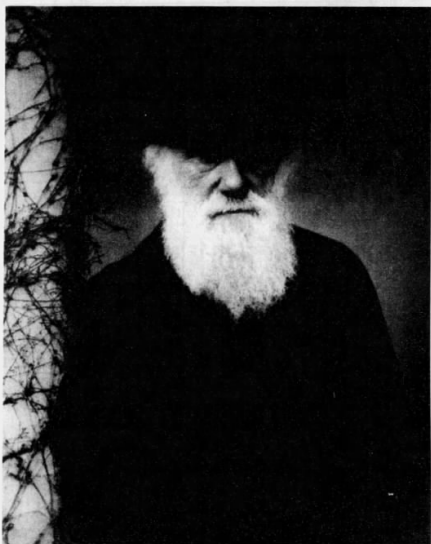


Charles Darwin

Conventional man, radical idea



The Bridgeman Art Library International

Long years of research and study and deep thinking contributed to make Charles Darwin look profoundly weary when photographer Julia Margaret Cameron made this portrait of him about a year before his death, when Darwin was 72.

Bozeman science writer's
interest in Darwin keeping
him busy in bicentennial year

By **ED KEMMICK**
Of The Gazette Staff

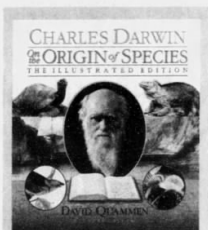
Charles Darwin, who fundamentally altered the way scientists view the world and whose ideas are nearly as inflammatory today as they were when he announced them to the world 150 years ago, was a quiet, kindly homebody who was literally sickened by excitement and dispute.

And though he is known now for one big idea, the theory of evolution by natural selection, Darwin spent his life, in the words of David Quammen, immersed "in the beautiful significance of tiny details."

Quammen is a science writer who lives in Bozeman. Having spent most of February and March delivering lectures on Darwin around the country, Quammen said he sometimes felt a little presumptuous, given that Darwin apparently never gave a single public talk on evolution.

"It was hard for him even to have a really animated discussion with one of his friends without being sick the next day," Quammen said.

Darwin is the subject of renewed interest this year because it is the 150th anniversary of the publication of "On the Origin of Species" and the bicentenary of



New illustrated edition

David Quammen was asked by Sterling Publishing to edit and write an introduction to a new illustrated edition of Charles Darwin's "On the Origin of Species," timed to come out just before the 150th anniversary of its first publication in 1859.

Quammen said yes, with just a few conditions. One was that the publishers use the first edition of the book. Darwin made five revisions of the seminal work in his lifetime, but Quammen says the first edition is still the best and most readable.

"It was the first edition that made the splash, that caused the stir, that started the whole ball rolling. ... That's the one that came from his head and his heart most boldly," Quammen said.

"I recommend to people that this is a book that everybody should read, everybody can read," he said. "It's accessible and yet it's one of the great works of science in history."

Please see Darwin, 12A

"It's laughable when people say, 'Well, it's just a theory.' They're using the word 'theory' in a way that science doesn't."

— David Quammen
Boseman science writer

Darwin

Continued from 1A

his birth in England on Feb. 12, 1809. Quammen is in demand because he has spent much of his career writing about evolutionary biology. He delivered a speech on Darwin at the Library of Congress in 2002, and in 2006 he wrote "The Reluctant Mr. Darwin," a short biography. He also served as general editor and wrote an introduction for a big, new illustrated edition of "The Origin" published in October.

He has lived in Boseman since the 1970s and is now in his third and final year as the Wallace Stegner Distinguished Professor of Western American Studies at Montana State University.

He said he has been surprised "to find myself sort of a tinpot Darwin expert.... I'm not trained as a scientist myself. I'm not an evolutionary biologist. But I've been in love with this guy and his work for a long time."

Burdened with an idea

One of the major themes of Darwin's life was the struggle of caution versus honesty. Quammen said, because he was "a fundamentally conservative man who found himself burdened with a deeply radical idea."

When Darwin set off to sail around the world on H.M.S. Beagle late in 1831, acting as the surveying ship's gentleman-naturalist, he was a conventional young Englishman with vague notions of becoming an Anglican parson. Nearly five years later, when the Beagle returned to England, he was pondering the idea of the "transmutation" — he didn't yet use the word "evolution" — of species.

Those five years spent observing plants, animals, fossils and geological formations all over the world had provided the spark. His ideas became more sharply focused when he returned home and began to hear from the various specialists who had agreed to study and describe the huge number of specimens he had collected, which included preserved fish and reptiles, dried plants, fossils, mammal pelts and bird skins.

There were so many puzzling questions. Why did very similar but distinct species of creatures live on neighboring islands, like the finches of the Galapagos? Why were the fossils of giant extinct creatures found in the same geographical area as smaller but closely related living animals? Why were there flightless birds? Why, for that matter, did men have nipples?

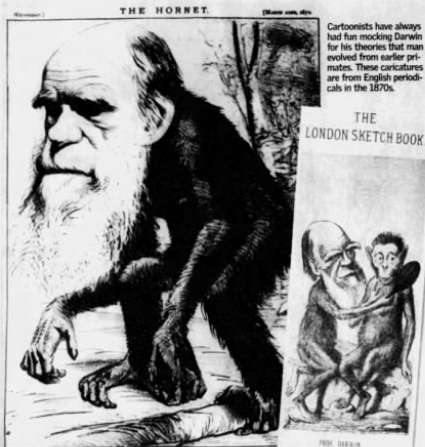
He was working toward an answer. It is impossible to date Darwin's "intellectual conversion" exactly, but Quammen thinks he became an evolutionist in the spring of 1837. And in July of that year, Darwin began keeping a series of "transmutation" notebooks, posing questions, stacking up facts, noting down the theories he tried to develop. He was also reading widely and mailing detailed queries to scientists around the world.

But no matter how bold he was in his study, Darwin continued to be cautious in public, knowing that the theory he was groping toward contradicted the prevailing beliefs of both science and theology.

A mysterious ailment

He had other reasons for caution. One was that he had developed a mysterious ailment whose symptoms included heart palpitations, nausea and vomiting. Any kind of physical or intellectual excitement could make him sick.

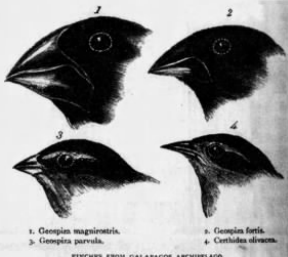
Another reason was that in 1839 he married his cousin Emma, a fervent, traditional Christian. They were extremely close, but she always worried about what Quammen called Darwin's "science-driven impurity." Darwin was too honest to cloak his skepticism, but neither



"Unbearable Chirp Chirping" from The Hornet, 1872

More cartoon caricatures from The London Sketch Book, 1874

The Bridgeman Art Library International



FINCHES FROM GALAPAGOS ARCHIPELAGO

The beaks of the Galapagos finches, adapted for different purposes in varying biological niches, were among the pieces of evidence that Darwin used to support his theory of evolution by natural selection.

did he want to hurt her.

All those concerns explain the intensity of the famous letter he wrote to a friend in 1844, admitting that he was "almost convinced (quite contrary to opinion I started with) that species are not (it is like confessing a murder) immutable."

It was also in 1844 that Darwin completed a 189-page essay outlining his theory of evolutionary change, together with his explanation of how that change occurs — by natural selection. Briefly, his theory was that small, random differences among individuals are inherited, resulting in different chances of survival and reproduction.

Variations that prove useful are lost, while useful variations are passed on and magnified over time, resulting in gradual change within a species. And when genetic changes build up within an isolated population of a species, and that population further adapts to local conditions, it eventually becomes "irrevocably distinct," in Quammen's words. It becomes a new species.

Quammen called his biography "The Reluctant Mr. Darwin" because of the long gap between Darwin's formulation of his theory and its appearance in book form in 1859. The

189-page essay was tucked into a desk drawer, unused by anyone else, with a note from Darwin to his wife, asking her to have the essay published in the event of his death.

One more factor in Darwin's delay was his perfectionism. He could not bring himself to stop gathering facts, conducting experiments, reading books and papers and testing his ideas.

"He kept getting distracted into other projects that seemed to him at the time to be important and necessary — and worthwhile," Quammen said. "And the biggest digression of all was when he decided to entirely revise the world's barnacle taxonomy. He spent the next eight years buried in barnacles."

His study of these tiny marine creatures, some of them no larger than a pinhead, resulted in four more books, added to those that he had written or edited about the voyage of the Beagle.

Home experiments

With the barnacles behind him, Darwin became occasionally in a series of ingenious, occasionally eccentric home experiments. Aided by his butler, Pansy, Darwin tested the

ability of various seeds to germinate after being soaked in salt water. He wondered how long a seed could float in the ocean before alighting and germinating on a distant shore. He conducted similar experiments with lizard eggs, and with snails attached to ducks' feet. He collected the carcasses of chickens, horses, dogs, cows and rabbits for measurement and study. He became so wrapped up in the breeding of pigeons that he joined a couple of pigeon-fancier clubs in London.

There is no telling how long he might have postponed publishing his views on evolution, Quammen said, but he was finally startled into activity in 1858, when he received a manuscript from the far side of the world.

It was from Alfred Russel Wallace, a young naturalist with whom Darwin had already traded a few letters. The manuscript, sent from an island in the Malay Archipelago, was titled "On the Tendency of Varieties to Depart Indefinitely from the Original Type." Though there were some differences between Wallace's ideas and Darwin's, the essay was basically an explanation of evolution by natural selection, a theory Wallace had independently arrived at.

The propriety of what Darwin did next is still being debated, but in consultation with some associates, he had Wallace's paper and an excerpt of his own manuscript from 1844 presented simultaneously before a scientific association in London. And then he got to work, abandoning his plans for an encyclopedic amplification of his 189-page essay.

Instead, he labored for 13 months to produce a 500-page book, which he had originally wanted to call an "abstract," or summary, of his evolutionary theory. "On the Origin of Species" was published in November 1859.

A still-troubling idea

It remains one of the most important books ever written, and the stir it caused has never died down. Unlike the theories of Copernicus, Newton and Einstein, the theory of evolution by natural selection went to the heart of what it means to be human, and its con-

clusions have always been rejected by sizable portions of the general population, particularly in the United States.

Quammen said Darwin never pretended to have a theory about the origin of life. His theory addressed what happened after life appeared, how it acquired so much complexity, diversity and adaptation. And Darwin concluded, in his own words, that "man is not special." He did not challenge the existence of God, but the godliness of man.

"That's where push comes to shove with Darwin's view of evolution and Darwin's view of the world," Quammen said. "He believed as firmly as he could believe anything that the job of science was to explain the physical universe with physical cause and effect, and not miracles and special intervention and tricks."

Darwin called himself an agnostic, a word that had been coined by his friend, Thomas Huxley. And in his autobiography, Darwin frankly admitted that he "gradually came to disbelieve in Christianity as divine revelation."

Although Darwin pondered the origins of morality in the absence of revelation, his critics might have difficulty finding a lack of morality in Darwin's own life. Quammen said Darwin "was a good husband, he was a good father, he was a good grandfather."

'Just a theory'

As for evolution by natural selection, Quammen said "it's laughable when people say, 'Well, it's just a theory.' They're using the word 'theory' in a way that science doesn't."

A theory is simply an explanation of observable data, and if something comes up that contradicts that theory, it is the job of science to resolve those contradictions and adjust the theory.

"And in the case of evolution by natural selection, in 150 years there has never been a piece of data that has caused scientists to feel that this theory is wrong," Quammen said. "There have been a lot of false alarms about that, but there has been no credible, authoritative challenge to the theory. On the other hand, there have been millions of pieces of additional supporting evidence."

Quammen doesn't entirely dismiss the idea of teaching "intelligent design" in public schools.

However, he said, "We should teach what we believe, in comparative religion, alongside Christianity, Islam, Zoroastrianism, and the old Hindu belief that earth rests in space supported on four really big elephants that stand on the back of Chinese giant turtles."

"After 'The Origin' was published, Darwin lived another 23 years. In addition to issuing five revisions of his great work, he continued to collect information, conduct experiments and write new books. Some of them dealt directly with evolution, but others were as arcane as his work on barnacles. His last book, written in solid quietude despite its sleep-inducing title, was "The Formation of Vegetable Mould, through the Action of Worms, with Observations on Their Habits."

In the year before he died he was still conducting his oddball home experiments, none more eccentric than those designed to determine whether earthworms possessed a sense of hearing. He enlisted his wife, Emma, to play the piano, his son, Frank, to play the bassoon, while his grandson, Bernard, blew on a metal whistle. Darwin observed the worms, which seemed not to notice a thing.

As Quammen said, "Warm research, Darwin style, was an activity for the whole family."



QUAMMEN