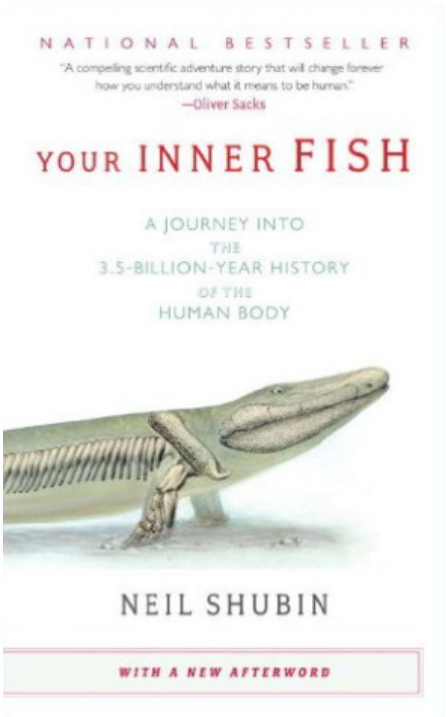

Your Inner Fish: A Journey Into the 3.5-Billion-Year History of the Human Body

Neil Shubin

Your Inner Fish: A Journey Into the 3.5-Billion-Year History of the Human Body

Neil Shubin

Your Inner Fish: A Journey Into the 3.5-Billion-Year History of the Human Body Neil Shubin

With a New Afterword

Why do we look the way we do? Neil Shubin, the paleontologist and professor of anatomy who co-discovered *Tiktaalik*, the “fish with hands,” tells the story of our bodies as you've never heard it before. By examining fossils and DNA, he shows us that our hands actually resemble fish fins, our heads are organized like long-extinct jawless fish, and major parts of our genomes look and function like those of worms and bacteria. **Your Inner Fish** makes us look at ourselves and our world in an illuminating new light. This is science writing at its finest—enlightening, accessible and told with irresistible enthusiasm.

Your Inner Fish: A Journey Into the 3.5-Billion-Year History of the Human Body Details

Date	:	Published January 6th 2009 by Vintage (first published January 15th 2008)
ISBN	:	9780307277459
Author	:	Neil Shubin
Format	:	Paperback 237 pages
Genre	:	Science, Nonfiction, Biology, Evolution, History

From Reader Review Your Inner Fish: A Journey Into the 3.5-Billion-Year History of the Human Body for online ebook

Nadin Adel says

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Will Byrnes says

How are embryos like fossils? How did we come to have the hands, arms, heads, bone structures, ears, eyes and many of the other parts we have? It turns out that homo sap is a very jury-rigged critter, an accumulation of biological compromises and re-purposed parts. One can look at fossils to see how we got from there, waaaay back there, to here, and one can also find, in comparing embryos of different species, evidence of our developmental history. DNA tells tales. Neil Shubin follows both paths on his road to our past in a book that demonstrates popular science writing at its best.

Neil Shubin with Tiktaalik or the other way around - image from the Chicago Tribune

There is a wealth of fascinating material in this easy-to-read book on how human anatomy came to be. Paleontology, like Con Edison, swears by the motto “Dig we Must.” Shubin offers a quick intro into how one decides *where* one should dig to increase the odds of finding what you are looking for. He should know. Currently both a professor at the University of Chicago and Provost of the Field Museum, his primary claim to fame was as the person who located in the Canadian Arctic, a fossil, *Tiktaalik roseae*, a flat-headed fish/amphibian that marked the transition of animals from sea to land. This was front page news across the world in 2004.

Looking at how embryos develop one can see remarkable similarities among species. Human embryos look a lot less different from embryos of other species than we as adults look from the fuller versions of other critters. Plunging into the DNA of each holds many answers. In *Your Inner Fish*, Shubin looks at different parts of the human body, for example teeth, and hands and arms, eyes and ears, then traces their structures back through the scientific record to see where each bit first appeared. This is way cool, and gives one some perspective into just how much we, as humans, are part of all life on earth (and who knows where else?)

Children of Mother Earth - image from Feynmanino.watson.jp

Did you know that "the head is made up of vertebrae that fused and grew a vault to hold our brains and sense organs?” (p 88) How about that “bones that are the upper and lower jaws in sharks are used by us to swallow and hear.” (p 92) There are many revelations of this sort. I was most impressed by a section that described how our ear was related to a sense organ, the neuromast, present in the sides of some fish. This figures prominently in our reaction to over-imbibing. People who overindulge in spirits experience spins. This has to do with a side-effect of alcohol not mixing well with the water in one’s ear, the ear that helps regulate our sense of balance. Just as the neuromast lets fishes know about the world around them, acting as a sense, and ultimately, balance organ, so too our ears use a very similar mechanism to help us retain our sense of balance. When alcohol mixes, poorly, with the water in our ears, it mucks up the works, thus that unfortunate spinning sensation This book offers a cornucopia of gee-whiz explanations just like those.

Shubin shows how our genetic makeup makes us high-end mutts, the product of eons of accumulated changes, a creature designed by a committee. That baggage can get heavy at times. Elements of our makeup that made sense when we were hunter gatherers now leave us ill-prepared for sedentary life in the 21st century.

Shubin has a gift for popular science writing. He says that he was “trying to understand the family tree of relatedness.” Clearly, he succeeded. There were only one or two times in the book when I felt at all strained.

And his effervescent enthusiasm for his field is infectious. If I were a student, I would be offering bribes to anyone who could help get me into his class.

My only gripe about this book is that it was too short. Maybe it needed more time to evolve.

==========**EXTRA STUFF**

There is a nice interview with Shubin at BloggingHeads TV. It runs about 51 minutes and was never boring. Another is a piece from the University of Chicago that offers detail about Tiktaalik roseae.

Also Preeti provided a link in comment #5 below to a PBS series that has been made of this. I know I'll be watching.

And Alfred added a link to an excellent Slate article on the series in comment #8.

August 17, 2016 - a nifty item in the NY Times Science section - From Fins Into Hands: Scientists Discover a Deep Evolutionary Link - by Carl Zimmer

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Fahad Alqurain says

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HBalikov says

For those who enjoyed the writings of paleontologist and evolutionary biologist, Steven Jay Gould, here is another master in communicating complex science to the lay person. Neil Shubin has the smarts, the skills, the enthusiasm and the insights to enlighten us on the manner in which we humans are part of the world's amazing collection of life forms past and present.

Gould taught at Harvard and was associated with the American Museum of Natural History. In remarkable parallel construction, Shubin (who received his doctorate at Harvard) has similar roles with the University of Chicago and the Field Museum of Natural History.

Shubin's self-imposed challenge is to explain how scientists can be so confident as they reconstruct

relationships among "long-dead animals and the bodies and genes of recent ones." Gould starts with an example of the relationships and hierarchies among creatures:
Everything with heads
Everything with heads and limbs
Everything with heads, limbs, breasts and hair
Everything with heads, limbs, breasts, hair that walks on two legs

He then focuses on the common plan for limbs: one bone, followed by two bones, then little "blobs", then fingers or toes. Pointing out that "the differences between creatures lie in differences in the shapes and sizes of the bones and the number of blobs, fingers and toes." He clearly lays out how the tools we now have allow us to explore and pin down relationships among creatures.

I have to agree with the promo on the book's cover: "Your Inner Fish makes us look at ourselves and our world in an illuminating new light." Well done.

Ahmad Ebaid says

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Fatema Hassan , bahrain says

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Vince says

If you have a semi-extensive science background, you'll probably find this book annoyingly vague. Lots of handwaving, little in the way of explanatory detail.

If you're a fan of well-written scientific prose, you'll definitely be driven around the bend. The author was chosen to write this book because he made a terrific discovery in northern Canada a few years back -- a key missing link between fish and mammals -- not because he can write his way out of a wet paper bag. Each chapter lunges hither and yon, little bits of distracting trivia are thrown in at random, and sequential thinking is fiercely avoided.

Typical chapter:
1. Strained humorous anecdote
2. Wannabe paradigm-shifting question, dimly related to anecdote
3. Assorted poor summaries of recent research
4. Lame pun
5. Handwaving
6. Shocking answer to question: Mammals are a lot like fish!
7. Remember that joke I told? Ha ha, right!?

Kapi says

Update 12/2009: Shubin and I have just released 40 figures in this book as a deck of PowerPoint slides with the hopes that educators across the country will be able to use them in their lectures on evolution and biology. They're available for free on the Tiktaalik website: http://tiktaalik.uchicago.edu/book-to... Hope they're useful!

Review from 12/2007: Keep an eye out for this book's release in January of 2008. I worked extensively with the author while he was writing it, and was constantly entertained by the content and the style. Shubin skillfully uncovers the evidence for evolution we carry within our bodies every day, all the while weaving in

personal anecdotes of adventures in the Arctic and self-discovery in cadaver labs.

The book caters to a broad spectrum of folks - from your average person who vaguely remembers reading a headline about some dinosaur find last week to the most dedicated science geek. If you don't come away from the book with a greater appreciation of the profound connectedness of life, at least you'll gain an arsenal of fun facts to bust out at your next cocktail party. Definitely a good read!

Trevor says

This really was a pleasure – another book recommended by Wendy – although what I liked most about it was possibly not the most obvious things about the book. From very early on I was in a bit of a world of my own and had started to wonder what to make of the fact that palaeontologists tend to make such wonderful science writers?

I've said it before, but I think Gould is a better writer than Dawkins – and that is a big statement for me, as I tend to prefer an English voice over an American one. I don't mean that to be rude, but there are many more similarities between British English and Australian English than I think there are with American English – but Gould is in a class of his own. I get Gould, I understand him much more readily than I understand other 'science writers' and I think this is because I really understand his notions of development and change. His book, Life's Grandeur (or Full House – in the States) is perhaps one of the greatest books on evolution ever written – as someone who had read many, many books on evolution before I had read Life's Grandeur I really didn't think I would ever 'fundamentally' learn anything new about evolution again – this book showed me just how limited my understanding of evolution really was. The only other book to come close to 'teaching me anew' something I thought I knew well enough was Deep Time. Although Your Inner Fish didn't fundamentally change my view on the world – I think it might if you haven't read much on evolutionary biology. Even if you have, there is much of interest here.

But I've distracted myself – the thing that had me fascinated throughout this book was the idea that it was so well written and again, written by a palaeontologist. What is it that makes them such good writers? Well, I think it might have something to do with the fact that while the rest of science is focused on specialising to a nearly absurd level – palaeontologists are required to be generalists. They need to know geology to know how old rocks are, they need to know chemistry to know how bodily processes or rock processes or uranium processes work, they need to know physics (or at least physical chemistry) to understand why fossils don't form in basalt, and they absolutely need to know a little theology because – well, because you know why. Also anatomy, DNA and physiology of many, many animals.

Someone once said all science is either physics or it is stamp collecting - I think this book goes quite some way to showing that 'stamp collecting' has very many payoffs and physics has little to be quite so smug about.

I think it might be the fact that there is so much they need to know, so many bits and pieces of knowledge – the fact that they need to be generalists – that makes them such good science writers. And this guy really is a very good science writer.

Years ago I worked with a couple of Fundamentalist Christians. When we were talking one day one of them became outraged and said to me, "Do you really think I'm related to a FISH".

I had no idea how to answer him at first. Given Christians are quite fond of fish (Peter and all that – well, and those stickers they put on the back of their cars) it took me a second to work out the problem. I had also been expecting APE – so when he got worked up over fish, well, I wasn't sure what had happened. I told him it was worse than he even imagined – I didn't want him to take it personally, but actually I thought he was related to a bacteria. He didn't seem to find this a much more comforting notion and looked at me as if I was completely insane. He wasn't the first, he won't be the last.

This book does not waste time arguing with fundies – and that has to be a good thing. Already there has been far too many trees cut down and turned to paper in a pointless attempt to achieve the impossible – that is, to convince those who have no interest in understanding that their God just didn't create the world 4,000 years ago – I've decided that it is best to just ignore these people. They have self-selected themselves to a life of ignorance and blindness, unfortunately, nothing can be done for them – and whilst this is terribly sad, it is, nonetheless, a fact of life.

What this book does do is work its way through your body and show interesting little facts about residual properties we have that are there due to our ancestry. And not just our paternal grandfather, Herbert St George, but those fish my fundamentalist friend was so outraged over. And more – down into the deep dark past when we were not even yet fish, back when we were yeast or something similar.

Because that is one of the truly fascinating insights that fundamentalist Christians will never get to grasp – the 'theory' of evolution allows us to make remarkable predictions about how we live and how we have come to be the way we are. Those predictions allow us to delve into our genetic heritage and to make sense of where we have come from – and that knowledge, that insight, is not barren (in the sense that saying 'God did it' is barren), but rather allows us ways to potentially find solutions to some of our life's ongoing ills. For me the end of this book was by far the most interesting – the part where he explains why some many of us suffer from haemorrhoids or varicose veins or hernias.

Our inner fish can sometimes seem to have had it in for us. His explanation of the evolutionary choices that are made by animals (I mean that metaphorically, obviously) particularly around whether to see in colour or in black and white, is truly fascinating. I also learnt what is happening in my ear when I drink too much alcohol and the room starts spinning – and who would have thought that your eyes would tend to move to the right due to this misperception of a spinning room? Fascinating.

In fact, the book is full of little bits of information about bodily processes I have experienced, but never really understood. And that is always a nice thing to find out. We do tend to spend quite a bit of time in our bodies and being told what they are up to can be quite something.

This book is worth reading for his discussion on embryology alone, if you know nothing about this fascinating subject you should rush out and get hold of this book. I also enjoyed it for the stuff about dolphins not being able to smell, due to their on-again / off-again relationship with the sea.

I also enjoyed him talking about the nerves in the face and how these twist and turn in ways one would never get them to do if one was 'designing' their function from scratch, so to speak. Not that this was actually what interested me, what really interested me was the discussion of the various muscles of the face that make us frown and smile or do things like that. I had a chicken/egg moment where I wondered which came first, the ability to frown to display perplexity – or was this something that was selected for so that the muscle become 'honed' over time, or generations rather?

This was a fascinating book, with lots of asides to chew over – if you are interested in how we got here and

how much of our inner fish is still obvious about us – this is a great book to read – now it is my turn to recommend it

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Katherine Furman says

This book delivered exactly what I wanted: an explanation of evolution from fish (and before really) to man in layman's terms, but not moron layman--well-spoken layman. I had so many 'ah-ha!' moments while reading this book that my head began to spin a little, but in a good way. For instance, when I used to think about evolution the hardest part for me to wrap my mind around was the slow progress of body parts morphing from one form to the next. What this book enlightened me to was that it's not just the body parts themselves that are physically changing in particular organisms, but it's the genes that change which cause the bodily structure change. It was a lot easier for me to wrap my brain around slight changes in DNA that cause physical mutations that, if useful, are passed through generations. For some reason I had always put the horse before the cart and thought of evolution in terms of the physical change before the genetic mutation. But even if your questions on evolution are more sophisticated than my unfounded misguidance, you will learn a ton from this book.
Structure by structure. Piece by piece. You can see how we evolved from our aquatic ancestors. This book was more informative and enlightening than all the anthropology classes I ever took in college. It's like getting a free minor in human evolution!

Nate says

There are lots of titles out there in American bookstores that see the need to defend the idea of evolution from the claims of creationism and intelligent design. But this book is not one of them. Shubin assumes that

you accept evolution to be a fact about the world and gets on with it. He is a fish paleontologist who teaches anatomy to first year medical students at the University of Chicago. If that sounds strange, it won't so much after you've read his book. Paleontology and comparative anatomy can tell us a lot about the human body, especially when it's backed up by molecular evidence in the DNA that we share with apes, fish, and even bacteria.

Although it's not directed at creationists, you may want to suggest this book to anyone who doubts evolution to be true yet hasn't taken the time to look into it. It still amazes me when I hear people say, "You know, after 150 years, they still haven't found one missing link." People still say this. In a way, this book is entirely about the "missing links" that some people haven't heard about.

Mohammed-Makram says

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Michael says

It was refreshing to see recent (and not so recent) discoveries about evolution of the body and brain put into an accessible book. My medium rating reflects the limited impact I got from the book due to a former career in developmental neurobiology and past reading of inspired writing on evolution from the likes of Gould, Dawkins, and Wilson. Still it's sexy and cool to hear about how structures evolved for one purpose get adapted for new functions when opportunities for expansion of life emerge. Thus it was for fish making the transition to land life as amphibians by "repurposing" bony structures of fins as forms that comprise bones of the limbs and paws/hands. That Shubin was involved in finding the rare fossils of transition forms above the Arctic circle brings some valuable authenticity to his story.

He is in his element as well when he covers the lineage of the bones of the mammalian inner ear from bones of the jaws of ancient fish. And he does a pretty good job keeping it lively when he covers basic embryology behind basic body plans, limb development, and the evolution of teeth, smell, and eyes. He has to spread himself so thin, that the molecular genetic revolution spawned by the discovery of pattern genes called Hox and how cell fates are determined gets such a light treatment that much of the wonder and magnificence of these advances don't really shine.

The hook for the general reader is an altering of your mindset as highlighted in the book's title, i.e. like Russian nesting dolls, the forms and patterns of our fish ancestors lie within us. The concept of lineage from one parent to another assures continuity even further back (he notes that he could have called the book "Your Inner Fly" given the analogous roles that Hox genes play in their development). Looking at the advances from the fish side of things, his playful perspective leads to a section near the end called "Why History Makes Us Sick":

In many ways, we humans are the fish equivalent of a hot-rod Beetle. Take the body plan of a fish, dress it up to be a mammal, tweak and twist that mammal until it walks on two legs, talks, thinks, and has superfine control of its fingers—and you have a recipe for problems. We can dress up a fish only so much without paying a price. In a perfectly designed world—one with no history—we would not have to suffer everything from hemorrhoids to cancer.

That's a pretty punchy way of looking at things, and he tries to make good on the conclusions by diverse examples of diseases and problems with our bodies that reflect on its evolutionary history. He just ran out of space in a 200 page book to do the subject justice. Somehow I miss the creative ability of Lewis Thomas to highlight the concept of mitochondria as bacterial invaders enslaved in all cells with the sentence along the lines of: "I sometimes wonder whether I am taking my mitochondia for a walk or whether they are taking me for a walk." Shubin just doesn't have such wonderful skill in writing. Few do, and many readers can still

learn much from a decent B+ lecturer.

Emma Sea says

This is a really nice introductory book on the clues that allow us to trace our decent from single-celled bacteria. It's a good companion to David Attenborough's Rise of the Animals: Triumph of the Vertebrates.

https://youtu.be/o5Z4mPQBjqA

Would suit high-school-aged readers as well as adults who haven't read on the topic before.

For followup and more in-depth reading I recommend The Vital Question: Energy, Evolution, and the Origins of Complex Life

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