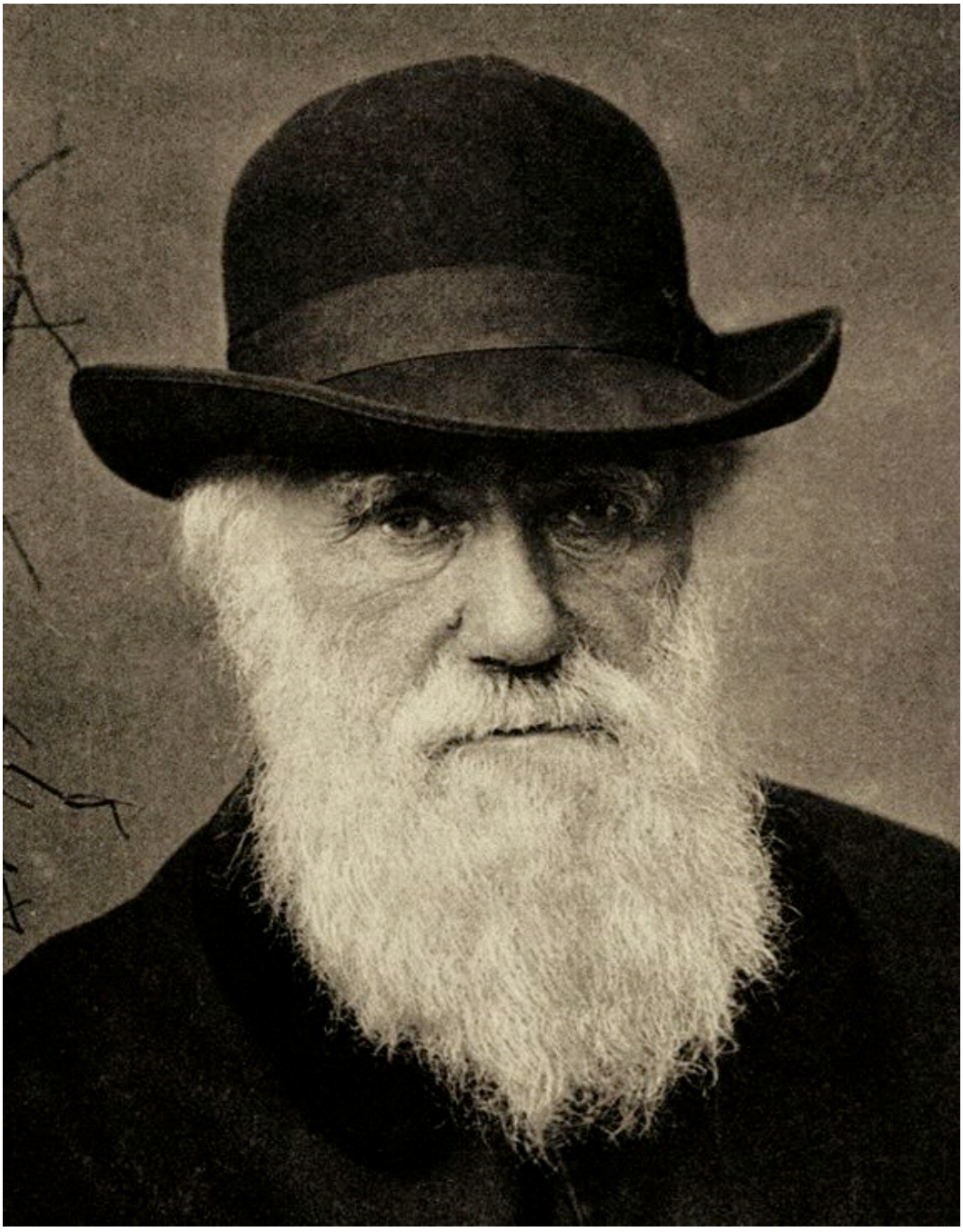

Darwin: A Summative Evaluation of the Visitor Experience

Prepared by Ellen Giusti

March 2006

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Summary

A summative evaluation of the visitor experience in *Darwin* was conducted to learn about the exhibition's impact. Specifically it attempts to answer:

- Are visitors' expectations met, and what was most memorable?
- What do visitors take away? Does *Darwin* the exhibition convey a sense of Darwin the man, and what do visitors learn about evolution and natural selection?
- How do visitors react to the way the exhibition handles "the controversy" between scientific perspectives of evolution and intelligent design? Do they understand the difference between each camp's use of "theory"?
- Do visitors find the exhibition design appealing? Are the exhibition's interpretive text and media appropriate?
- Is anything missing that visitors expect to see or learn about?

Three methods were used to triangulate findings: an exit survey with more than 300 visitors, in-depth interviews with more than 50 visitors, and timing and tracking more than 30 visits.

More than half the *Darwin* visitors came to the Museum particularly to see the exhibition. Some 95% of visitors said their expectations were met or exceeded. The average rating was 8.5 on a 10-point scale.

Visitors estimate their time in *Darwin* (based on timed ticketing) from one-half hour to over three hours, 77 minutes on average. This is the longest for any AMNH temporary exhibition since they began timing, longer than *Petra, Diamonds, Shackleton* or *Einstein,* which averaged from 51 to 61 minutes respectively.

Half the surveyed visitors said they found something particularly memorable in *Darwin*. Details about Darwin's biography and scientific information were cited by an equal percentage of visitors. Other memorable features of the exhibition were design elements (the study), the original documents, live animals and, to a lesser extent, the religious issue.

Visitors recognized Darwin as a product of his times as well as an original thinker. They seemed to empathize with his dilemma about publishing the results of his observations and research that he knew would result in controversy. This seemed to "humanize" Darwin for visitors. His life and work were seen as almost inseparable, as depicted in the exhibition.

According to visitors, the Beagle voyage was the breakthrough experience for Darwin. Visitors could see that this was where he began to develop his theory of evolution by natural selection. Visitors mentioned being amazed that he could develop the theory with such simple tools, basically close observation and journals. The original documents were compelling to a number of visitors.

The idea of evolutionary through the mechanism of natural selection did not shock AMNH visitors. All but two of 300+ survey respondents agreed with its tenets and appeared to understand the meaning of "theory" as it is used in the scientific realm. Visitors cited many areas that provide evidence of evolution throughout the exhibition, particularly in the last section illustrating how contemporary scientific research supports Darwin's insights. Interview subjects spoke at length about the exhibition's effective presentation of the science. Tracking revealed that visitors stopped frequently at science-related displays, particularly homology, evolution of the horse and hominid skulls.

The exhibition's design was broadly admired, particularly the recreation of Darwin's study. Text was deemed easy to read and understand and visitors said that the amount was not excessive. Media features drew good audience and high ratings.

Introduction

Darwin opened at the American Museum of Natural History (AMNH) on November 19, 2005, and remains on view through August 20, 2006. Curated by Niles Eldredge, it was organized by the AMNH in collaboration with the Museum of Science, Boston; The Field Museum, Chicago; the Royal Ontario Museum, Toronto, Canada; and the Natural History Museum, London, England. The exhibition was mounted in cooperation with English Heritage, the organization responsible for Down House, Darwin's longtime home, and with Cambridge University, the primary repository of Darwin's writings.

The exhibition explores the life and work of Charles Darwin. This 19th-century scientist's theory of evolution through natural selection launched modern biological science, providing the key to our understanding of the origin of species on the planet. The exhibition aims to be a source of education about one of science's most important and controversial ideas.

The exhibition is organized sequentially into several sections:

- Introduction, focusing on Darwin's method of observing phenomena closely (his magnifying glass) and recording them (his notebook).
- The world before Darwin, as understood by 18th- and early 19th-century naturalists
- Darwin's family and early life as a budding naturalist
- His trip around the world on the HMS Beagle
- Making sense of observations back home in London
- Darwin's ongoing research at his country home in Down
- Evidence from modern biology supporting the theory of evolution
- Darwin's legacy and evolution's predictive power

Along with fossil and mounted specimens collected by Darwin and others, the exhibition is noteworthy for the Museum in containing live animals: Galapagos tortoises, an iguana and horned frogs from South America. A reconstruction of Darwin's study at Down House, along with many of his journals, notebooks and personal effects, add a sense of the human side of a great man of science.

Charles Darwin's evolutionary theory is central to science and is the foundation for all of modern biology. Yet, outside the scientific community, the theory has been the subject of controversy that extends from the time of the publication of *The Origin of Species* nearly 150 years ago to the present day. The exhibition addresses "the controversy" in a measured manner, while maintaining a scientific perspective. For example, text and video draw distinction between a scientific "theory" and the same word meaning a guess or a hunch in common parlance.

Purpose

The purpose of the summative evaluation is to learn about *Darwin's* impact on visitors. Specifically, the exhibition team had questions that the evaluation aims to answer:

Do visitors have expectations for *Darwin* going in? What are they? Are they met? Exceeded? Not met? Would they recommend *Darwin* to friends and family?

Which aspects of the exhibition attract and hold visitors' attention?

- What were visitors' favorite parts of the exhibition?
- Do they find the exhibition design appealing?
- Do they notice the recreation of Darwin's study?
- Did the live animals add anything to the exhibition?

What do visitors take away about Darwin and his contribution to science?

- Do they get a sense of Darwin the man?
- What do visitors think of the world and science before Darwin?
- Do visitors feel that they understand more about the science than before they came?

Evolution and natural selection:

- Do people understand it?
- VISTA: do visitors notice it?
- Do visitors understand the connection between natural selection and evolution?
- Do visitors notice the human evolution display of skulls? What do they think of it?
- Where in the show did they see evidence for evolution? Common ancestry?

What do visitors think of exhibit components on Science and Faith and What's a Theory?

- What are their reactions?

Do visitors read the original documents or do they read transcripts?

- Do they like seeing the "real" thing?
- Was the writing legible?

Interpretation and media

- Was the amount of text too much, too little or just right?
- Do visitors watch the films in the theater?
- Do magnifiers work for children and adults? Are they used?
- Do visitors use the Homology and Ladybug interactives? What do they think of them?
- Were the Explainers helpful?

Was anything missing visitors expected to see or learn about? Did the exhibition raise questions that were not answered?

Method

Three methods were used to investigate the visitor experience in *Darwin*:

- An exit survey explores the exhibition's impact on visitors
- Interviews that utilize photographs of the exhibition to prompt in-depth discussion of visitors' perceptions of the exhibition
- Timing and tracking provide objective data about what visitors do in the exhibition.

The exit survey consisting of open-ended and multiple-choice questions was conducted from Thursday, January 26, through Sunday, January 29, 2006 to ascertain the views of weekday and weekend visitors. Some 312 visitors exiting *Darwin* were selected at random and asked to take a few minutes to give their opinions about the exhibition. Tables and chairs were set up across from the shop area for visitors to self-report their responses. Two different questionnaires were crafted to avoid taxing respondents with an overly long survey. The two questionnaires contain many of the same questions and demographic information. Half the respondents were asked about media and half about the documents; half responded to multiple-choice questions about science themes and half to questions about exhibitry elements. Survey instruments are included in Appendix B. The response rate was high: fewer than 1 in 5 visitors who were approached declined to participate, and those that did decline, typically could not speak English or had no time. Survey data was analyzed statistically; chi square tests were performed for significance relating to age and scientific training, and are reported where significant variation was found.

Some 31 interviews were conducted with 52 visitors to delve into their perceptions of *Darwin*. Twelve photographs of exhibition sections were chosen for their relevance to important exhibition themes and used as prompts for visitors to help them recall what they had seen and discuss the meaning derived from certain exhibits. Selected images appear in this report; a list of images and questions used in the interviews can be found in an appendix. Interviews lasting from 5 to 20 minutes were recorded and transcribed.

Visitors were timed and tracked unobtrusively as they toured the exhibition during the month of February 2006. Some 30 visitors were selected at random. Data collectors documented observable behaviors: stopping for three seconds, reading the text, watching a film, using an interactive, talking to a companion. When correlated with survey and interview findings, these data suggest which exhibit elements appeal to visitors and engage their attention effectively. Timing and tracking was particularly challenging for *Darwin* because visitors spent such a long time in the exhibition.

The report that follows is organized by exhibition themes and topics cited above in the Purpose section of the report. The three methods used to gather data on the visitor experience are interwoven to better explore relevant findings. Demographic data of participants in all three methods is in Appendix A. The surveys and interviews are quoted liberally throughout, using the visitors' own words to add richness to the data. Numbers in parentheses identify the respondents quoted: a single number, e.g., (10) is the number of the survey from which the quote was taken, while (M 50) refers to a 50-year-old male interview respondent.

Findings

Darwin draws visitors to the Museum: more than half the visitors surveyed (51%) said they came to AMNH particularly to see the exhibition. Table 1 illustrates visitors' reasons for coming.

Table 1. Visitors' reasons for coming to *Darwin*

Contributed to the decision to see *Darwin* today	**Frequency N=312**	**Percent***
I came to the Museum particularly to see it	159	51
I am interested in science/evolution	152	49
I came with a friend or family	150	48
I am a tourist visiting NYC	95	30
I read about it	82	26
It was recommended by friend/family	58	19
I brought an out-of-town guest	32	10
I saw the banner outside	15	5
I learned about it at the admission desk	6	2
Other	24	8

*Percents add up to > than 100 due to multiple responses

Darwin ratings and other AMNH exhibitions

Visitors' response to *Darwin* was positive: on average they rated it 8.5 on a 10-point scale (1 low, 10 high). Four in five visitors rated *Darwin* an 8, 9 or 10, and 28% gave it a perfect 10. Table 2 compares *Darwin* with other AMNH temporary exhibition ratings.

Table 2. Ratings of AMNH temporary exhibitions

AMNH temporary exhibitions	**Rated 8-10**	**Rated 10**
The Endurance: Shackleton's Legendary Antarctic Expedition	85%	46%
The Genomic Revolution	83%	30%
Einstein	81%	27%
Darwin	**80%**	**28%**
Butterfly Conservatory	74%	40%
Epidemic: The World of Infectious Disease	72%	30%
Body Art	72%	33%
Dinosaurs: Ancient Fossils, New Discoveries	66%	22%
Fighting Dinosaurs from Mongolia	63%	16%
Times Capsule	40%	17%

Expectations

Darwin matched or exceeded visitors' expectations. One visitor commented:

> I expected models and the controversy and the development of the theory, but it was much more thorough than I expected. I expected a lot but it exceeded that. (M 45)

Table 3. Visitors' expectations

How well did *Darwin* match your expectations?	**Frequency N=312**	**Percent***
It was better than I expected	127	41
It was about what I expected	167	54
I was disappointed	15	5

Interviews suggest that most visitors did not have specific expectations before they came—or did not think they had any. After a brief disclaimer, most interviewees found they had a number of preconceptions. The comments below illustrate their previsit expectations. Not one of the visitors claimed to be disappointed.

> I didn't really know what to expect. I hadn't read much about it and I was just looking on the museum's website and I saw *Darwin*.... I guess I thought it would be a little more about *him* and what his life was like as opposed to his ideas. But I like that they were able to put in his ideas and what he thought. (F,22)

> I guess I thought it would certainly tell about how Darwin evolved his theory which it certainly met that. And then it went beyond that to start talking about evolution more broadly which I didn't know would be part of it. (F 27)

> I thought there would be a little less words and more images I guess, like the monkey and the whole line-up of human skeletons. That's kind of what I was thinking. (F 25)

> I was looking forward to the live animals. Yeah. I expected that. I kind of wanted there to be more of them, like I thought there were going to be more live animals. (F 22)

The misconception below is not uncommon; we heard it during *Dinosaurs: Ancient Fossils, New Discoveries*. Perhaps the Museum should be careful when using the term "show" to signify exhibition.

> No I didn't actually. When I walked downstairs for a ticket I asked if it was a *show* because I had no concept of what it is that the Museum was presenting. It is interesting because I think there's an admission fee and normally in this Museum you walk around and all the halls are open. There was an admission fee so that in my mind equated *show*—theater or movie or something like this. (M 28)

The highest praise for the exhibition is from the 94% of the 300+ survey respondents who said they would recommend the exhibition to friends and family.

Time spent in the exhibition

Visitors spent an extraordinarily long time in the exhibition, contributing to one of the few negative comments, overcrowding. Timed ticketing admitted visitors every half hour, but with an average stay of more than an hour, throughput was slower than may have been anticipated, particularly on weekends. Because visitors had timed tickets, we can assume that their estimates of one-half hour to upwards of four-hour visits are quite accurate. Actual timing of visits was less reliable: because people stayed so long, data collectors often tired after half the visit, resulting in a smaller sample with questionable validity. The smaller sample of interview subjects estimated their visits to range from one-half hour to 3 hours, averaging 1 hour and a half.

Figure 1 illustrates the range of survey respondents' estimated time in *Darwin*.

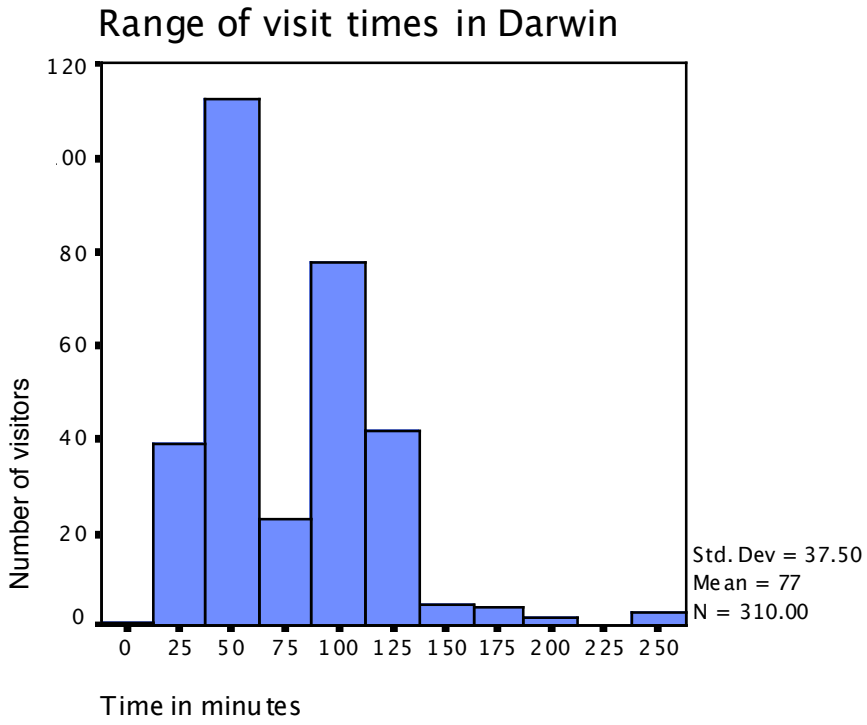


Figure 1. Time visitors spent in *Darwin*

The average visit estimated by survey respondents lasted 77 minutes, more than 1 hour and a quarter. This is considerably longer than visitors' estimated times in other AMNH temporary exhibitions with an extra charge and timed admission.

Figure 2 illustrates that visitors spent more time in *Darwin* than in any other temporary exhibition since AMNH began to time visits. "Estimated time" refers to visitors' estimates of the time they spent in an exhibition: they were able to calculate this by noting the entrance time marked on their ticket and subtracting that from the time when they sat down to complete the survey.

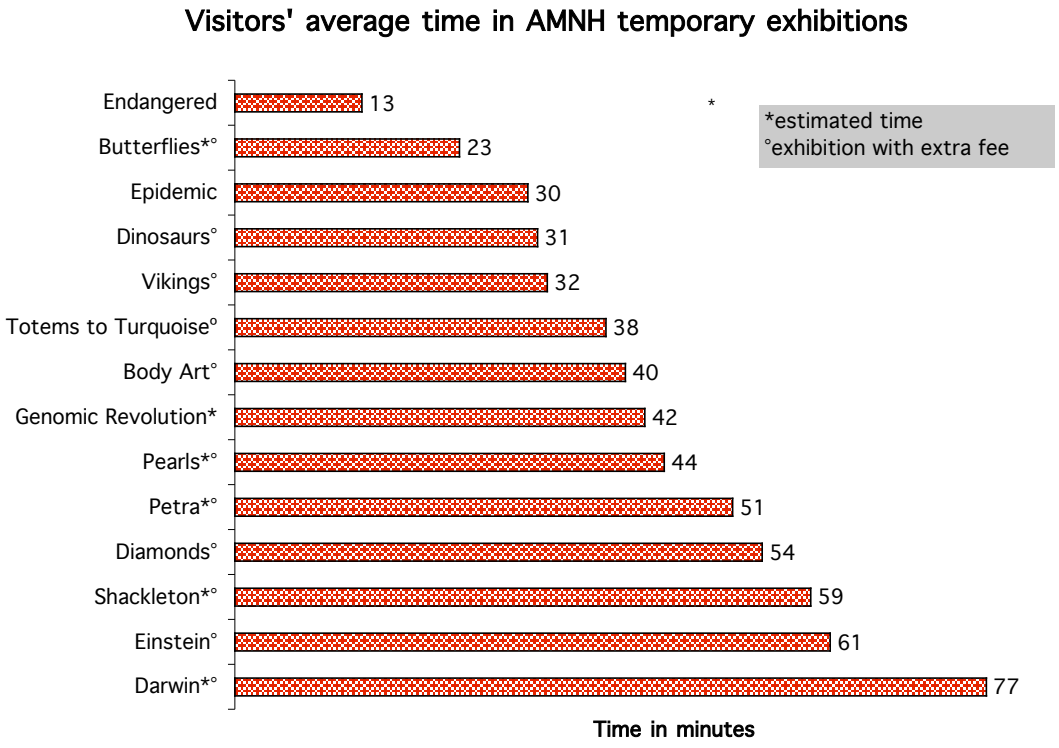


Figure 2. Average time spent in AMNH exhibitions

All of these temporary exhibitions (with the exception of the Butterfly Conservatory) were on view in Galleries 3 and 4 which measure approximately 6500 square feet.

Highlights

Half the surveyed visitors were asked if they found something particularly memorable in *Darwin*. Two in 3 reported at least one memorable moment, and several people mentioned more than one. Topics that visitors found memorable were categorized as biographical, scientific, exhibit-related, original documents, live animals and religious issues (summarized in figure 3). Interestingly, biographical and scientific topics were equally strong, with some visitors favoring biography and others science.

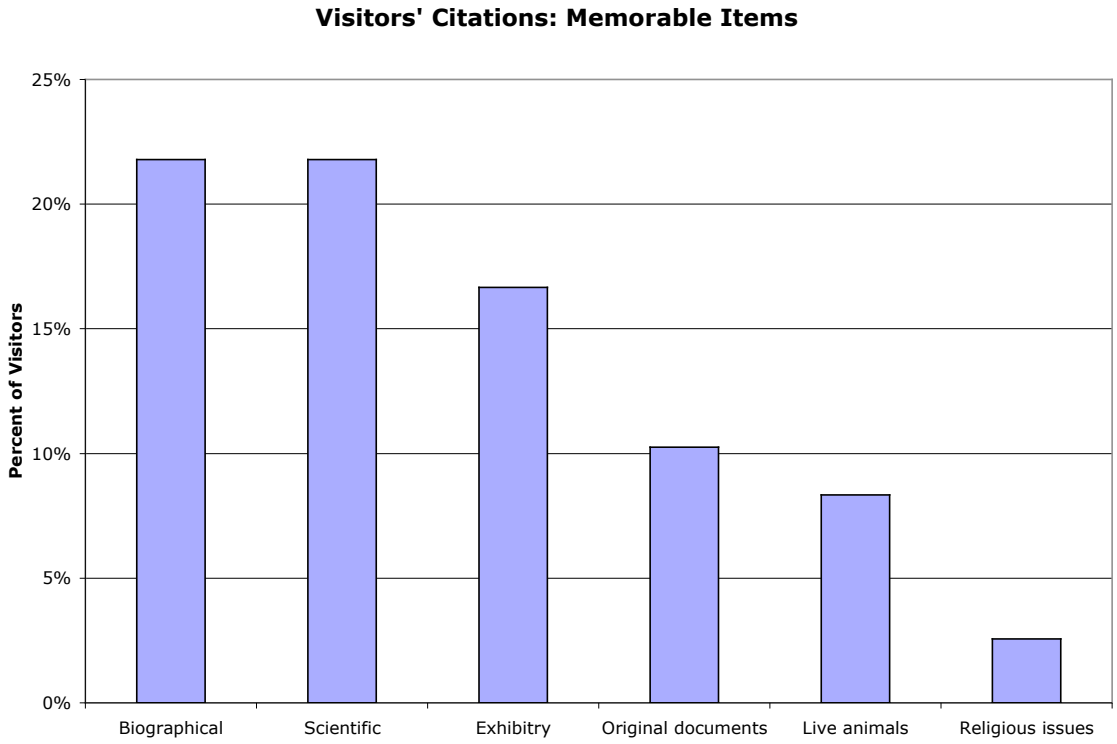


Figure 3. Memorable items cited by visitors

Half the surveyed visitors were asked to cite three things they would tell someone about *Darwin*. With three items to cite, virtually all respondents cited at least one biographical topic. Because respondents were encouraged to dig a bit deeper to come up with more than one memorable item, there was considerably more variety in these citations. One respondent had practical advice: "1) Very informative scientifically and historically. 2) Make sure you have enough time (at least 2 hours). 3) It is for adults mostly; younger kids will not have the patience or intellectual skills to really enjoy it. Lots of reading." (210)

A man and a scientist of his times

There was a great deal of interest among visitors in Darwin "the man." People said the exhibition "humanized" Darwin. Visitors recalled the exhibition's biographical material in detail: for example, a surprising number remarked on Darwin's relationship to the Wedgewood family. Other areas of interest focused on his marriage, his study and voyage on the Beagle. Several people remarked that he had the opportunity to pursue careful research for years and years because he was independently wealthy and was not obliged to work for a living.

> Yeah, he was blessed with not having to earn a living. That helped! Oh but he seemed just totally lovable, this little kind of geeky guy just collecting his beetles. I like the human aspect. (F 45)

> Darwin came from a privileged family but [it showed] how well he used the privilege to [pursue] knowledge and learning, [to do something for the world] rather than just being a selfish individual. You know, he could have lived the life of luxury, not gone anywhere [or done anything]. (F 50s)

> I thought it would be mostly evolution and looking at the animals, at the animal bones or whatever. But I really enjoyed the fact that it was more on a personal level and you learned more about Darwin himself and his life and his times and seeing him in his environment and the story about the ship, I mean about the voyage, HMS whatever it was. But I liked that. I liked the antique nature of everything, the way the exhibit was put together. It wasn't only science. (F 52)

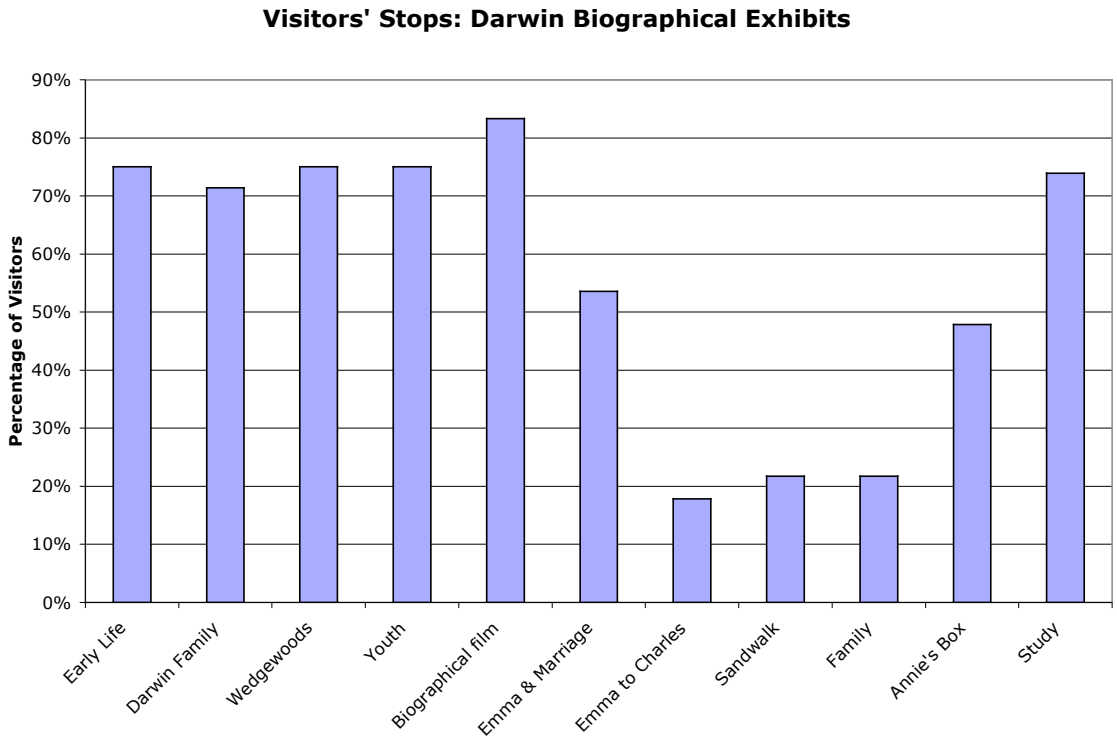


Figure 4. Where visitors stopped at biographical exhibits

Three exhibit elements were less visited than others, all in Down, in the area of the Sandwalk. Emma to Charles and Family were somewhat overpowered by nearby components, and the Sandwalk appeared to be a sort of projected graphic to many visitors.

> I like that he wrote to marry, to not marry and he had like a list for each like a scientist kind of would. (F 46)
>
> The first thing I loved about the exhibit was the fact that he didn't do well in school. He hated memorizing Latin. He wasn't a good student, but he was obsessed with finding bugs and beetles. And I liked learning about how he grew up and just the fact that you never know what you're going to do until you're in your twenties. (F 52)
>
> One of the parts I found really fascinating, which was telling the story about how much his father had not wanted him to go on the journey on the Beagle.… Darwin seemed so passionate about his work yet if his father said don't go, you know he's this twenty-two-year old man, he would not have gone. I thought that that … told a lot about who Darwin was. (F 27)
>
> Well throughout you get the sense of him as being this person who was driven by curiosity, but also someone who really likes order and routine and repetition, but also he's a congenial guy. He ends up winning over the captain and he probably would have been someone you would have enjoyed [spending time with]. (M 48)
>
> His life is an interesting tale of how important the intervention of others is in the development of a career. (288)

The World before Darwin

Science then and now

The scientific information that visitors take away is remarkably varied. Visitors found much to learn about science, and evolution in particular, throughout the exhibition.

Science then

Science was important to Darwin throughout his life. Visitors stopped frequently at displays illustrating Darwin's early interest in collecting beetles, and geology. Visitors noticed the historical context within which Darwin worked and saw where his work conformed or diverged from that of his peers.

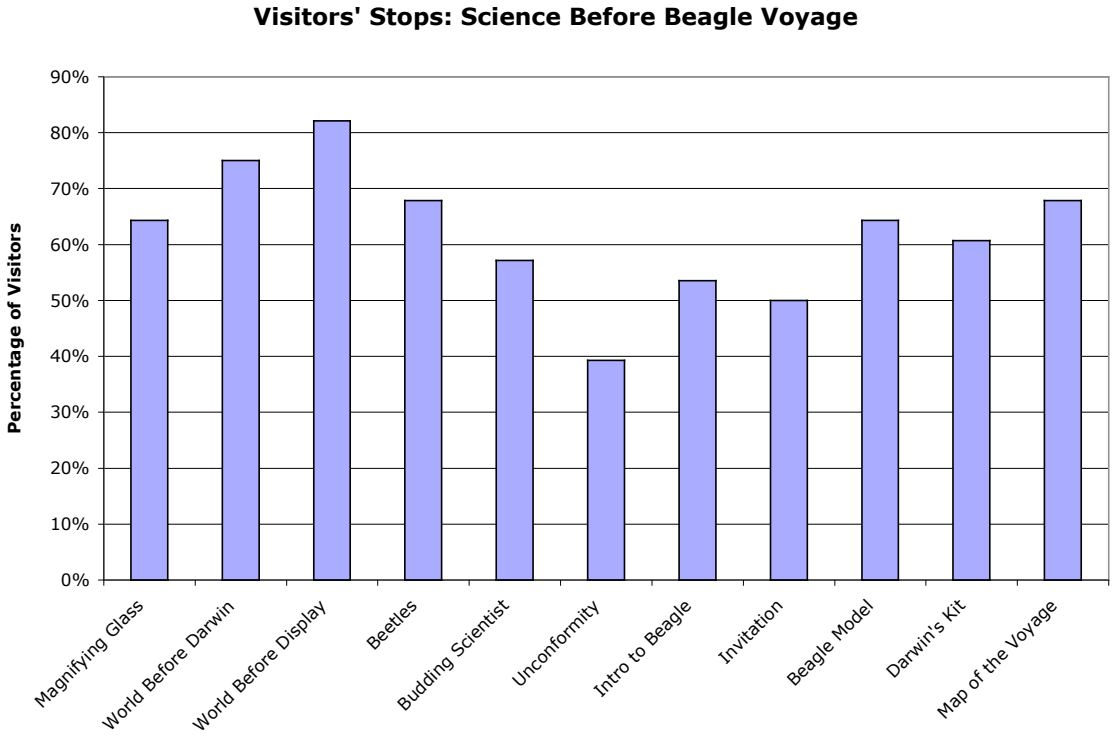


Figure 5. Where visitors stopped: Science before the Beagle voyage

Visitors saw that Darwin was a product of his times. His ideas did not seem to take a radical turn until after the Beagle voyage.

> [The exhibition] presents a fascinating view of pre-Darwin scientific thought. (132)
>
> [I learned] how his work was received at that time. I didn't know anything before about his contemporaries and their views. (56)
>
> It was interesting to see in the beginning [of the exhibition the] tools that he used.... And he really worked with simple tools—nothing that he could see extremely detailed with, but he was able to extract so much information by working with a magnifying glass. (F 22)
>
> I like the fact that [the exhibition] mentioned something about his geological surveys because it's really not emphasized in his work and his ideas. Evolution just seems to be his key idea and people tend to forget that geology was also involved in it. (F 22)

Visitors recognized that the Beagle voyage was the breakthrough experience for Darwin. Many people spoke about the map of the voyage and were amazed by the voyage's 5-year duration and geographical extent. Comments confirmed what was learned in background audience research: most people believe that Darwin's travels took him only to the Galapagos Islands.

> The excitement of thinking about his trip around the world. I actually absolutely loved this map where it showed the different stopping points and described his observations and what happened at different points in the trip.…That was so exciting to me, just thinking about those different places around the world. (M 48)

The Voyage of the Beagle

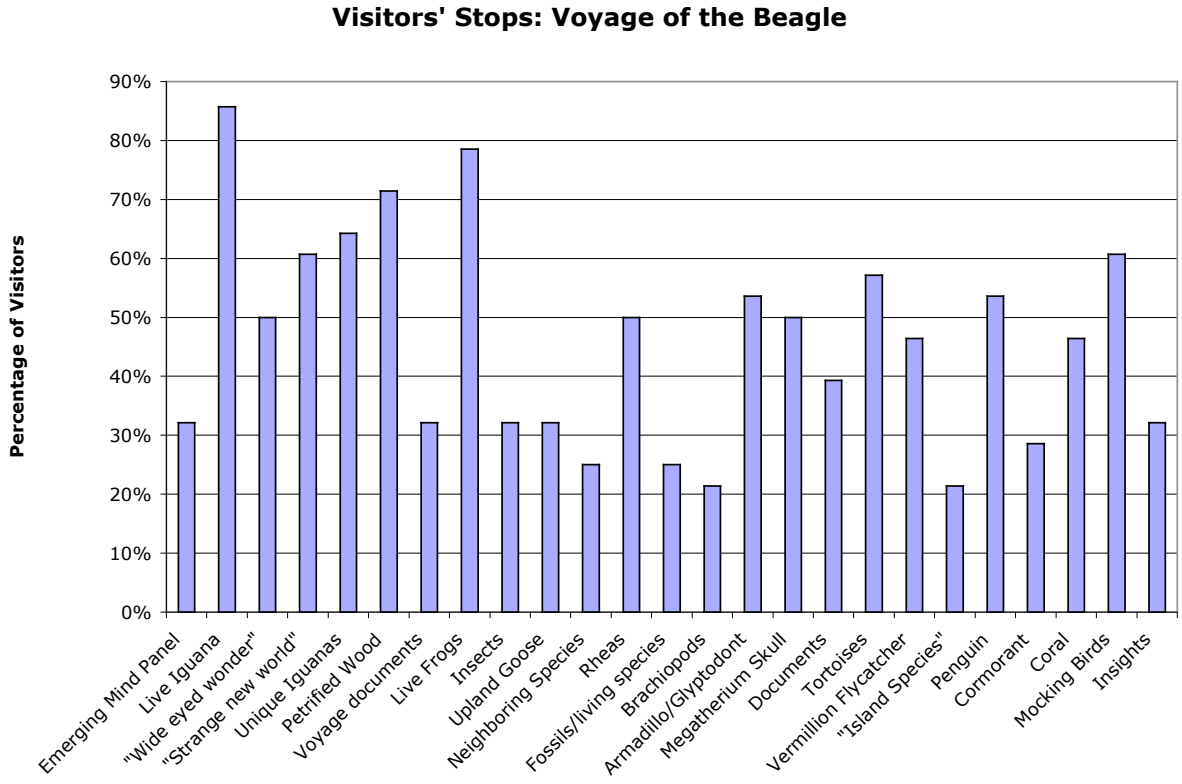


Figure 6. Where visitors stopped: Voyage of the Beagle

Evidence of evolution

The Beagle section's array of specimens—living, preserved and mounted—suggests the scope of what Darwin saw on his voyage. Visitors are encouraged to make the connections that Darwin observed and pondered: for example, similarities between extinct and living species, between distinct species occupying different islands and the relevance of Earth's geologic processes.

> [I was amazed to see] how many similar animals are evolved from the same species! (310)
>
> His interest and skill in geology [led to] conclusions drawn from findings in the Andes—plant fossils at great height. (128)

The interviews explore visitors' thinking and reveal how they were interpreting some of the exhibition's important themes. For example, The Voyage of the Beagle section shows visitors what Darwin saw, encouraging them to deduce how he would later discover in it the evidence for evolution. But would visitors understand this subtlety? Some did.

> Man:[Voyage of the Beagle] is the *heart* of the exhibit in my view. This is where you present the evidence and I thought they did this brilliantly… You know the inductive learning that is going on here in trying to present the data as Darwin himself encountered it and trying to get sort of the concepts emerging without saying it didactically. Whoever organized, whoever curated this [did a great job]. Now he's home and now he's trying… Woman: And the idea takes shape…. O.K., his idea is evolving and—it took me a long time to just read all the different parts where you could sort of get, OK, he's seen all this dramatic new stuff and now he's going to shape his idea of evolution. (M F 60s)

It explained how he went from wondering why smaller things looked like bigger things, the fossils he found and the animals that he saw. And the exhibits kind of took you along that path with him. And I liked that. I like the way they started to put together the evidence that, you know, shows how he was accumulating different observations [and seeing] commonalities across all the different observations. (F 55)

London: an idea takes shape

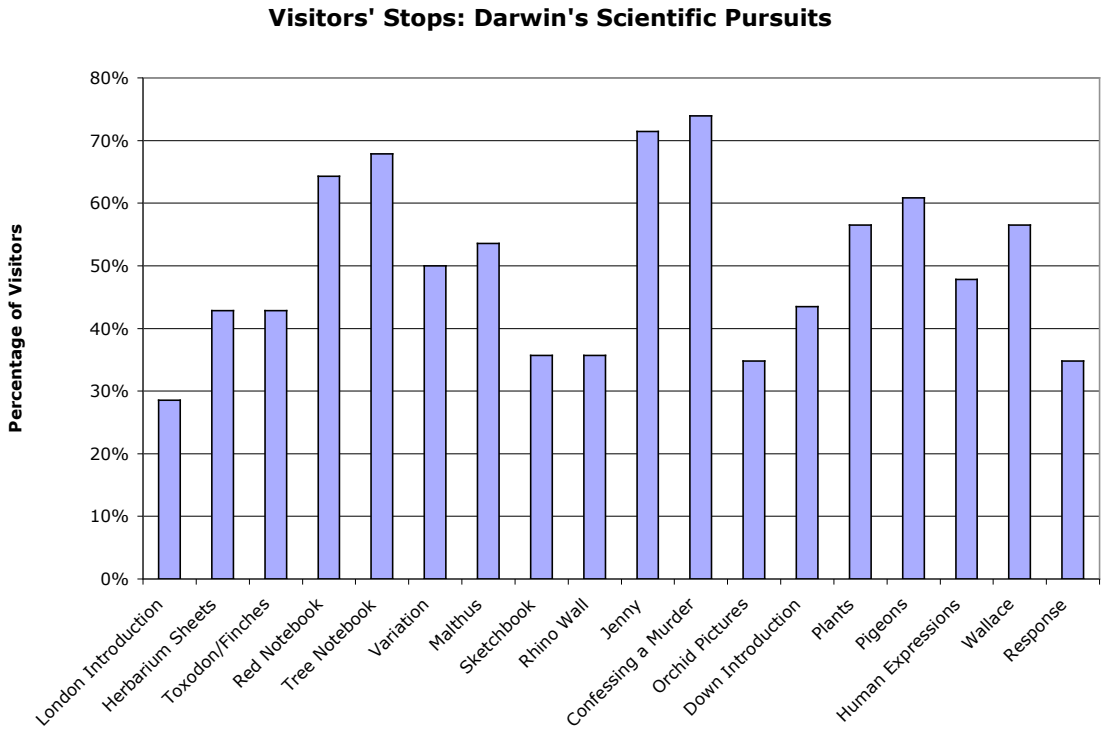


Figure 7. Where visitors stopped: Darwin's scientific pursuits

Visitors were attracted to the exhibits that reflected Darwin's thought processes, how his theory evolved and how he came to the conclusion that all species are related, in spite of his personal misgivings.

> The simple structure of the study and the lack of complicated scientific instruments, that was really interesting. So the question is: How did Darwin put these ideas together without a lot of preparatory information and really [minimal equipment at a time when] these are not common ideas? All he had were his journals. (M 65)
>
> His theory of evolution has more importance to science than I thought. It's very helpful to see the specific animal and plant examples to understand how he came to develop the theory. (288)
>
> He had his child, servants and others help with small studies around the house, like counting flowers. (8)

Visitors recognized Darwin's dilemma, his reluctance to provoke controversy regarding the impact of his theory on religious beliefs. Darwin yearned to stay within the bounds of contemporary religious dogma that was so important to his wife, Emma.

> I'd already heard that he'd gone through a lot of personal soul searching and because of the impact on his relationship with his wife and the fact that he was compelled intellectually to this theory was also very painful for him to deal with.... If we're going talk about the relationship between intelligent design and Darwinian theory then I think it's important to talk about the fact that he was not some antireligious zealot who was out to disprove God. That had nothing to do with it, but it was the compelling nature of what he was studying that led to his theories. You can tell there's a real spiritual battle in him that goes on and how you reinterpret your understanding of the world and God if in fact everything you've been taught is suddenly called into question. (F 50 anthropologist)

> He was a great example of honesty and integrity so rarely found in society today. His life shows the struggle all men have, to varying degrees, with religion and science. He was privileged to be exposed to people who stimulated his mind. Good proof that a strong education provokes the mind. (257)

> Well, I remember how they talked about how he wouldn't publish his findings because it contradicted the Bible and that there was a risk that he would be hurt if it was taken as a direct offense towards the Church and he didn't want that to happen…and after about 20 years he published his findings. (M 30s)

> I thought it was very touching that as he developed his work he began to lose faith in traditional religion and that caused his wife to have stress over that, which caused him to be sad that she had the stress over it. So in a marriage I could see where that could be difficult to work through. But it was touching to me that that was happening. (F 56)

Many visitors read the "confessing a murder" text panel. They were astonished that Darwin waited more than twenty years to publish his findings, only doing so when pushed by Wallace's letter.

> I thought it was interesting the way he started off helping Wallace along because Wallace had not picked up on natural selection when he was talking about evolution. Then when Darwin discovered that Wallace was really getting into natural selection, that's when he started to panic. So he decided he better write *Origin of Species* very quickly. (F 56)

> Although I'm not a fan of sensational [headlines] but, you know, the part that said, "like confessing a murder"—I thought that was good because it quoted something that he said. It just really explored the conflict in him. He discovered this and he knows it's [going to cause a lot of trouble, but he still has to] get it out. (F 50s)

Science now

Do visitors who leave the exhibition feel that they understand Darwin's theory of evolution better than they did before they entered? Three in 4 said "yes." Unfortunately, because of the way the question was asked in the study, we do not know whether the remaining 24% did not feel they understood evolution better after seeing the exhibition because they already understood it before coming, or were still confused about it when they left. Just two people said they did not accept evolution, far fewer than the national statistics. Obviously people self-select to visit *Darwin*, and those who do not want their beliefs challenged simply stay away.

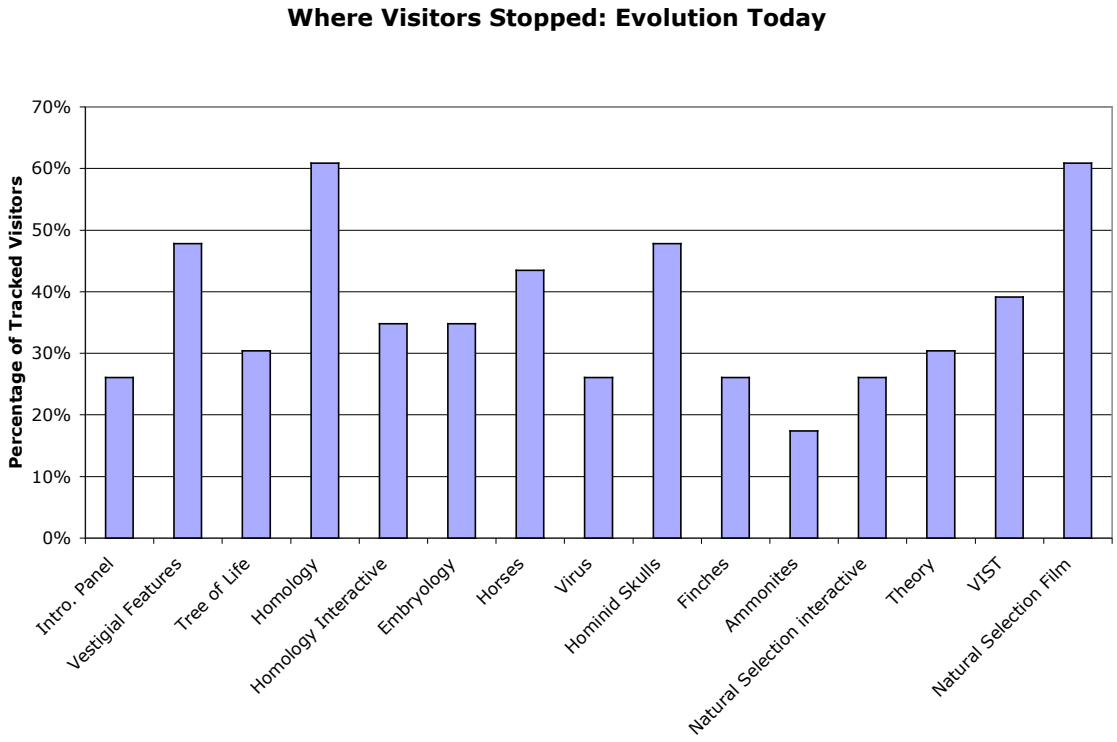


Figure 8. Where visitors stopped in Evolution Today

Evolution of the horse

Visitors stopped frequently in this section. Did they see evidence of evolution in the exhibition, and if so, where did they find it? Generally, visitors said they found evidence for evolution in the snake with vestigial legs ("I didn't know snakes evolved from lizards"), the horse skeletons changing over time, the butterflies, the three embryos, the homologous limbs and the hominid skulls. The bacteria exhibit conveyed a sense of relevance

and immediacy to the topic. Many visitors, self-selected as they are, had previous knowledge of and interest in the subject.

> Was there anything that provided evidence *against* evolution? I think the thumb was on the scale there! Oh the butterflies you understand and all the narrative about South America. (M 65)

> This [Tree of Life] was very interesting. For a layman you don't see these kind of—I mean my biology class in high school was an eternity ago but it was much simpler then, you know, the animal kingdom, the plant kingdom, that kind of stuff. And here to see the green line that shows the connection between the different—I don't even know the names—orders, whatever they are, showing how this came from out of this and explodes into this next sub-classification and explodes into this one and here's the little frog at the end of it, the result of all that. That's pretty cool. (F 65)

A series of multiple choice questions asked visitors if they agreed or disagreed with themes about evolution that the exhibition hopes to convey. Figure 9 illustrates the percent that agreed, indicating as well those who agreed strongly.

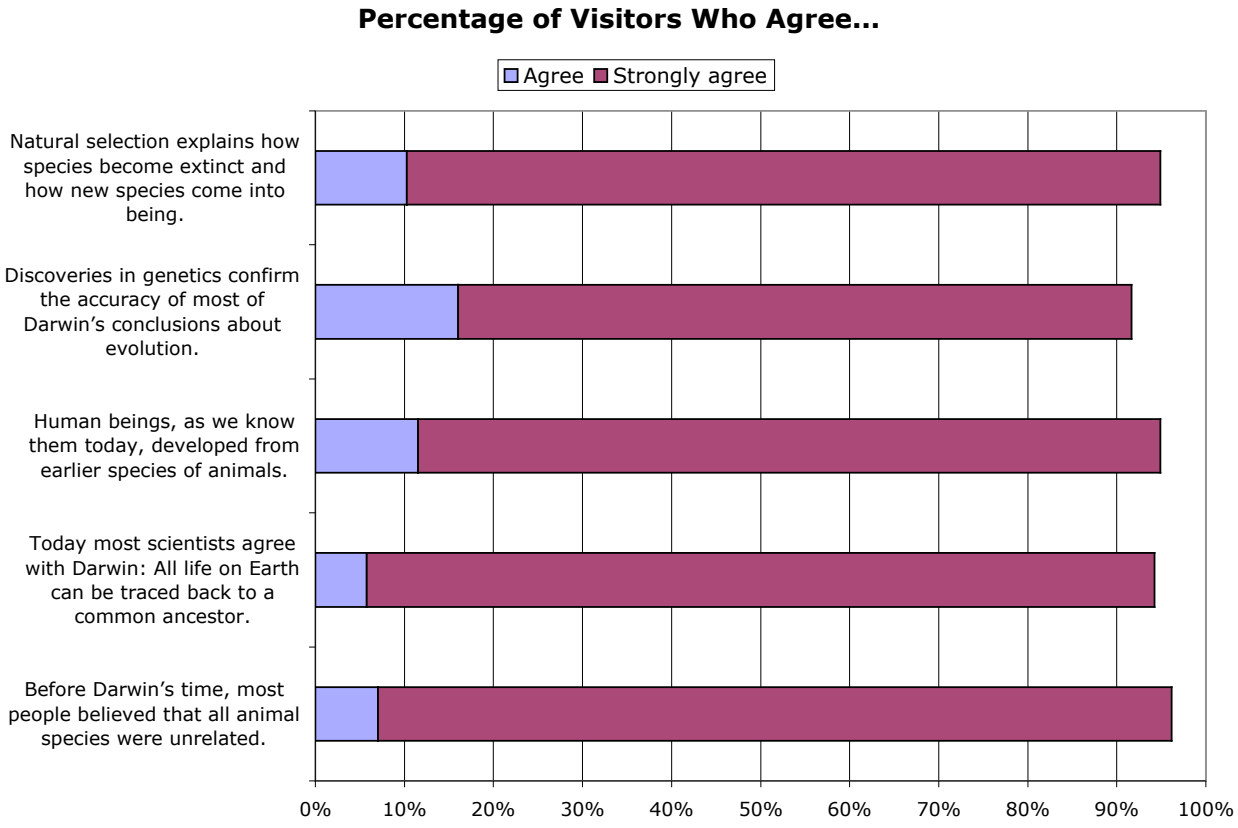


Figure 9. Visitors' response to evolutionary theory

Natural selection

Darwin's major discovery was the mechanism of evolution—natural selection—not evolution itself. This evaluation suggests that visitors saw and learned a great deal about evolution in the exhibition, but it is unclear whether the exhibition conveys Darwin's major finding: that evolution is driven by the processes of natural selection.

"VIST," developed by The University of California Berkeley's online Museum of Paleontology, is an acronym for the components of natural selection: Variation, Inheritance, Selection, and Time. AMNH exhibition developers added "A" for Adaptation. Does VISTA help visitors to understand evolution by natural selection?

> V.I.S.T.A. - love it! (291)
>
> [It showed] variation in the eyes [on the butterfly wings]. Variation. Comparison, selection and time. (F 45)

Variation

> The Southern [butterflies] are darker. Yeah, I thought this was well done. Well it showed varieties and unusual features they have and why they have those features and how those features protect them. (F 40s)
>
> Some horses are different from others. Some are like racing horses; some are workhorses and there are very distinct differences in the horses, despite the fact that they're all in the same species, [have the same] genes. They're all horses, yes, but they are built for different purposes. They've evolved to different levels. A Clydesdale is a workhorse; a thoroughbred is a racehorse. (M 40)

Inheritance

> The fact that the bones of a bat resemble the bones of a human being. (123)
>
> And I liked the thing that showed the fish, the chicken and the pig. Yeah. That in the beginning we all look so much alike but at the end we look like completely different species.

Selection

> Most of it comes down to the survival of the fittest and the stronger traits beating out the weaker traits and going on and the dominant traits continue forward, the weaker traits die off. And for most of the things this remains true. (M 40)
>
> There were two cute things [on evolution]: there was the small five-minute film on evolution with the newts … and the little game which I guess was good for kids, but you know, as an adult it was also fun to do. (M 46)
>
> I liked this particular exhibit showing the various dead ends. I thought that was very good. It had a dead end going this way, a dead end going this way, the Neanderthal and all that and then you have *Homo sapiens*. (M 40)

Time

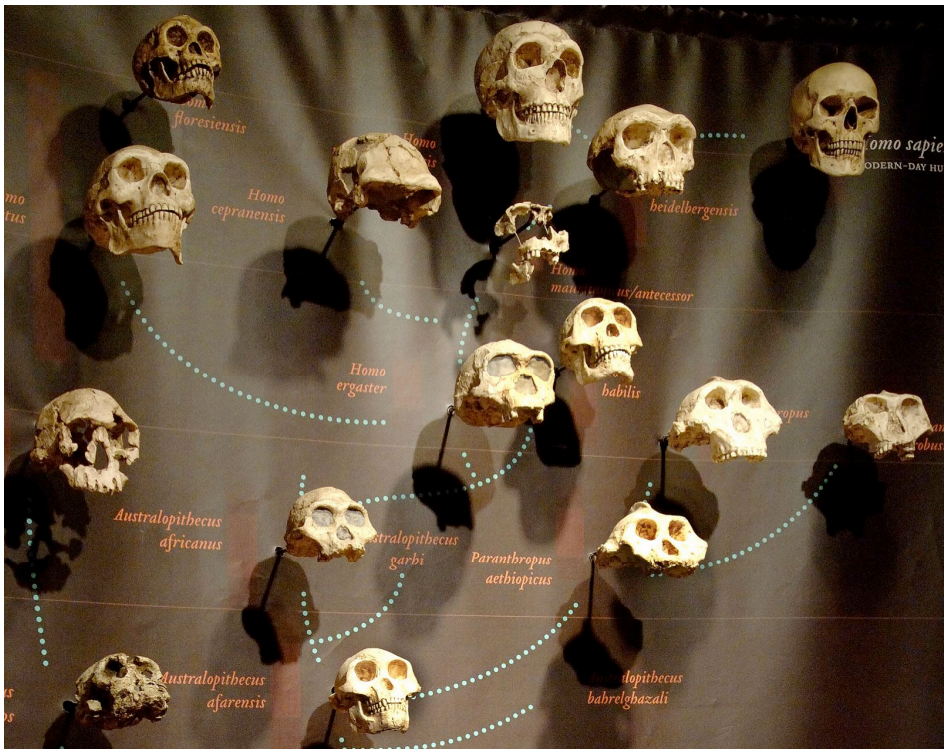
> The bacteria were really interesting because the rate of reproduction has a huge impact on evolution. So you could watch it change, evolve—yeah, like the flu virus. (F 13)
>
> Yes, how Darwin's ideas were influenced by geological theories. He began to understand the length of time that was involved in developing his ideas, that geological time was much

more, was much longer than he had understood before, which allowed for more variation to take place over time. (M 65)

Adaptation

I liked the way they showed the butterflies that were almost exactly alike, how they could change their color to adapt to the environment. I thought that was a really nice illustration of what happens with natural selection. (F 30)

[The horse display] shows how a given form can turn and change in size over eons of time and they also mentioned that in some cases there is a drive toward getting larger forms and in other cases there are many examples where things evolve into smaller forms. (M 69)



Display illustrating Hominid evolution

The interviews suggest and tracking confirms that visitors do not engage with exhibit elements on both sides of the recreation of Darwin's study occupying the center of the gallery. Most visitors tend to move around the study to the left (counterintuitively, because visitors typically turn right when entering a space) toward the open view beyond the study. To the right the exhibits seem darker and the view is blocked by the study wall. Figure 8 suggests that Finches, Ammonites, and the Ladybug interactive did not attract visitors as effectively as displays on the other side of the room—Vestigial Features, Homology, Horses and Hominid Skulls. VIST, directly to the right as one enters the section, attracted more visitors, perhaps because the display adjoins the Natural Selection Theater, which attracted more than 60% of the visitors. Interestingly, visitors seemed to exit the theater and turn left instead of continuing toward the exhibits on their right.

The controversy

> A very timely moment for an exhibition about Darwin and his theories at a moment when some try to promote intelligent design. (293)
>
> I am distraught to learn that 57% of Americans don't believe the science. (105)

Background (front-end) audience research revealed that visitors wanted to know about the rift between those who accept evolution as an explanation for the diversity of life and those who opt for creationism or its offshoot, intelligent design. The exhibition addresses the so-called controversy head-on in a video featuring well-known scientific figures, some of whom hold personal religious beliefs, discussing how they find no contradiction between acceptance of science and their personal faith. Visitors who saw the film rated it highly.

Table 4. Visitors Rate the Film about the Interaction between Science and Religion

Rating the Video about Science and Faith	**Frequency N=153**	**Percent**
High (4, 5)	50	33
Middle (3)	11	7
Low (1, 2)	5	3
Did not see	87	57

Most visitors approved of the way the exhibition presented the issues. Survey respondents commented extensively on "the controversy" and interviews provided the opportunity to discuss the exhibition's handling of the science and religion duality in depth. A few felt the exhibition's treatment was "defensive," while the majority deemed it balanced in approach. Some were of the opinion that the exhibition was correct in virtually ignoring the existence of ID, presenting only the data supporting evolution. A few visitors thought that the exhibition did not come down strongly enough against ID: if it was going to acknowledge ID at all, they said, it should have taken a stronger stand. A sampling of opinions follows.

> Well, I think it dealt with it very well because it could be very easy to say that this whole thing was mounted just to refute intelligent design. And you don't want to be in that position because you're not refuting it. You're just saying here's the science.... It was better that you could draw your own conclusions rather than making it intelligent design versus evolution, which you don't want to do. (F 56)
>
> I think my favorite part was the mention of intelligent design. There's a little sharp tongue like you could tell that the scientists didn't have very high favor of intelligent design but they went there anyway and tried to discuss it. So that was nice at the end. It was very succinct. My personal opinion is it's much more sharp-tongued than they intended, but I don't think it was alienating.... I mean we are in the context of a museum of science first of all. But it was interesting that it was given mention. You can't ignore it anymore. I mean I realize the argument giving voice to it gives it legitimacy, but it was necessary to address. It was strong for I think someone who very much believes that science makes the world cold and godless. I've met a lot of these people.... There seems to be a societal rift between believers and nonbelievers, those of faith and those of science. One of the biologists said for him it needn't be that split, but a lot of people see it as an either/or thing. Actually what

> I see is people cherry-picking science. Oh I like this part of science so I'm going to use it in my life. This doesn't make sense to me so that's God.... The people I've spoken to become threatened. And it becomes, "You're cold and godless. How can you view the world like this?" (M 28)

And those who found the exhibition somewhat defensive:

> The exhibit appeared to me to be very clearly a reaction to the intelligent design controversy that's going on. So I felt that it was very targeted.... I got the feeling though that it was an "on the defensive" display.... The controversy is one that's going to stay with us for a long, long time I'm afraid. (F 50)

Survey respondents were asked if there was anything missing in the exhibition that they had wanted to learn more about. A number commented that they wanted to learn more about the controversy, echoing findings from background audience research.

While we did not hear from any creationists, several visitors said they considered themselves people of faith yet had no problem reconciling religious beliefs and science.

> I thought it was largely ignored and it's probably just as well that way. I mean, we live in the twenty-first century. I'm an Orthodox Jew—modern Orthodox, I should say—I don't see that there's a dichotomy between evolutionary theory and God. No, I see that evolutionary theory once again proves to me that the Supreme Being is an amazing creator and works in ways that we can't possibly have understood. We do understand it but it's just amazing how it fits together. I think it's leaving that aside—just not getting into the question, because that could alienate people from the exhibit. (M 46)

> I just thought [the exhibition] stayed clear of the religion part. There's definitely a huge argument between the two. You know I consider myself a religious person but at the same time certain things like this, it's kind of hard to deny the truth. (M 25)

> My theory is, if there is a God, he created evolution because evolution had to come from something. (F 70s)

A few visitors thought that the exhibition went too far in trying to be neutral and nonconfrontational. Here is an example from an interview.

> It wimped out. Yeah, I think so.... I mean that's where the exhibit is [weak] because it only had like one little piece. There's one [monitor] with a bunch of talking heads and a copy of a textbook on biology with a sticker and just a paragraph. For somebody who wants to know how scientists think, that's not even enough to get started. For somebody who doesn't believe [in evolution, it doesn't help to] talk about it.... You know it covers the whole controversy from beginning to end and leaves it sort of hanging, saying that science is what's testable and provable.... I wouldn't have even dealt with it. If they were going to go there, they should have given it three times as much space and really gone into, you know, what is intelligent design. What are its tenets? What's creationism? Where does it come from? What are its sociological foundations? How does it tie together with scientific theory? How is scientific theory different from the religious way of thinking? (M 45)

A small number of people thought the exhibition was indeed confrontational.

> I was reading one of the signs at the end about what a theory is and ... you showed like a textbook that somebody had put a sticker on saying that this is not fact in here—read it with an open mind. You tried to set up the question of, you know, this is controversial to some, but I think it definitely leaned on the side of evolution and facts. Well, that's my own belief

> so I think that's fine, but I can see if I was a creationist coming in how I would be a little put off by it. I think it was appropriate because you had the support there and the evidence there. I'm just saying that if you didn't come into it with an open mind and you had a strong view on creationism, you would be distraught! (F 27)

A few visitors seemed to be struggling with their own cultural baggage.

> [Darwin] was born knowing that the Church was very strict with the evolutionism versus creationism. And even today most Catholic universities will not teach both courses.... You can teach creationism, but you cannot teach evolution. Or you can teach evolution theory, but you cannot teach creationism. So we still fall back to the old line of thinking from Darwin's day.... Being a Catholic myself I still don't claim to understand that. [The exhibition] shows you how Darwin's theory on natural selection and survival of the fittest has played throughout history. And it deals with the issue of church because many of the naturalists back in the day were often men of the cloth. They may have had their ideas but were afraid to publish for fear of being outcast. It's an interesting world even today because the Church for all of its advances, if you want to call them that, still refuses to accept certain ideas of evolution, saying that no, the good Lord our creator is responsible. (M 40)

> I grew up also as a Catholic, so I had to learn to cope with both views. I decided to shy away from religious doctrines a few years ago. I think that one of the greatest contributions of the late Pope John Paul was to make Catholicism not have [a problem accepting] evolutionary theory. It shattered the most diehard religious people. (M 35)

One of the interviewees said she had overheard a rabbi talking to his companions about the compatibility of the Bible (the Torah) with evolutionary theory. She commented that it would have been interesting to have people of various denominations talking about science and faith, instead of scientists exclusively.

What's a theory?

Survey respondents were asked to choose between two definitions:

1. The theory of evolution refers to scientists' best-supported explanation for the diversity of life on Earth, or
2. The theory of evolution refers to scientists' best guess or speculation for the diversity of life on Earth.

Darwin visitors overwhelmingly chose the first definition (92%) and just 8% the second. A video features prominent scientists making the distinction between theory, the closest thing to a fact in science, and theory as it is used in everyday speech, meaning guess or "hunch." Table 5 illustrates visitors' opinions of the film.

Table 5. Rate the film explaining scientific theory

Rating the film defining scientific theory	**Frequency N=154**	**Percent**
High (4, 5)	53	34
Middle (3)	3	2
Low (1, 2)	5	3
Did not see	93	60

Only about 40% said they watched the film. However, among visitors who saw it, several commented that the exhibition's explication of "theory" was excellent:

> Reminder and explanation of "scientific theory" at the end. The careful, consistent, and clear explanation – with supportive evidence – of natural selection, and how Darwin came to recognize them. (295)

Interview respondents discussed the exhibition's focus on theory building. A couple in their 70s finished each other's sentences:

> Man: The people misunderstand what's meant by a theory, like it's a guess. Woman: Yeah, and that's not true. Man: Right, when [scientists] talk about theories they talk about evidence. Woman: You have to build a theory. You don't just have a theory. You have to build a theory with blocks of evidence. We have misused the word. We have a theory about why she's wearing a red dress or something and that's a wrong use of the word. (F M 70s)

Others comment:

> In the explanation of evolution of thought and theory, I did not realize previously how the theory, or theories, were the result of so many elements of discovery, background and accumulative learning: the essential relentless quest for knowledge. (308)

> One of the things I thought was most important … was the video explaining what a theory means to science. I think that's very, very important. For somebody who works with words, which is my career, I thought that was a very important thing to do because people use the word "theory" to malign [evolution]. I think that's probably the most important part of the exhibit given the time we're in right now. (M 40)

Documenting discoveries

The exhibition team wondered whether visitors were reading Darwin's handwritten notebooks, letters and journals. Darwin's notebooks and letters were much more accessible than Einstein's, despite difficult handwriting. Table 5 summarizes responses.

Table 6. Visitors who read the documents written in Darwin's own hand

Did you read the original documents?	**Frequency N=154**	**Percent**
Yes, I read some of many of them	25	16
Yes, I read a little of several	49	32
Yes, I looked at a few	40	26
No, I didn't have time	7	5
No, they were too hard to read	28	18
No, I don't like to read documents	5	3

Many more visitors read the transcribed excerpts. Because there was no need to decipher Darwin's handwriting, the transcriptions were much more accessible.

> I definitely tried to read some of them…. I mean some of it's [hard to read] of course, but I liked having the actual artifacts there. Well, I think whenever you come to a museum so

> much of it is just, you know, signs with "this is this," "this is that" and just having the actual things there is neat. (M 40)
>
> I liked how you were able to look at what he thought and what he wrote down and the animal bones and everything. I wasn't able to read his handwriting. Well, if you were able to read it, you could tell what he thought about it … when he saw it. (M 25)

The original documents inspired some visitors. A contemporary naturalist working in Alaska spoke eloquently about the meaning of the documents for him.

> I think the most important part for me was the five-year journey through the transmutation notebooks seeing through B, C, D, E, which I thought was really important. And I know a lot of that's covered in an upcoming book that will be released, so I was pretty interested in seeing that, just seeing the actual writings.... [My field is] landscape ecology and wildlife ecology, so I work with natural systems as a career.... [Writing journals is] the single greatest thing we can do when we're out in the field collecting our own data or when we're in meetings thinking through thoughts or different things like that. (M 38)
>
> I liked the actual copy of *Origin of Species*, one of the only six remaining copies that are [in existence]. (M 40)

Table 7. Visitors who read the transcribed excerpts

Did you read the document transcripts?	**Frequency N=155**	**Percent**
Yes, most of them	69	45
Yes, about half	32	21
Yes, just a few	44	28
No, I didn't read any	10	7

Visitors with training in science were significantly more likely to say they read the transcribed documents than visitors without a science background. Some 51% of visitors with science training said they read most of the transcriptions compared to 38% of visitors with no science background, and 62% of visitors with science training said they read about half the documents, while only 38% of visitors without science training read about half (x^2 (3, N=151) = 13.50, $p < .05$).

"The beauty of the museum's presentation. Applause!"

The heading above comes from one of many laudatory comments on the exhibition's design and presentation features. The recreation of Darwin's study was one of the most frequently cited elements, as were the films and the live animals.

His study gave me a sense that he could have walked in and sat down at his chair and gone to work. It was nicely done. (M 65)

The study—it just seems like a more relaxed and easy-going time. It just gives more a sense of peace. And it's in settings like this that people do their best thinking. (M 40)

Orchids, Iguana, and frogs—it was nice to see living things so well taken care of. (96)

Darwin's study

Artifacts and interpretation were much admired as well.

> Artifacts were fantastic! ... Good models of specimens and skeletons with clear explanations of their relevance and/or cross-similarities... [Documents and artifacts] really helped you "travel through Darwin's life" and experience the environments he was working in. (231)
>
> Not overly detailed. Engaging. Definitely worth a trip to the Museum. (274)

While a few appreciated the Sandwalk display, it seems to have been lost on the majority of visitors. When shown a photograph of the Sandwalk, many interviewees said something like, "I didn't understand why there was that projection on the wall instead of a graphic panel," obviously not realizing that the projection was cycling through a series of images. Speeding up the cycle and adding a bench in the open space in front could mitigate this situation. Even one of the interview subjects who loved the Sandwalk said,

The Sandwalk

I would have had [the Sandwalk] go faster. I wanted to sit at the path, the landscape path. I wanted to see more of the path that Darwin walked. It was changing too slowly for me! I stood there for about a minute and I realized at this pace I'm going to be here for a *long* time! (M 58)

There were some visitors whose appreciation of the Sandwalk was unqualified:

> This was neat, that thing about the sand path was very interesting. I liked that a lot—the idea that he created his own kind of quiet world I thought was really interesting. I noticed it changing like you were moving through his path. Oh yeah, I got it. I liked it. (F 38)

Crowd control

The World Before Darwin was particularly susceptible to overcrowding, even on quiet days. Relatively large numbers of visitors are admitted to *Darwin* every half hour. Typically, visitors are very diligent at the beginning of their visit, and The World Before Darwin is the first "meaty" exhibit component they reach after entering. The area is not spacious and there is only a single, large case and its labels to see—and the case is compelling. Visitors tend to gather round so that those behind cannot see. The section becomes a bottleneck, and since there is nothing else to look at in the room except the wallpaper and introductory panel, many people give up and move on. Several interview subjects who were shown a photograph of that section said, for example, "I remember that was where we saw the monkey, right at the beginning, and the seal (I said it looked better with its skin on!) I remember it, but we walked right through it. It was so crowded. We didn't stop to read anything. We walked by it."

Visitors' perspectives on interpretation

We asked visitors if they agreed or disagreed with sentences describing aspects of the display. Figure 10 summarizes the results.

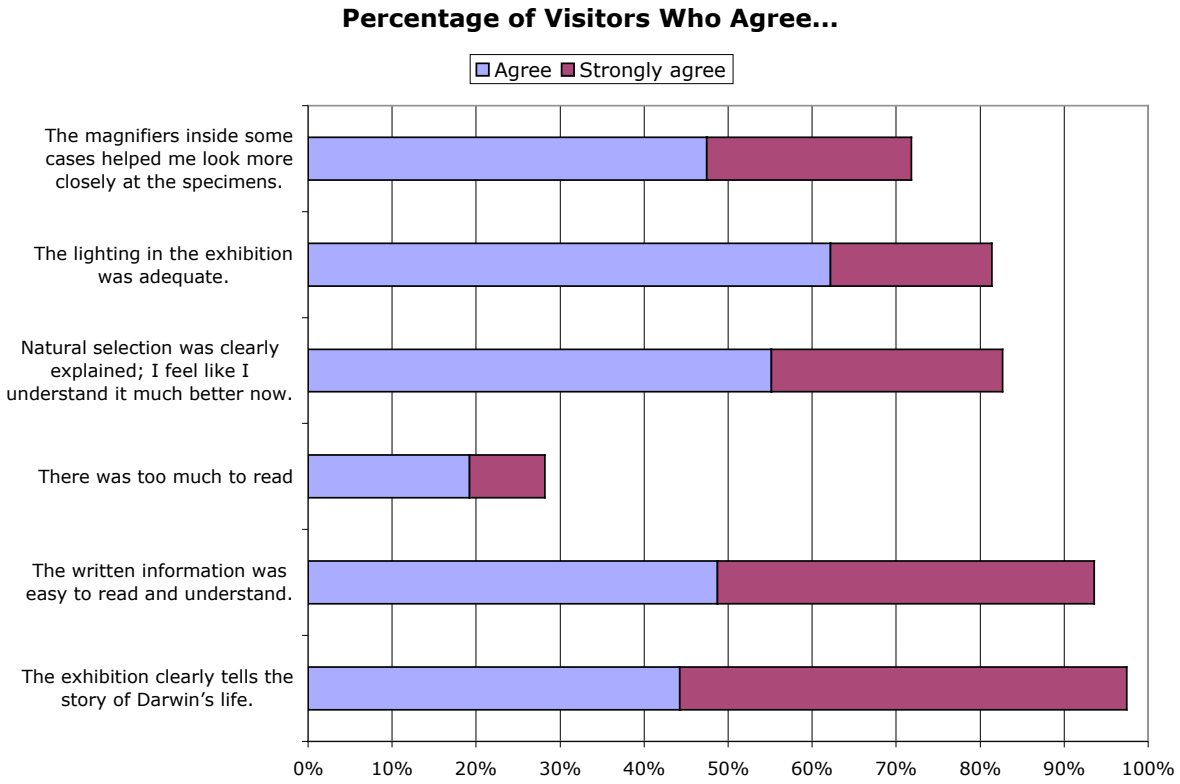


Figure 10. Visitors' response to aspects of the exhibition

While more than 70% agreed that the magnifiers helped them look more closely at specimens, almost 30% did not. Their placement made it difficult for very short and somewhat tall people to use the magnifiers effectively. Light reflection added further challenges to viewing. While a few people felt that the lighting in the exhibition overall was too dim, more than 80% of survey respondents agreed that it was adequate. Virtually all respondents agreed that the exhibition clearly tells the story of Darwin's life.

Exhibition text

Fewer than 1 in 3 visitors thought there was too much text, and tracking clearly indicated that visitors were reading diligently wherever they stopped. Respondents agreed that the written information was easy to read and understand. Panels designed to introduce each section of the exhibition also attracted many readers. Because they include graphics and even objects, visitors see these graphic panels as integral to the exhibition. The panels introducing the London section and the final section, Evolution Today, attracted fewer readers than the others. Placement is the most likely explanation for this: the London panel is placed between sets of herbarium sheets and the Science Today panel is on the left as visitors enter the area, with the study, one of the exhibition's most appealing components, located directly in front of them, drawing them forward and away from the panel.

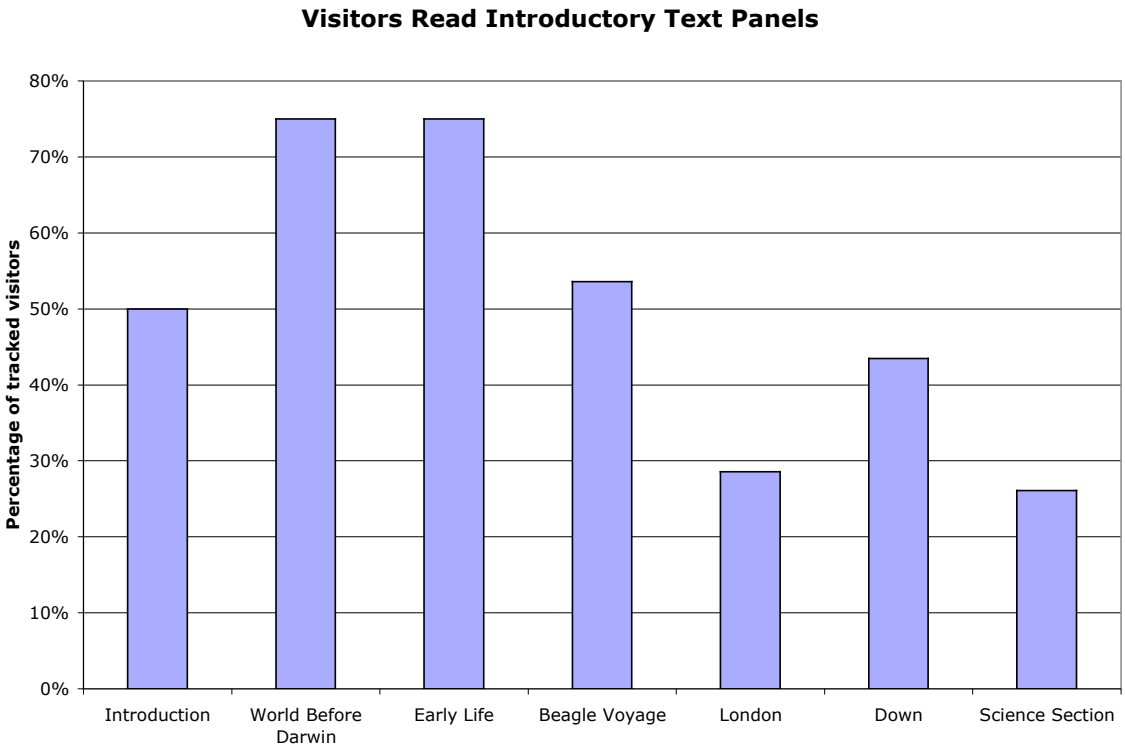


Figure 11. Visitor reading of introductory text panels

A visitor noticed Darwin's own words quoted in the text: "I think that in general, one of the overall things I liked about the exhibit is how you pulled out quotes from his own writings so you got his own observation [about specimens]."

Media

Visitors found both films engaging and helpful for their understanding of Darwin's life and theory of evolution by natural selection.

Table 8. Rating the Introductory film

Introductory film ratings	Frequency N=154	Percent
High (4, 5)	98	64
Middle (3)	10	7
Low (1, 2)	4	3
Did not see	42	27

Table 9. Rating the film on natural selection

Natural selection film ratings	Frequency N=154	Percent
High (4, 5)	58	37
Middle (3)	10	7
Low (1, 2)	3	2
Did not see	83	54

Tracking reveals that virtually all visitors who watch the films watch them in their entirety. The clear indicating of their duration encourages visitors to watch films because they know how much time is required. Seating also encourages attendance. Each film was housed in a small theater with benches. However, benches were often insufficient for the number of visitors who wanted to watch. Visitors rated both films highly. A number of visitors commented that the films were one of the exhibition's highlights.

> The two films are excellent. The employment of highly regarded scientists is powerful. (193)

There was some variation in rating based on age: respondents between 21 and 35 were more likely to say they had not seen the film, and respondents 50 and older were more likely to rate the film highly (x^2 (20, N=142) = 36.45, p < ,05). The introductory and natural selection films were among the few places where visitors could sit, which may account for older visitors being more likely to watch.

Table 10. Visitors' use of interactives

Use of interactives	Frequency N=150	Percent
Visitors who used Homology interactive	34	22
Visitors who used Ladybug interactive	31	20

About 1 in 5 visitors use the interactives, a statistic that is consistent with past experience. Visitors who used them deemed them engaging and instructive.

I love the comparisons they do with the hands and the limbs and I stopped over there at the computers and did the little dragging thing. That would be great for children who are coming through the exhibit. (F 22)

Homology display comparing limbs of various species

I liked the interactive features like these video screens. I saw a whole bunch of little kids crowded around it. And it was nice that there was something that would pull small kids in. (F 38)

Visitors' suggestions

Was anything missing from the exhibition that visitors expected to see? Only 1 in 4 said there was. The most frequent category was scientific information, followed by exhibition-related comments, historical questions and religious issues. Visitors who said they had special training in science were significantly more likely to say they expected more information in the exhibition.

Influence of genetics and development of neo-Darwinism could have been more thoroughly presented. (PhD biology 68)

Add some examples of certain evolution characteristics, i.e., how did the eye, teeth, etc develop. (164)

Geological record; more about rock layers and geographic barriers and the role they play in evolution. (191)

Perhaps a bit more emphasis on human evolution would have added more interest for us humans! (210)

Exhibition issues were fairly minor and usually involved someone's particular interest, e.g., a botanist asked for more herbarium sheets. More than one person asked about the portraits in the study—who were they?

> I enjoyed seeing his study. I wanted to know who were the pictures over the mantelpiece because I would have thought they would be particularly important to him because that's strictly a place of honor. And I don't know who those people were. I couldn't find it in the program. (F 55)

Visitors, including a scientist, said they would like to have seen more for children.

> I'm an environmental scientist. The one thing I was hoping there was more of [was] computer opportunities for the kids [on say] natural selection. I think there could have been more hands-on stuff for kids. I think that people are getting more used to that in museums—you know, design your own creature…. There was a lot of reading. (F 45)

One comment about the lack of focus on social Darwinism:

> I'm particularly interested in social Darwinism. This received minimal attention in the exhibit. While perhaps not of interest at this institution, Darwin's impact (like it or not) on the social sciences—even on social science delivery and eugenics in NYC is significant. (58)

Explainers and guided tours

Explainers are paid docents stationed in the galleries to help visitors understand displays and their meaning. Do they actually help visitors? Fewer than half the surveyed visitors responded to the question. Of those who did, 1 in 4 said an Explainer had helped her understand some part of the exhibition; close to 3 in 4 said they didn't speak to anyone. A very small percentage (3%) said the Explainer had not been helpful but did not elaborate. One of the interviewees described a satisfying experience with an Explainer:

> And it was just nice that actually you had somebody who works here just chat with us a little bit. I mean we were talking to each other, but you're not really interacting with anybody else. And then here's this man who's clearly really interested in Darwin and science and the Museum and you know he had some comments to make. It was sort of like, oh, that's really cool! That was nice. (F 65)

Visitors' response to Explainers varies: interacting with a knowledgeable person, a stranger, in a museum exhibition is a personal choice; some people want to be left alone to read and explore, others welcome a human presence to clarify ideas and provide access to complex scientific material.

Guided tours occasionally disturbed visitors who were trying to read lengthy labels. As one man put it, "The folks from the museums who were giving the tours were a bit loud. And so being able to read and digest in the contemplative spirit of Darwin was not always possible."

Conclusions and implications

While most visitors say they had few particular expectations going into *Darwin*, more than half say they came to the Museum specifically to see the exhibition. However nonspecific their expectations may have been, evaluation findings indicate that exiting visitors were not disappointed: 54% said that *Darwin* met their expectations, 41% said it exceeded them. The exhibition was rated on average 8.5 out of a possible 10 and visitors spent more time there than in any exhibition since AMNH began to time visits (77 minutes estimated average). Virtually everyone (95%) said they would recommend *Darwin* to friends and family.

Two in 3 visitors reported finding at least one memorable moment in *Darwin*. They cited exhibition highlights equally among scientific and biographical material. Findngs suggest that the exhibition succeeded in integrating Darwin's life and scientific pursuits: it is often difficult to tease out one from the other in visitors' interviews. Survey findings are supported by tracking visits in the exhibition, which indicate which exhibit elements attract and hold visitors' attention.

> Visitors found much to admire about Darwin the man. They said the exhibition "humanized" a great man of science. They recalled information about his family (many were struck by the Wedgewood connection), his interests as a young man, the excitement of the Beagle voyage and his marriage and family life at Down. Visitors said they were "touched" by his misfortunes (Annie, his own ill health) and the way he wrestled with his conscience about publishing his findings about evolution through the mechanism of natural selection. A number of visitors mentioned the recreation of Darwin's study, saying they could imagine Darwin sitting down and working there.
>
> Many visitors saw that Darwin was a product of his times. They noted the context within which Darwin worked and said it helped them understand why his science has been deemed so radical. Some wondered why so many of us are still locked in pre-Darwinian notions when the evidence seems so clear.
>
> The Beagle voyage was a highlight for many visitors. A surprising number mentioned the map showing its duration and stops around the world. As we found in background research, people were unaware that the trip was so long and visited so many places in addition to the Galapagos Islands. Many visitors remarked on the uniqueness of live animals and tracking showed that they attracted more visitors than any other element in the area (the iguana and frogs attracted 85% and 80% of tracked visitors respectively).

Three in 4 visitors said they understood evolution better after seeing the exhibition than they did before. Just two survey respondents (of 312) said they do not accept evolution. The Museum should not be surprised to be "preaching to the choir"—people who hold to radical views probably do not want them challenged. A series of questions about evolution and natural selection asked visitors if they agreed or disagreed with statements confirming modern science's grounding in Darwin's theory. Well over 90% of survey respondents agreed with all of them.

Visitors found evidence for evolution throughout the exhibition. Tracking revealed that visitors stopped less frequently in the last section about evolutionary science today. However, interview subjects remarked on the vestigial features display (snake skeleton showing its vestigial legs) the homology exhibit comparing limbs of many creatures, the horse display of that species' evolution over time and hominid skulls, the only area that brings humans into the story of evolutionary relationships. Some visitors mentioned that the video about virus evolution made that point highly

relevant. An interviewee spoke admiringly about how the Beagle area led visitors down the path that Darwin followed to deduce his theory from the accumulation of observations.

While we found widespread understanding of these evolutionary components, it is difficult to say with certainty that visitors understood the relationship of natural selection to evolution. The exhibit components that focused on natural selection installed in back of Darwin's study were the ones where visitors stopped less frequently. It was darker there, and except for the film about natural selection (Toxic Newts), visitors tended to move away from that area and exit without going back to the missed components. Future venues might consider modifying the layout somewhat to draw visitors to those less visited displays.

"The controversy" between science and religion seems to fascinate visitors, indicated by findings in front-end as well as this summative evaluation. Most people said the exhibition handled this well; however a small minority said they wished there had been more information. The video showing scientists discussing the issue was not widely watched by visitors: some 57% said they did not see it. However, the majority of those who saw it rated it highly. Most interview respondents who talked about the subject at length said they thought the exhibition coverage was fair and balanced. Among those who said it was biased, most said it favored science ("this is a science museum") but a few said the exhibition was too soft on intelligent design and should have come down harder on creationism as science.

Surveys and interviews suggest that visitors are clear on the difference between "theory" as used in science and theory meaning guess or hunch. However, 60% said they did not see the video where scientists explain the difference, and again the majority of those who saw it rated it highly. This video was located behind Darwin's study where fewer visitors ventured. The same scientists speak similarly to the camera in both videos, which may have led people to believe that they were saying the same thing. Some diligent visitors did go back to the display and remarked on seeing the textbook with the disclaimer sticker advising students to read it "with an open mind."

Some 3 in 4 survey respondents said they read some of the original documents, and 10% said they were a highlight of the exhibition. Tracking confirmed that many visitors were drawn to the documents. A few interview subjects found the documents extremely compelling. Visitors with training in science were more likely to say they read documents. The reaction to these original artifacts written in Darwin's own hand was more positive than observed in *Einstein*. Perhaps this was because Darwin's writings are in English and Einstein's in German. Or perhaps the natural world is more accessible to Museum visitors than is physics. Handwriting in both sets is difficult to decipher.

Although there was a great deal of text in *Darwin*, visitors did not seem to mind. The vast majority (more than 70%) disagreed with the statement, "there was too much to read," and 93% agreed that "the written information was easy to read and understand." Tracking indicated that the first four section introductions were read by at least half the visitors—75% of visitors read The World Before Darwin and Early Life. Introductions to London, Down and Evolution Today were read less often, possibly because visitors were becoming more fatigued as they moved through the exhibition. It is also possible that these panels were less prominently placed where visitors could encounter them.

Media in Darwin was deemed appropriate and useful. The film orienting visitors to Darwin's life and work was well attended and highly rated. The film about natural selection, Toxic Newts, also drew a wide audience and was rated highly. Some 20%-22% said they used one of the interactive

computer activities in *Darwin*. Several people remarked that they "were good for kids," but some said they were also fun for adults. A few visitors said there could have been more interactives aimed at children.

Magnifying glasses were installed inside several cases to allow visitors to look closely at specimens, such as a hummingbird and the snake's vestigial legs. Some 72% of survey respondents agreed "the magnifiers inside some cases helped me look more closely at the specimens." Adults were willing to bend over to peer through them, while children stood on their toes or were held by adults so they could see.

Overall, the exhibition design and sequential layout received high praise from visitors. Among the design elements mentioned by visitors, the recreation of Darwin's study stands out. The sequential layout kept visitors moving in the desired path.

> One area that could be improved is The World Before Darwin, because its tight space and large compelling exhibit element cause a bottleneck. Displays at the beginning of exhibitions typically attract a high percentage of the audience: people are fresh, interested to see and learn about the subject and tend to spend time reading and inspecting exhibit elements close to the entrance. The World Before Darwin is the first major component visitors come to. The case is large and filled with diverse skeletons, with interpretive label decks low beside it. Visitors who get there first stop and read; visitors behind the first row can see little and consequently move on without being able to see into the case or read the descriptions. They do see the introductory text panel (increasing the bottleneck) and wallpaper, both of which evoke a sense of the section's meaning. Future venues should try to enlarge this area to prevent the bottleneck from occurring.
>
> A second area that could possibly benefit from retrofitting is the area behind Darwin's study. Components illustrating natural selection attracted fewer visitors to this area that appeared narrow and darker than competing exhibit elements on the other side of the gallery.

The vast majority of visitors did not mention anything they thought was missing or had expected to see or learn about. A few asked for more scientific information (for example, the relationship of modern genetic research to Darwin's theory). A few visitors said there could have been more about "the controversy," but interview comments suggest that visitors understood that to debate ID would not be appropriate. A number of visitors said they wished there was more for children in the exhibition, particularly more interactive components.

Appendix A Demographic Data

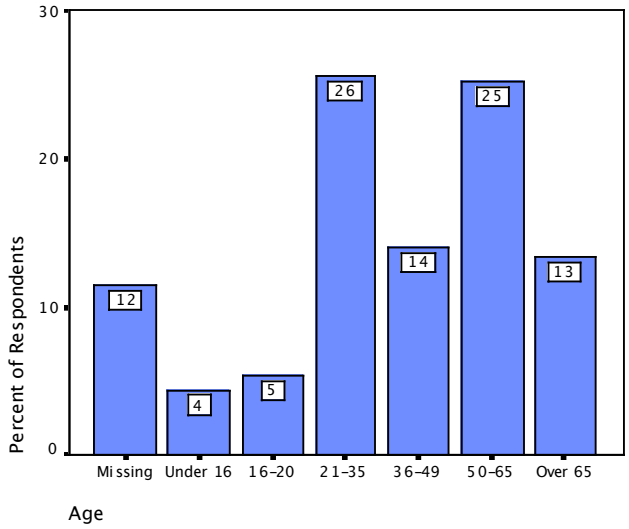
Survey sample

Gender

	Frequency N=312	Percent
Male	167	54
Female	143	46
Missing	2	1

Percents add up to > 100 due to rounding

Age



Residence

	Frequency N=312	Percent
New York City	109	35
Suburbs	74	24
Other USA	96	31
International visitor	28	9
Total	307	98
Missing	5	2

Percents add up to > 100 due to rounding

29% of the sample were Museum members.

50% of the sample said they had special training or interest in science.

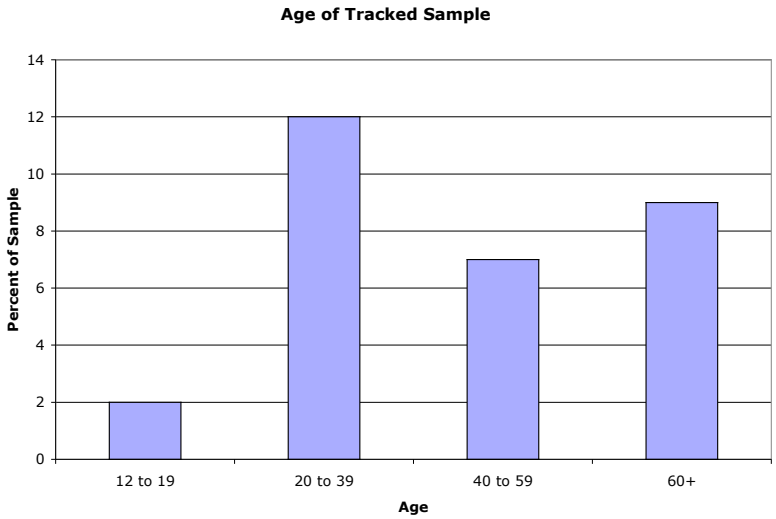
Just half the respondents listed the number of people they were visiting with. Of those, 60% were visiting with one other person, 42% with 3 or more and 8% were alone.

41 (13%) of the respondents were visiting with children under 16 years of age.

Tracked sample

Gender

Male	14
Female	16



Tracked sample's ages as estimated by data collectors.

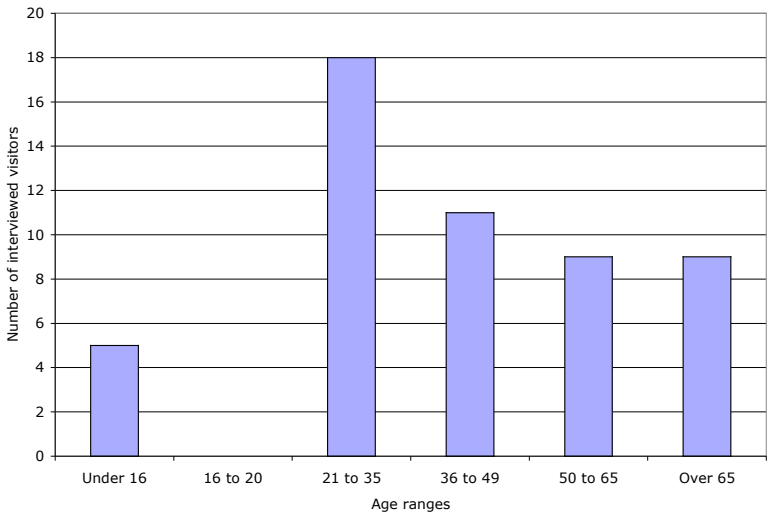
Interview sample

Thirty-one interviews were conducted with 52 visitors; 18 had special training in science.

Gender

Male	19
Female	33

Age



Residence

NYC	16
NY Metro area	12
Other USA	20
International	5

Time in *Darwin*

Interviewees' estimates ranged from one-half hour to 3 hours in the exhibition, averaging 1.5 hours. This correlates roughlywith survey respondents' time estimates.

Appendix B Evaluation instruments

Numbers in the following survey instruments are not completely sequential due to dividing one large questionnaire into two. The numbers were retained as originally designated for purposes of data analysis.

Darwin*: *Visitors' Assessment part a ***Date:***

Please take a few minutes to tell us what you think of "Darwin." It will help the Museum staff
improve our exhibitions. We appreciate your time.

1. Which of the following contributed to your decision to see "Darwin" today: (check all that apply)

__I brought an out-of-town guest
__I am a tourist visiting NYC
__I came with a friend or family
__I am interested in science/evolution
__I came to the Museum particularly to see it
__I read about it in _____
__Saw the banner outside
__I learned about it at the admission desk
__It was recommended by friend/family
__Other _____

2. About how much time did you spend in "Darwin"? _____

3. How would you rate "Darwin"? Use a scale from 1(low) to 10 (high) Rating:_____

4. How well did "Darwin" match your expectations? (check one)

__It was better than I expected __It was about what I expected __I was disappointed

5. Please tell us if you agree or disagree with the following, and how strongly you feel.

About the exhibition	Strongly agree	Agree	Disagree	Strongly disagree	No opinion
The exhibition clearly tells the story of Darwin's life.					
The written information was easy to read and understand.					
There was too much to read.					
Natural selection was clearly explained; I feel like I understand it much better now.					
The lighting in the exhibition was adequate.					
The magnifiers inside some cases helped me look more closely at the specimens.					

7. Was there something in “Darwin” that was particularly memorable for you? ___Yes ___No

If yes, what is it:

8. Which of the following is more accurate, in your opinion (circle one): a b

a) The theory of evolution refers to scientists' best-supported explanation for the diversity of life on earth.

b) The theory of evolution refers to scientists' best guess or speculation for the diversity of life on earth.

9. Would you recommend “Darwin” to friends and family?

___Yes, definitely ___Yes, probably ___Probably not ___No I wouldn’t

11. Was anything missing that you expected to see or learn more about? ___Yes ___No

If yes, what was it

12. Do you feel like you understand Darwin's theory of evolution better than you did before?

__Yes __No __I don’t accept the theory of evolution

13. a) There were a lot of documents written in Darwin’s own hand. Did you read them?

___yes, I read some of many of them ___no, I didn’t have time

___yes, I read a little of several ___no, they were too hard to read

___yes, I looked at a few ___no, I don’t like to read documents

13. b) Did you read the transcribed excerpts?

___Yes, most of them ___yes, about half ___yes, just a few ___no, I didn’t read any

16. Did an “Explainer” help you understand any part of the ehibition?

__Helpful ___Not helpful ___Didn’t speak to anyone

Now a little about you so we can know our visitors better.

How many people (including yourself) are visiting “Darwin” today?

Are you: ___Male ___Female Your age: _____

How many children 16 or under are with your today? ____ Their ages:_____

Your home:

___New York City Borough_____ ___Other USA

___Suburbs (NY, NJ, CT) ___International visitor

Are you or anyone in your group Museum members? ___Yes ___No

Do you have any special training or interest in the sciences? ___Yes ___No If yes, what is it?

Darwin: ***Visitors' Assessment part b*** ***Date:***

Please take a few minutes to tell us what you think of "Darwin." It will help the Museum staff improve our exhibitions. We appreciate your time.

1. Which of the following contributed to your decision to see "Darwin" today: (check all that apply)

__I brought an out-of-town guest
__I am a tourist visiting NYC
__I came with a friend or family
__I am interested in science/evolution
__I came to the Museum particularly to see it
__I read about it in _____
__Saw the banner outside
__I learned about it at the admission desk
__It was recommended by friend/family
__Other _____

2. About how much time did you spend in "Darwin"? _____

3. How would you rate "Darwin"? Use a scale from 1(low) to 10 (high) Rating:_____

4. How well did "Darwin" match your expectations? (check one)

__It was better than I expected __It was about what I expected __I was disappointed

6. Please tell us what you think of the scientific information in *Darwin*. How well were the following explained, in your opinion?

Scientific topics	Very well explained	Not well explained	No opinion
Before Darwin's time, most people believed that all animal species were unrelated.			
Today most scientists agree with Darwin: All life on Earth can be traced back to a common ancestor.			
Human beings, as we know them today, developed from earlier species of animals.			
Discoveries in genetics confirm the accuracy of most of Darwin's conclusions about evolution.			
Natural selection explains how species become extinct and how new species come into being.			

8. Which of the following is more accurate, in your opinion (circle one): a b

a) The theory of evolution refers to scientists' best-supported explanation for the diversity of life on earth

b) The theory of evolution refers to scientists' best guess or speculation for the diversity of life on earth.

9. Would you recommend “Darwin” to friends and family?

___Yes, definitely ___Yes, probably ___Probably not ___No I wouldn’t

10. What 3 things would you tell someone about “Darwin”?

1

2

3

11. Was anything missing that you expected to see or learn more about? ___Yes ___
If yes, what was it

12. Do you feel like you understand Darwin's theory of evolution better than you did before?

__Yes __No __I don’t accept the theory of evolution

14. Please rate the films in “Darwin,” using a scale from 1 (low) to 5 (high). If you didn’t watch or don’t remember, give it a zero.

___Introductory biographical film
___Film on Natural Selection and related research (i.e., poisonous newts and HIV)
___The films about the nature of science and the interaction between science and religion.
___Video explaining: What’s a Theory?

15. Did you use the interactive computer programs (check which ones)
___ Homology (bone comparisons) ___Ladybugs

16. Did an “Explainer” help you understand any part of the exhibition?
__Helpful ___Not helpful ___Didn’t speak to anyone

Now a little about you so we can know our visitors better.

How many people (including yourself) are visiting “Darwin” today?

Are you: ___Male ___Female Your age: _____

How many children 16 or under are with your today? ____ Their ages:_____

Your home:

___New York City Borough_____ ___Other USA

___Suburbs (NY, NJ, CT) ___International visitor

Are you or anyone in your group Museum members? ___Yes ___No

Do you have any special training or interest in the sciences? ___Yes ___No If yes, what is it?

Thank you!

Darwin visitor interviews

Hi, the Museum is interested in what visitors think of Darwin. *I'd like to ask you a few questions.*

1. Do you remember what you expected of the exhibition before you saw it? Did the exhibit meet your expectations? Tell me about it….

2. Now I'd like to show you some pictures of parts of the exhibition to refresh your memory. As you look at them, what comes to mind? Think out loud….

3. Did you get a sense of Darwin the man, the human being, in the exhibition? Where did you see that? Anything else?

4. Did you see anything in the exhibition providing evidence for evolution? Tell me about it. Anything else?

5. In your opinion, how does the exhibition deal with science and religion? Please explain….

Demographic data

Male Female Age: ____ (or decade) Residence: _____

How much time in exhibition: _____

Special training in science: _____

Thank you for your time.

List of photographs used to prompt in-depth interviews

1. The World Before Darwin
2. Youth: A Budding Scientist
3. A Trip Around the World
4. The Journey on the Beagle
5. London: An Idea Takes Shape
6. Like Confessing a Murder; Sandwalk
7. Down Study
8. How does natural selection work? Butterfly case
9. How do new species evolve? Ladybug interactive
10. Evidence of evolution: vestigial features, tree of life, homology
11. Time: horses, virus video
12. Hominid skulls