reproduced in newspapers and journals throughout the world.

Nora Barlow, Darwin's granddaughter and historian, wrote an important letter to *Nature* published September 7, 1935 (i.e., during the BAAS meeting). She asked:

> At what period during the *Beagle* voyage did [Darwin's] views crystallise? . . . I have . . . been fortunate in finding among the contemporary ornithological notes a passage bearing directly on the subject, where the significant phrase "for such facts would undermine the stability of species" occurs. Here we have the earliest date yet obtained, I think, for an admitted upheaval of his thoughts along evolutionary lines. The ferment had already begun to work in September 1835.[18]

It is hardly surprising that Barlow took notes about Galapagos birds to be written during Darwin's 1835 visit to the Galapagos, especially in the year of commemoration of his visit. We now know that this passage was written on the *Beagle* near the end of the voyage, around mid-June to August 1836, between South Africa and Britain.[19] It is important to remember, however, that the passage cited by Barlow referred to mockingbirds, not finches.

Nevertheless, the finches also made their first appearance as inspiration for Darwin's theory in 1935. The curator of birds at the Natural History Museum, Percy Lowe, had studied the Galapagos finches in the British Museum bird collection. Lowe was invited to give a paper at the BAAS meeting in Norwich. This was an obvious choice. The theme of the meeting was, after all, Darwin *on* the Galapagos. Lowe's talk was entitled "The Finches of the Galapagos in Relation to Darwin's Conception of Species." In it he coined a new name for the birds: "Darwin's finches." Lowe explained:

> I do so because I think it is true to say that there is no group of birds in the whole world which has more right to occupy the attention of zoologists at the present moment; for the problem presented by the very extraordinary diversity seen within this group of Finches appears to me to be a problem of first-class biological importance. We know that it was the diversity presented by these Finches, as well as the Mocking-birds, tortoises, and plants, which started Darwin down that brilliant corridor of thought which led to his conception of the origin of species.[20]

So there were two reasons for talking about the finches at this time. One was that the birds posed serious problems for ornithologists and the other was Lowe's belief that the finches, as well as other Galapagos species, had first started Darwin on what became his theory. Lowe did not assert that the finches convinced Darwin *on* the Galapagos, or that they were the exclusive inspiration. That would come many years later. For now, Lowe wrote, the confusing finches "represent A HETEROGENEOUS SWARM whose diversity has been the despair of systematists, and whose distribution among the islands is completely abnormal."[21] Further investigation was deemed necessary.

The independent convergence on celebrating Darwin's visit to the Galapagos by the BAAS, Barlow, von Hagen, and others made an influential and lasting impact on how Darwin's life was described. There was no turning back. After 1935 Darwin was predominantly portrayed on the Galapagos when he came to be an evolutionist. The finches, for the first time, were explicitly put forth as important influences. For the moment, however, they were largely of interest to ornithologists.

1947

Lowe and others were convinced that Darwin's finches were a particularly difficult case for Darwinian evolution. Julian Huxley, then secretary of the Zoological Society of London, suggested a young schoolmaster and ornithologist, David Lack, be sent to the islands to learn more. Lack was a young school teacher and promising amateur ornithologist. Huxley encouraged the Zoological and Royal Societies to fund a simple expedition to the Galapagos to study the birds in their native environment and discover if they were a heterogeneous swarm. Lack and five companions set out in 1938.[22] These field observations were later supplemented by studying the collections of the California Academy of Sciences and other major collections. Lack's mentors were Julian Huxley and Ernst Mayr, two of the foremost proponents of the so-called neo-Darwinian modern synthesis. The

synthesis was a new rapprochement between laboratory geneticists and field naturalists. Mutations and Mendelian inheritance were coming to be seen as compatible with Darwinian explanations of adaptation through natural selection.

After long reflection back in Britain Lack come to see how the different species of Darwin's finches could coexist and persist so closely together. Lack showed that Darwin's finches were not a strange anomaly but in fact excellent exemplars of Darwin's theory.[23] The beaks now became center stage because they demonstrated the ecological specialization and isolation of the different species. Darwin had noticed the beaks as displaying a fascinating gradation, supporting an evolutionary development. But Darwin believed the birds all fed together in flocks, and did not appreciate their ecological specialization. For Lack, a Darwinian understanding of evolution, with genetic variation, geographical isolation, and natural selection, could now explain the diversity of the finches. As Sulloway has aptly written:

> In this sense, then, *Darwin's Finches* was a return to Darwin's own version of evolutionary theory after nearly a century of disputes among rival doctrines. Reflecting this triumph of Darwinian theory was the whole design of Lack's book, which included relevant quotations from Darwin's *Journal of Researches* and his *Origin of Species* at the heads of each chapter. It is hardly surprising, then, that many readers of *Darwin's Finches* tended to synonymize Darwin's understanding of his finches with the neo-Darwinian understanding of them.[24]

However it is not strictly the case that "with the publication of Lack's book in 1947 the legend became fully established" nor were "Readers and reviewers of Lack's book, steeped in a Darwinian conception of the finches."[25]

1958–1959

Further commemorations of Darwin took place in 1958–1959 marking the one hundredth anniversary of the Darwin and Wallace papers at the Linnean Society in 1858, the first announcement of the theory of evolution by natural selection, and the 1859 publication of *Origin of Species*. On this occasion for increased attention to Darwin and his discoveries, the stories were markedly different from 1909. The Galapagos were now *always* a crucial part of the story and the finches played a crucial role for the origins of Darwin's theory in about 50 percent of publications.

Also about this time a new version of the story began to appear: the finches convincing Darwin of evolution while actually on the Galapagos. One of the earliest was Ruth Moore's popular biography of Darwin from 1957: "the peculiar little finches with their graduated beaks had given the twenty-six-year-old naturalist a probable answer to that most profound of all problems."[26] An abridged edition of *Voyage of the Beagle* was published in 1959 by Millicent Selsam with illustrations by Anthony Ravielli. In it, the finches from Darwin's 1845 *Journal* were rearranged to look like one of those ascending evolutionary scale images apparently derived from the ape skeleton frontispiece to Huxley's *Evidence as to Man's Place in Nature* (1863).

1960S–1982

From the 1950s the association between the site of Darwin's discovery or insight and the Galapagos Islands and Darwin's finches was very widespread. Virtually all of the most influential popular accounts of Darwin after this mention the role of the Galapagos and the finches. In the 1978 BBC dramatization *The Voyage of Charles Darwin* millions of viewers saw the young Darwin lining up the finches on the *Beagle* while at the Galapagos and noticing their gradually increasing beak sizes. David Attenborough, in his acclaimed and still unmatched natural history series *Life on Earth* (1978) and its accompanying book, also told vast audiences that the finches played a special role in inspiring Darwin's theories: "Darwin had noted similar variations in the bills of the finches of the Galapagos Islands and regarded them as powerful evidence for his theory of natural selection."[27] The finches became, and remain, one of main features of the Darwin story. This is quite independent of their usefulness as a paradigmatic example to explain evolutionary adaptive radiation.

CONCLUSIONS AND MORALS OF THIS STORY

When I set out to find the origin of the legends that Darwin's finches inspired Darwin to become an evolutionist on the Galapagos I assumed these stories could be traced back to some original source. But these legends did not spring forth fully formed like Athena from the head of Zeus. Although some versions of the story eventually tended to dominate in the place of others, there is no simple pattern of inevitable progress toward the modern legends of Darwin's finches. In fact there were still accounts in which the Galapagos or Darwin's finches were given no special role or not even mentioned in the 1970s and 1980s.

Always keeping in mind that the evolution of ideas over time is a very complex continuum, one can, for simplicity's sake, artificially break down the evolution of these legends into six stages.

1. The Galapagos were never mentioned.
2. They were mentioned but no special role given to them.
3. The theory was later derived from them.
4. The theory was conceived on them.
5. The finches played a special role.
6. The finches caused the theory to be conceived on the Galapagos.

The stories that emerged by the 1960s (with Darwin discovering evolution on the Galapagos by noticing the beaks of finches) is not the product of anyone's design, or of a mistake, or the result of particular motives or philosophies of interest groups. There was also no inexorable or directional development toward these stories. Instead minor elements of the modern legends developed independently and for quite separate reasons at different times and in different contexts and only later were occasionally merged together to form the legends we all know of discovery *on* the Galapagos because of Darwin's finches. The legends that evolved were the result of countless individuals' idiosyncratic takes on what they had heard and read, in addition to their political or personal motives

on spinning the story of Darwin in a certain way at particular times. The stories were tossed about in a sea of ever-changing local and national and international social and political contexts. Hence to explain how stories came to be a certain way one needs to appeal not only to the use they are put to in a particular context, but also to understand their genealogy or history.

Although innovative themes such as Darwin discovering evolution on the Galapagos in 1935 or a prominent role for the finches came about suddenly for reasons that made sense at the time, they formed a legacy (since they were in print), and remained to influence people later. The Galapagos slowly grew in importance between 1909 and the 1930s quite independently of the finches. The significance of the finches arose for quite independent reasons in the 1930s. Each carried on for a time and were later occasionally combined into the same story. This gradual process gave us the popular legends of Darwin's finches.

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NOTES

1. Sulloway, "Darwin and His Finches."
2. *Darwin Online*; Chancellor and van Wyhe, eds., *Darwin's Notebooks*.
3. Darwin, *Journal*.
4. Darwin, *Origin*, 1.
5. Darwin, *Journal*, 380.
6. Wallace, "Debt."
7. F. Darwin, *Life and Letters*, 1: 83.
8. Huxley, "Obituary," xi.
9. Zacharias, "Charles Darwin."
10. Blinderman and Joyce, *The Huxley File*.
11. F. Darwin, "Charles Robert Darwin."
12. F. Darwin, *Charles Darwin*, 165–66.
13. F. Darwin and Seward, *More Letters*, 37–38.
14. F. Darwin and Seward, *More Letters*, 37–38.
15. F. Darwin and Seward, *More Letters*, 38.
16. F. Darwin, *Foundations*, xiv.
17. *Report of the British Association*.
18. Barlow, "Darwin."
19. Sulloway, "Darwin's Conversion."
20. Lowe, "Finches," 310.
21. Lowe, "Finches," 311.

22. Larson, *Evolution's Workshop*.
23. Lack, *Darwin's Finches*.
24. Sulloway, "Darwin and His Finches," 45.
25. Sulloway, "Darwin and His Finches," 45–46.
26. Moore, *Charles Darwin*, 22.
27. Attenborough, *Life on Earth*, 206.

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