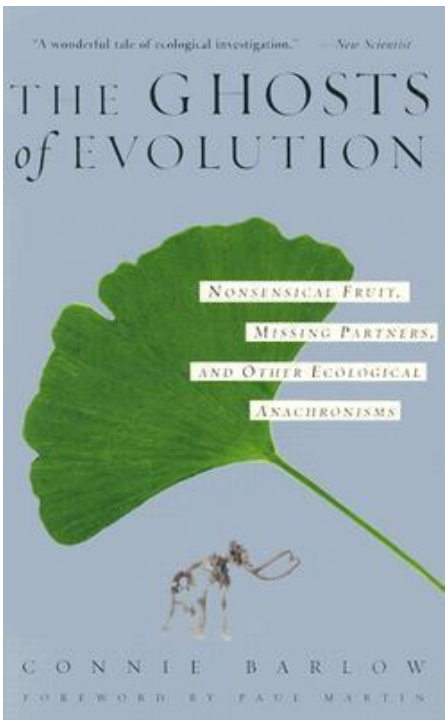

The Ghosts Of Evolution: Nonsensical Fruit, Missing Partners, and Other Ecological Anachronisms

Connie Barlow

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A new vision is sweeping through ecological science: The dense web of dependencies that makes up an ecosystem has gained an added dimension-the dimension of time. Every field, forest, and park is full of living organisms adapted for relationships with creatures that are now extinct. In a vivid narrative, Connie Barlow shows how the idea of "missing partners" in nature evolved from isolated, curious examples into an idea that is transforming how ecologists understand the entire flora and fauna of the Americas. This fascinating book will enrich the experience of any amateur naturalist, as well as teach us that the ripples of biodiversity loss around us are just the leading edge of what may well become perilous cascades of extinction.

The Ghosts Of Evolution: Nonsensical Fruit, Missing Partners, and Other Ecological Anachronisms Details

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From Reader Review The Ghosts Of Evolution: Nonsensical Fruit, Missing Partners, and Other Ecological Anachronisms for online ebook

Adam says

While some exceptions have made their way into popular purview - chiefly the understanding that industrial humans are destructive - ecology is still largely seen the way it was presented by William Paley: a web of interactions in which inefficiencies and waste are pared away by the exigencies of natural selection and where every piece has its function, even if it's not yet clear to us. This is evident in Optimal Foraging Theory and Optimal Defense Theory, which are essentially tautological: whatever organisms do must be the optimal choice to make, because of Evolution.

The Ghosts of Evolution is Barlow's attempt to explode that vision out into a historically complex picture of the world. The premise, of course, is that there are plant traits (mostly fruit, but a few thorns and growth habits are thrown in for good measure) that evolved in response to a specific sort of mutualism that no longer exists.

The book is initially kind of weak. Barlow's premised the whole thing on a "groundbreaking" paper Dan Janzen and Paul Martin wrote in 1982. She's enamored of the idea, she finds it romantic and exciting. Much of the book is structured around quotes from email exchanges she had with the two authors. For a book about such an old topic, it seems remarkably rich in speculation and low in primary research. She constantly presents these anecdotal "experiments" she's done, with the caveat that they're "not real science" so we shouldn't invest any Truth in them, but with the clear feeling that she really wants the suggestions they made to be true, just because she would find it Cool.

While the premise wears rather thin in the first few chapters - it's really sufficient to assert that honey locust, persimmon, pawpaw, avocado, and the Kentucky coffee tree are anachronisms and why without being so repetitive about it - the book picks up when Barlow broadens her scope.

There's a wonderfully intensive discussion of comparative digestive anatomy. She concludes, reasonably, that most of the anachronism fruit eaters were hindgut digesters - foregut digesters aren't made for fruit. She points out that the Pleistocene megafaunal extinction left a continent devoid of hindgut herbivores larger than a beaver - though she uncharacteristically fails to speculate on why this is. Most of the large animals that moved in from Eurasia were foregut digesters. I like discussions of digestive anatomy because they are inextricably linked with forage chemistry, which turns faunal assemblages into keys to and engineers of a chemical landscape.

The beautiful thing about the book is the way it expands our perceptions of the relationships among organisms. Anachronistic fruits are the living evidence of megafauna, and the present distribution of the plants that produce them is evidence of their absence. Barlow's knowledge of the specific histories of animals, plants, and their interactions as continents moved throughout North America's history seems rich and full, which is unusual. I find the whole thing complex and hard to wrap my head around - camels and horses arose in North America, while Bison arose in Eurasia, but they migrated across the Bering Straits at various different times up to the Pleistocene. I really want to learn this deep history with more familiarity, because I tthink the historical, evolutionary, dynamic perspective is the only way to understand the logic of a land community.

Overall, Barlow made an interesting picture and changed my view of ecology and evolutionary history (particularly just noting that evolution can leave anachronistic features as big as avocados for 13,000 years is remarkable). It's not the most eloquent or subtle book, but it works.

Stephen says

The Ghosts of Evolution: Nonsense Fruit, Missing Partners, and Other Ecological Anachronisms
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291 pages

Grocery stores are excellent places to encounter ghosts. They lurk in the fruit section, feasting on anachronisms.

The biological world is a wondrous web of connections between various animals and plants, and such connections are the source of evolution's "endless forms most beautiful". Not only does the contest between predators and prey – a biological 'arms race' – drive evolution, creating faster feet, sharper brains, and more discrete camouflage, but the mutually-supportive relationships between species shape them toward one another's uses, , like leather molding itself into a glove over an offered hand. But what happens to the glove when the hand is ripped away – when one part of a cooperative pair vanishes into the mists of history and leaves its partner alone? Said partner becomes a living anachronism, and such anachronisms and their ghostly partners are the subject of this fascinating bit of science journalism that may be most readers' introduction to the field of paleoecology.

Like an ethereal spectre waiting at a window for her beloved, every spring trees throughout the western hemisphere produce fruit for animals which no longer exist to consume them. The two American continents once looked very much like Africa, being home to massive beasts. While some are familiar to us, like the mammoth, others are fantastic (sloths that make grizzlies look like pups?) and still others just seem misplaced, like American species of lions and tigers (andbearsohmy). Barlow and her associates take a forensic approach to uncovering relationships between extinct and extant species. Although some bits of evidence seem obvious -- fruits and seeds which are too large for the mouth of any living species, but would have been easily gobbled up by the elephant-like gomphotheres -- her work relies on a wide variety of evidence. Mouth sizes aren't everything: a given animal's intestines must also be taken into consideration. Some fruit require the digestive assistance of bacteria; some seeds need to be softened by stomach acid, or battered by gizzard stones before they can germinate. So varied are the pieces of the puzzle that Barlow establishes a diagnostic profile for ascertaining if a given species is anachronistic, one that also determines the degree of anachronism. While some species have found new markets for their produce (so to speak) in the form of horses and cattle brought over from Europe, others see their entire offering of fruit go to waste every year, and have survived the death of the megafauna only because they're exceptionally long-lived species who sometimes get lucky.In addition fruit, Barlow also illustrates how many plants are attempting to defend themselves against the muzzles and digestive systems of animals who haven't been around for centuries

Ghosts of Evolution is one of the most fascinating science books I've read in a long while. Like Sherlock Holmes taking Watson along to investigate a mystery in Victorian London, so Barlow takes the reader

through the Pleistocene jungles with a grand mystery of her own. The text isn't as formal as most -- more a journalistic account of Barlow's investigation, and replete with dialogue between herself and a colleague as they puzzle matters through - but it's teeming with interest. Not only does she illustrate the rich biological heritage of the Americas while piecing together the puzzle, but what she does find offers lessons for modern-day conservation efforts. If we can figure out what kind of dynamics kept the landscape healthy in the past, perhaps we can make efforts to restore it. Her epilogue contains information about ecological approaches that have been inspired by work in this field: for instance, the idea that camels should be introduced to the North American desert plains to feast on certain pervasive species of scrub that have been allowed to become overly dominant thanks to a lack of natural predators....a lack created when said predators suddenly disappeared shortly after the arrival of humans in the Americas.

Himanshu Bhatnagar says

The book, at first, reminded me of Shaw’s rather mean-spirited review of a budding author’s manuscript, “There’s too much space between the covers.” Reading the book, I found myself skipping words, then sentences till by the end I felt like Spiderman, able to leap over entire chapters in a single bound.
But brickbats apart, I do not mean to say that the actual subject matter of the book i.e. there are flora today with anachronistic traits which seem adapted to now extinct mega-fauna is uninteresting, not in the least. It’s just that you get the feeling that this book is made out of a scientific article that should have remained a scientific article.
The Hypothesis is very intriguing, but once you’ve explained the concept in the first twenty pages or so, what else do you do to fill up the rest of the pages? So we find Ms. Barlow getting interminably repetitive, flogging the same dead horses (no pun intended) every few pages, and providing needless details that are not only not pertinent to the topic but are rather uninteresting at that.
The journalist in Ms. Barlow shines through in her repeated attempts to keep her readers hooked; “X will be further explained in a further chapter”, “Y is further discussed in chapter so-and-so”. It’s like she’s still writing for a newspaper and wants you to continue reading her article from the front page into the jumble of the middle pages.
Midway through the book, I started getting the feeling that Ms. Barlow was truly fascinated by this subject and wanted to present it to everyone in a readable and easily understandable format.
The problems are that
A) There is scant literature evidence or actual research into this hypothesis, and
B) The author is, sadly, not quite up to the task of piquing everyone’s interest.
The handful of examples that she has available are inadequate to fill up almost 250 pages and her attempts to romanticize the topic by repeatedly referring to “Ghosts of extinct Pleistocene mega-fauna” also do not have the required effect.
Still given the author’s passion and the intriguing idea she presented, I still finished the book and did not consider it time wasted.
A most glaring omission, and one that’s been mentioned by a number or readers is the complete absence of even a line drawing of all the Pleistocene mega-fauna that are invoked in every chapter. Where are the Giant Sloths, the Mastodons, and the Gomphotheres? Surely they shouldn’t be as elusive as ghosts in a book that’s dedicated to the partners they’ve left behind? How much could it have cost to get publishing rights to a few pictures?
In the end I would still recommend this book to anyone interested in evolution and its little, fascinating mysteries. The only advice I would give the author would be to pare the book down to almost half and add a few illustrations of mega-fauna
Not a must-read, but definitely not unreadable either.

Rhythm says

As a child I used to bring various leaves to my grandmother and ask her which tree did they belong. Now as an adult I find it slightly reassuring to see the trees and plants I've known as a child, adorning the pavements and parks of a distant city, a thousand miles away from where I grew up. My childhood fascination hasn't left me. I still love to learn about trees and plants. I still look for the wild berries and fruits I gathered as a child and introduce them to my son. Reading this book forever changed how I consider seemingly inedible or unattractive fruits (to various dispersers) that gather below the parent tree and rot. This is a slow read, but if you are interested in paleobiology, this is an exciting one about anachronistic fruits and plants.

Loren says

I liked this book, but wanted to like it much more. It’s fascinating and offers insight into why common North American (or less common, or less American) species may be in their present form. It includes interesting dives into Osage orange, pawpaw, and of course the honey locust.

Where the book falters is in how the author is too casual on occasion, and it disrupts the narrative and the larger sense (hope?) the book isn’t just wishful thinking grounded in good science. One chapter posits a tree depended on the dodo, but it does a better job describing how the tree likely did not. Afterwards, it’s commonly referred to as depending on the dodo...it’s just odd, tonally. There’s another section where the author uses ‘shit’ again and again, and it’s funny in real life, between ecologists, but it feels off the mark in this book.

Finally, the last chapter is odd in how it turns into a rallying cry for the resurrection of the mammoth, which is fine, but it feels out of place when so much of the book focused on plants and their adaptations, anachronistic or not. I understand the intent, but it didn’t work.

All those caveats said...it’s entertaining and worth a read. As an urban forester and an arborist it’s given me fun facts to use and a different mindset with which to approach some common trees. Read the book and enjoy it for what it is.

Martine says

The idea: four stars
Execution: two stars

The general theses of this book is very interesting: fruits such as avocado are anachronistic because the animals for which they evolved are long extinct. I really wanted to read a book about that. I do however have a few problems with how that theses is presented here, which can be summarized with the question: 'for whom was this book written?' It seems to want to please both specialistic scientists and the general public and in the end is suitable for neither.

The hypotheses is certainly interesting enough for the scientific community, but the original 1982 paper

already served that function. Besides, this is padded with far too many anecdotes, endless rehashes of how Paul Martin and Dan Janzen came to this theory and kitchen-sink-type science experiments, usually containing only one or a handful of subjects. So then perhaps it was aimed at the general public with an interest in science? If that was the case then the multitude of latin names and the lack of pictures probably scared most prospective readers away. Thanks to Jurrassic Park and Walking with Dinosaurs most people have an idea of what to picture when they hear the name 'T-rex' or 'Pterodactyl' or any of a hand ful of dinosaur. Who however knows what a mastodont or a giant sloth looked like? A single image of one of these reconstructed giants would have gone a long way. Nor would a reconstruction (preferably with a live relative for size) of an extinct horse, camel, tortoise, rhino, elephant or the meriad of other animals named in this book have gone amis. Just a few pictures would have made this work a lot more accessible.

On the other hand, I did learn a lot about biology from this book, especially about the complex interactions between the different lifeforms on this planet and how they shape each others evolutionary paths. That part of it was truly fascinating.

In short, interesting but not the best presentation.

Suzanne says

This is a fascinating book with some occasionally irritating foibles.

The broad concepts here are intriguing and open a new window into the history of our natural world. The basic premise is that a number of plants in North America evolved to form partnerships with the megafauna that once dominated the landscape, but which is now largely extinct. This has resulted in a number of ecological "anachronisms"—plants whose seeds are nestled in large fruits no current animals can swallow whole, or whose fruit pulp is noxious to all current animal residents. The author examines and describes a wide range of examples in great detail.

I enjoyed this aspect immensely, and began to recognize some anachronisms in my own neighborhood. I was even more struck by Barlow's proposal that the recent reintroduction of megafauna to some North American ecosystems, in the form of horses and cattle, might be actively beneficial, partially replacing the animals that humans rendered extinct. (Barlow notes that horses and camels actually evolved first in North America, before spreading to other continents, and were endemic here until humans arrived. She makes a decent case that the American west would be better off now if it still had camels.)

Intermixed with the natural history lesson, however, is an extensive discussion of the history of this idea, and its reception in the scientific community. This, too, is interesting and worthwhile, up to a point. But she goes on about it rather past that point, until it seems like she's either hung up on vindicating her academic mentors, or desperate for material to pad this out to book length. Certainly it could have been shorter without sacrificing worthwhile content.

And finally, there's a lot of poetic description and personal anecdote woven in. Some of this is colorful and gives some life to the text. Some of it is goofy, and occasionally even cringe-worthy. Combined with occasional academic fuzziness (things don't "devolve," Barlow, they just evolve in a different direction), it lends a slightly sloppy air to the book.

But with that said, the book is largely an engaging introduction to a fascinating concept in natural history,

and I definitely recommend it.

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katdob says

I recommend this book. Apparently designed for the non-scientist, the reviews of the characteristics of anachronistic flora is engaging and interesting. At times, I'm unsure if the book is directed at the science lay-person or to the non-botanist scientist, but it was still a good read. The idea of this book is an A+, while the actual text is more of a C-.

My only qualm is the personal message sometimes injected by the author. I recommend skipping chapter 8 (Who Are the Ghosts?), as it's filled with self-described metaphysical assumptive leaps.

Lisa M. says

I don't read science books often. Obviously science has benefitted our society in many ways. But, I find the majority of it boring or difficult to understand. I looked back over my library and found that the only other science books I've read while using this website (which I've used for six years at this point!) were about animals, and I was never impressed with them. So I approached this book about plants with caution.

Was this book boring or difficult for me to read? Boring, no. This book develops a somewhat controversial theory about ecological anachronisms: plants and animals often develop in tandem. The plants evolve to attract the right animals that will disperse their seeds appropriately. This book discusses what happens when those animals go extinct or are separated totally from their partnered plants. The ideas Barlow presents seem "natural" to me (ha!) But, we learn about the uproar they caused in the scientific community when they were originally published.

Barlow relies heavily on the authors who originally supported these ideas, especially early on in the book. This wasn't a problem for me per-say, but if you are already familiar with Martin and Janzen's literature on the topic, you may not need to read this. I would only suggest it if you are extremely interested in the concept.

Barlow's personality is ever-present in this book. She is a constantly curious - and courageous - scientist! As she explores anachronistic plants, some of which are believed to be poisonous, she casually consumes them (in small, hopefully safe doses) to learn more about them. She also introduces readers to other passionate scientists who experiment in this way. It adds a unique twist and helps liven the text. Some of the ideas these scientists propose, such as reintroducing elephants to America, are really radical. But this book is so convincing that I found myself nodding and agreeing with the suggestions! I think Barlow's passion and curiosity made this a very accessible book.

This book was difficult at times because she only uses scientific names for the creatures she discusses throughout. I had to take the time to look them up or make assumptions about what they were. In some instances she uses the commonly known name, such as "wooly mammoth." If this book was written for a popular audience I wish she could have stuck with these common names or describe the creatures at some point in the book.

Overall this book was impressive. Maybe I need to stop reading books that focus solely on animals and include plants, too!

Ron Rayborne says

Just finished The Ghosts of Evolution. Wonderful book. I first discovered this title when I worked at my local library years ago. I remember it coming out, leafed through it, and knew that one day I'd have to read it.

Though I already understood the premise of the book, the symbiotic connection between plants and their consumers, Connie Barlow, and by extension, Paul Martin and Dan Janzen, solidified in my mind how deep those connections are (or were). To Barlow (and me too) it's sad to think that a lot of extant flora are still putting out fruit for fauna that no longer exist, and haven't for thousands of years thanks to us. And slowly, one by one, with no one to spread their seed, they are declining. Take a hike in the woods and it is often a lonely, silent trek. Most all of those grunts and bellows, roars and mewlings, chirps and chatterings, the sounds of a healthy, vibrant forest that should be there, are now gone. With them many of the plants that depended on them are succumbing. Barlow warns us that if we allow them to go extinct, we will be forced to do the work of pollinating and planting that they did if we hope to survive. And indeed, humans are already being forced to hand-pollinate crops in some countries. Will we "awaken to a new ethos" in time as Barlow suggests?

The answer then is to reverse course while we can. Take responsibility for our past mistakes and reintroduce the cousins of those species we hunted into extinction. They were once here in America and Europe, so let's bring back the elephant and the camel, the rhino and the antelope, the wild dog and the hippo. Thereby we will also be reintroducing ourselves to them; an apology and symbolic handshake that says, "let's start over". And, as a byproduct, we'll be restoring some missing adventure to our lives. Despite what some people may believe, we don't own this planet. It's here for all of us together. I mean, do we *really* want to live in a one species world?

Can it be done? Yes, with the will. Will we once again be forced to compromise with selfish ranchers and trigger-happy gun-nuts eager to begin the slaughter anew? To make these, our sister species on this planet, again learn to live in fear for their lives? God, I hope not! Wouldn't it be great if, this time around, with the resurrection of the megafauna, it was the destroyers, or at least their destroying mindset, that went extinct?

Aditi says

It's an excellent book. At one point it's very slightly repetitive and the last chapter (the one about the memorial service) is a bit self-indulgent, therefore 4 stars.

However, I must confess the book brought me a new perspective on all the trees I see on a daily basis, and the fruits I often eat. I recommend it to anyone interested in finding out more about our world as it is and as it was, and human impact on it.

Pat says

Read in the Nook epub edition.

Interesting ideas, though as not-a-scientist I'm unable to evaluate them. BUT. One reason I was reluctant to go back to reading this is that it's poorly written and very disorganized. Someone decided that Barlow's exploration of the idea with other scientists was the way to organize the thing; the result is that it's very difficult to follow what she's trying to say or even to figure out where the argument is headed next. Paragraphs with more than one topic; paragraphs with no discernible point-- It's an organizational mess. And there's a LOT of repetition: Barlow discusses a fruit in one chapter, and then discusses it up again and again and again ... It's almost as if she didn't have enough material for the length of book the publisher wanted, so kept repeating the same info over and over. (And, wow, did I get tired to the words "pulp" and "gut," which seem to appear every other sentence.)

Overall, interesting idea; and the bibliography is no doubt useful. But some good editing would have improved things immensely.

Dan Schwent says

The Ghosts of Evolution is an account of fruits and their missing seed dispersers.

Ever wonder what eats crazy-looking fruits like the Osage Orange? It could be that nothing living does, that the preferred organism for spreading the seed has been lost to the sands of time. Connie Barlow investigates fruits from around the world and points out the probable ecological anachronisms.

For instance, the avocado seems to be intended to be devoured whole by some megafauna, possible a ground sloth, but no such megafauna exists in its range. Fortunately for some of the tastier species, mankind has taken on the role of seed dispersement but some species aren't so lucky.

The Ghosts of Evolution was one of the more interesting non-fiction books I've ever read. It made me harken back to my pre-teen days of wanting to be a scientist, several years before deciding having friends was more important than being the smartest kid in the room. What was I thinking?

Anyway. The Ghosts of Evolution is a fascinating exploration of the ecosystem and what happens when it gets disrupted. Four out of five stars.

Jente Ottenburghs says

Great idea, but poor execution. The book relies heavily on a 1982 paper by Janzen and Martin. The author keeps referring to it. In general, the book is quite repetitive (like a stutterer with amnesia). However, for some reason I wanted to finish this book. And I did learn a lot from it.

Aerin says

During the later Pleistocene, as humans were inexorably invading nearly every landmass on the planet, a gradual extermination was simultaneously taking place. This mass extinction, the latest in a long line throughout the history of the biosphere, primarily targeted megafauna - from the mastodons and giant sloths of North America, to the woolly mammoths and woolly rhinoceroses of Europe, to the giant lizards and flightless birds of Australia. In most cases, their annihilation shortly followed the arrival of humans, and it is hypothesized that some combination of overkill by human hunters and climate change (that had, in many cases, allowed humans to colonize the area in the first place) led to their demise. (Interestingly, the reason that wild megafauna have survived in Africa, parts of Asia, and virtually nowhere else, is thought to be that humans have been in those areas the longest and actually co-evolved with large animals there.)

In North America, humans began to arrive some 40,000 years ago, and it wasn't long before the native relatives of horses, camels, elephants, and rhinos began to die off. Most native American megafauna have been long gone now for some 10-15,000 years, but their legacy remains in odd places. The botany of the Americas, particularly, bears witness to what Connie Barlow calls "the ghosts of evolution".

It's well known that many plant and animal species have evolved mutually beneficial partnerships. Often plants will attract animals with nutrient-rich fruit, which animals will devour, defecating the seeds intact elsewhere. The animal gets a tasty meal and the plant gets a new start in life for its offspring, far from the malignant shade of the parent. But there are many plant species whose fruits now go uneaten, rotting away on the forest floor, their seeds undispersed. Barlow argues that no plant would expend the energy to evolve a fruit that is destined to rot en masse. No, there are animals who eat these fruits - they just don't exist anymore.

Take the avocado, for instance. This is a medium-sized fruit with a relatively large seed, and it was clearly designed to be swallowed whole. After all, animals with smaller maws (like us) will just eat around the seed, which doesn't help the plant at all. But what animal in the Americas has a mouth and a throat big enough to effortlessly swallow an avocado seed? Well, many do - glyptodonts, toxodons, gomphotheres, ground sloths... but they are all extinct.

Plants take longer to evolve than do animals, and in any case 10,000 years is an eyeblink in evolutionary time. In essence, these plants that evolved in tandem with megafauna have not had time to "notice" that their partners have gone extinct. In some cases, these species have started to adapt to the loss of their primary dispersers; in others, they make do with less effective means of seed dispersal (flood waters, domesticated horses and cows); and in others, they are slowly diminishing and dying away. It's important to recognize these evolutionary "ghosts" if we want to understand, and to save, many of these species.

In this book, Barlow sets out to identify potential evolutionary anachronisms, from extreme examples like the osage orange (no living species is known to eat its toxic fruit) to milder cases that just seem somehow overbuilt for the purposes of any extant partnerships.

Overall, I found the book's premise really interesting, but its execution was fairly dry. Still, it's a topic I hadn't read much about and there were all kinds of little tidbits that made slogging through the boring parts worthwhile. For instance, did you know that ginkgo fruit - which smells like rotting flesh - may have evolved to attract carrion-eating dinosaurs? How cool is that?
