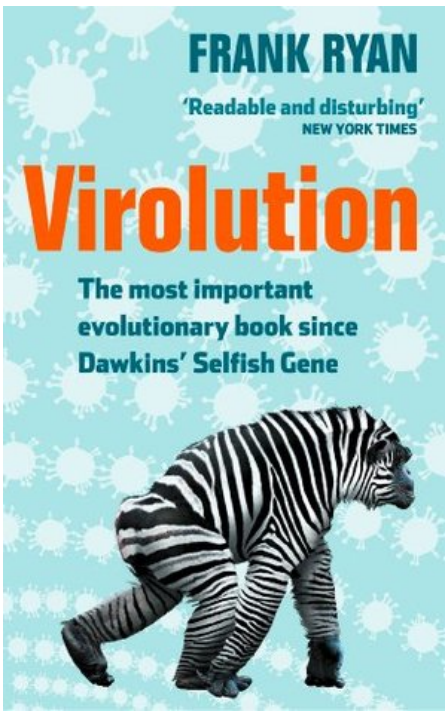

Virolution

Frank Ryan

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The extraordinary role of viruses in evolution and how this is revolutionising biology and medicine.

Darwin's theory of evolution is still the greatest breakthrough in biological science. His explanation of the role of natural selection in driving the evolution of life on earth depended on steady variation of living things over time – but he was unable to explain how this variation occurred. In the 150 years since publication of the Origin of Species, we have discovered three main sources for this variation – mutation, hybridisation and epigenetics. Then on Sunday, 12th February, 2001 the evidence for perhaps the most extraordinary cause of variation was simultaneously released by two organisations – the code for the entire human genome. Not only was the human genome unbelievably simple (it is only ten times more complicated than a bacteria), but embedded in the code were large fragments that were derived from viruses – fragments that were vital to evolution of all organisms and the evidence for a fourth and vital source of variation – viruses.

Virolution is the product of Dr Frank Ryan's decade of research at the frontiers of this new science – now called viral symbiosis – and the amazing revolution that it has had in these few years. As scientists begin to look for evidence of viral involvement in more and more processes, they have discovered that they are vital in nearly every case. And with this understanding comes the possibility of manipulating the role of the viruses to help fight a huge range of diseases.

Virolution Details

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Author	:	Frank Ryan
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From Reader Review Virolution for online ebook

Sander says

While this book certainly contains interesting information, I have so problems with it: The title and summary led me to believe that it would be about the role of viruses on evolution. However, the second half of the book is, at best, only tangentially related to viruses. Also, several times I had to feeling that the authors was building up to something which then didn't appear. In general I've missed conclusions. I appreciate that this field of research is quite new, but I'd have liked more theories or speculation, if you will, about how viruses have shaped our evolution.

Frank Ryan says

It's difficult to put a rating on a book you yourself have written. I'm hardly going to give it less than five stars. But I can't see any other way of communicating about it.

I'm the author of Virolution. All that I am trying to do is to invite readers to make contact. The ideas in Virolution have been confirmed in exciting ways. The message is important to how we see ourselves as human.

I am currently working with scientific colleagues in several countries to take the new ideas further. I have accepted the invitation of the governing boards to deliver plenary talks at the World Congress of the International Symbiosis Society in Krakow in July 2012 and to the European Society for Evolutionary Biology (PhD section) in Helsinki in September 2012. Both organisations have asked me to spend several days in addition to the talk to help young scientists to consider new lines of research in viral symbiosis.

What's happening is major. I think that Goodread readers might well be interested to hear more and I would be more than happy to help members of Goodreads to get a better understanding. It's not so complicated that ordinary readers wouldn't understand - indeed I am involved in a series of lectures to ordinary readers in the UK.

Please feel free to communicate with me through www.fprbooks.com.

Best wishes,

Frank Ryan

Ian Chadwick says

I've been reading about the ideas Ryan presents in his book for years, ever since the "junk DNA" in our genome was first announced. It never made sense, in an evolutionary perspective, that we would build a large database of useless information. There's got to be more to it.

With the discovery of mimivirus and pandoravirus, there seem to be new ideas about what viruses are what what role they play in evolution and environmental adaptation. Ryan as, I believe, the right idea: co-evolution.

Good book, well written, and a nice mix of science and anecdote. I suspect it will need a revision in the next few years to incorporate some of the more recent discoveries.

Colin says

Let's get this out of the way right now: I absolutely love franks Ryan's books, even if have minor issues with his writing style every so often. It's him I have to thank for my interest in microbiology and my possible future career. But much as I love his stuff, I also have a lot of issues with this book, and I will go through them here if you are considering checking it out and are a fan like me.

The book has a great start, and tackles some fascinating evolutionary questions about the role viruses play in our DNA, their presence in our genomes and the potential impact they have on our genetic mechanisms. If the book had just delved further into this, had gone farther like it seemed to want to I would've given this book a five. To be fair, this makes up a decent chunk. But it's not the whole book, and it doesn't go far enough, especially considering the rest. And that's where my issues lie.

Now, genetics are interesting to be sure, and epigenetics sounds like a fascinating new branch. But we were promised a book about virolution, and this chunk at comprises the latter half kills the momentum. He barely references viruses, instead talking exclusively about genetics, and this upsets me because the other stuff is so fascinating that abandoning it is a disservice. Had this been split off into its own book, both would be better for it and while both are important for genetics, the two parts are so disparate that it made it hard to force my way through it. It's not bad, it's fascinating but the virus stuff is so much more interesting that I don't see why it didn't get an entire book to itself. Epigenetics too could've gotten its own book, but the lack of mixing makes it feel jumbled and forced together and that disappoints me. This section also leans to heavily on interviews that while perhaps nessecery are put up as if they are as fascinating as Ryan's ruminations, but by simply putting them out there they can't hope to be. They are interesting, but by the end things are running out of steam and they are put in, but not given the discussion they deserve.

When the final chapter comes, it brings us back to viruses and the book gets the most interesting it's been for a while, bringing us back to the fascinating implications of viruses and even their dualality of life and unliife. It's incredible, and I love it, but it only increases the sting from realizing how little the epigenetics stuff mattered to it.

Mr.Ryan, I love your books and I will always check out your new work, but this book just tries to look at too much and it weakens both. The virus stuff makes the epigenetics stuff look boring by comparison, and it's not. It's not, it's not at all, and it just demonstrates how forced in the material is. Please consider talking more about viruses, but if you do so give them their own book and epigenetics and hybrids it's own book so as not to hurt the two. Because the virus stuff is so blisteringly beautiful and depriving it of its own depth and focus that you tend to provide is a disservice to you and both concepts. And if wasn't for the amount of viral info, this book would've scored a lot lower. And I like to think that counts for something.

Can't wait to see whats next.

Terry Erle Clayton says

If ever an author needed a good editor...

Genetic Cuckoo says

A detailed look at a wide range of ways that viruses have influences the evolution of life on Earth. Highlighting some interesting ideas regarding Epigenetics and Cancer. Certainly recommended reading for anyone studying genetics.

Nikki says

The cover made me worry that this was going to be complete pseudo-science, but it’s not bad at all. It’s a little scatterbrained — although the title is Virolution, a good chunk of it involves epigenetics, and it isn’t very clearly linked to the viral theme. The main thrust of the book is: evolution didn’t just happen by natural selection, but also through symbiosis. That symbiosis includes symbiosis with bacteria and viruses, as we co-evolved.

It’s not something I disagree with, and Ryan lays out the ideas clearly and informatively. I’m not sure I see such a huge role for viruses in evolution, at least not in the sense that he does. I don’t think it really modifies natural selection that much. Perhaps I’m just a little too familiar with stuff like Lynn Margulis’ theories about symbiosis? I’d always seen a fairly big role for symbiosis in evolution, because of course it drives co-evolution to establish stable mutualism.

Not a bad book, but perhaps a little too enthusiastic about its claims, and a little too scatterbrained about the content.

Originally reviewed for The Bibliophibian.

Eve Proofreads says

In my opinion, Frank Ryan’s ‘Virolution’ does exactly what a popular science book should. It brings original ideas to a broader audience in an accessible and largely interesting manner. Essentially, it explains the evidence for the role of viruses in the evolution of all species. As a non-scientist reading this, I cannot speak for the accuracy of the content, but I gave a brief précis of it people with varying levels of interest and expertise, and they all said something to the effect of: ‘well that sounds right: how could that not be the case?’. I think that is also an indictment of how clearly Ryan presents his ideas; their lucidity and logic render them instantly credible.

Unlike other books in the genre, Ryan innovatively chose to explain his thesis by leading the reader through his journey of discovery. The sections where he recounts direct speech in conversation with eminent colleagues were not entirely to my taste. I would have preferred a summary of their contributions. Aside from these sections, I found the scientific explanations enjoyable, though I was more engaged in the first half of the text than the second. Read more at http://eveproofreads.com/2012/12/09/v....

Samsara says

As a rule of thumb, any pop science book with too many I and me are bad. This is a epic example of a poorly, repulsive writing style. It is sad, since this book actually contains some very interesting facts which could one day totally change how we perceive virus, and us (human).

What I learnt from this book is that retrovirus could do the ultimate hacking, instead of the "normal" virus hacking of hijacking a cell or bacteria and forcing it to reproduce many copies of the virus, these retrovirus actually insert itself in the host DNA. In a sense, the retrovirus achieve immortality by inserting itself into host DNA!... And retrovirus do much more than this. It could be a weapon to wipe out the host's closest competitors. When first infected, most (up to 98% of the total population) could be wipe out (think of AIDS). But the surviving 2% manage to co-exist with this deadly virus, AND this virus could infect and kill other related specises. Again, think of AIDS, it do nothing to gorilla, but kill almost all human being infected. If we don't have the modern pharmaceutical cocktails, large portion of human could be purged!

Dennis Littrell says

Ryan, Frank Virolution (2009) *****
The starling (and scary) role played by viruses in biological evolution

A major thesis of this amazing book is that plants and animals including most significantly humans co-evolve with viruses. The term "virolution," presumably coined by Dr. Ryan, who is both a physician and an evolutionary biologist, comes from the words "virus" and "evolution" but also suggesting the word "revolution." The idea is that instead of being merely agents of pathology, viruses can also work together with their host to help it survive. Ryan gives the example of grey squirrels imported from America invading the territory of red squirrels in Britain. He writes:

"At first naturalists assumed that the grey squirrel was winning the survival battle because it was larger and more aggressive than the native counterpart, but now we know that the grey squirrel is carrying a squirrel pox virus that causes no disease symptoms in its symbiotic partner but appears to be lethal to the red squirrel." (p. 96)

In other words what we have here is war by an organism's own viral pathogens! Survival of the fittest may include carrying around lethal viruses that can wipe out your ecological competition. Ryan notes "We believe that HIV-1, the main virus of AIDS, was transferred to people from a specific group of chimpanzees. We also know that, in chimpanzees, HIV-1 grows freely and reproduces in their internal organs and tissues, but it causes no evidence of disease." (p. 86)

So what apparently happened is some bush meat eaters shot some chimps, ate and/or sold the meat and humans got the virus. Revenge of the dead chimp! Well, perhaps. But look at it this way. Imagine humans in prehistory or even humans a few centuries ago in the Congo jungle looking to take over some chimp territory. After some close contact, the virus jumps from the chimps to humans and the humans die. Survival of the fittest!

Ryan refers to this as an example of "aggressive symbiosis," and this is how it works in general: two similar species occupying similar ecological niches come into contact. Which is to prevail? One carries a virus like a loaded gun in its tissues. The virus jumps to the other species and typically is extraordinarily virulent and

kills them. Or perhaps there is a dueling of viruses, one from each species. At some point the only survivors are those with immunity to the viruses.

Ryan makes a further point with this example (quoting Max Essex on the deliberate use of a myxomatosis virus to kill rabbits in Australia): "The…virus killed…some 99.8% of the rabbits. But then two things happened. Number one - within four years, the resistant minority grew so you had a different population of disease-resistant rabbits… And number two - the myxomatosis virus that remained [as a persistent infection in the rabbits] was less virulent, so I think there is crystal-clear evidence that both the host and the virus attenuated themselves for optimal survival in that situation." Furthermore (and this brings us back to the previous point), any new rabbits brought in would be at a disadvantage because they would have no immunity to the virus and the surviving rabbits would. (pp. 87-88)

In other words looked at from an evolutionary perspective, host and virus worked together in a mutualistic symbiosis. In my mind this raises the question, what really did happen to the Neanderthal? We do know what happened to the natives of the Americas when they came into contact with the smallpox virus carried by the Europeans. Could a virus from homo sapiens have wiped out the Neanderthal, or at least helped humans become the sole hominid survivors?

In the largest sense, this idea of host and virus working together would seem to be more powerful than any kind of sharp tooth and massive claw in the struggle for survival. The old idea of survival of the fittest must now be seen in a different light. I have said for many years that "everything works toward an ecology" and "everything works toward a symbiosis," meaning that in a typical environment, if one species is able to work together with another, they may enjoy an advantage over rivals. Consequently, those species that are able to form symbiotic relationships are the ones more likely to survive. What this means for evolutionary theory, as Dr. Ryan has pointed out, is that symbiosis is a much more important part of evolutionary biology than has previously been thought. My guess is that the revolution begun by Lynn Margulis, who first saw the eukaryotic cell as a mutualistic development from parasitic relationships, will be accelerated by the work of Ryan and others to the point where the prevailing view from evolutionists will be that it is cooperation rather than competition that most characterizes fitness.

And that is what makes this book so important. It signals a great shift in our understanding of how evolution works.

But that is not all. Ryan shows that the so-called "junk DNA" in genomes is anything but. Much of it is viral ("endogenous retroviruses") and it is there as evidence that humans and pre-humans went through many periods of aggressive symbiosis including the horrid plague stage. We now see that plagues, from an evolutionary perspective, are common and part of how the evolutionary process formed us. Furthermore Ryan writes about how viral genes can help with the development of the embryo in the womb. In other words, viral DNA in part directs the protein building that makes for human beings, and indeed for many forms of life.

In the latter parts of the book Ryan explores the role of viruses in autoimmune diseases and cancer. He also considers the role of hybridization in evolutionary change and that of epigenetics. Particularly interesting is the work of Eva Jablonka and Marion J. Lamb that suggests that "new species might arise through the inheritance of acquired epigenetic changes," causing Ryan to remark, "they were resurrecting the long-discredited spectre of Lamarckian evolution." (p. 312)

The book is dense, difficult and perhaps revolutionary in scope.

--Dennis Littrell, author of “Understanding Evolution and Ourselves”

Joseph Masters says

Read this while I was back at school (in 6th form). Fascinating new scientific concept regarding the role of viruses in our evolutionary history - well worth a read for any budding biologists!

Perhaps slightly too speculative - may have been nice to see a bit more scientific 'evidence' in there. It focused just a bit too much on the author's 'journey' and was just a bit too 'story-like' for my liking. However, I guess this is a popular science book after all.

Hal Huntley says

An interesting book, although one does need at least a good course in biology plus a bit more to keep up with it. The author tries not to be overly technical and he does a pretty good job of explaining the ideas. The importance of the book is showing the research avenues for cancer and autoimmune diseases. I like how he integrated the discussions with other researchers in the field; they clarified some points and made it more interesting.

Two very fascinating discussions were of the elysia chlorotica in the first chapter and the blue-headed wrasse near the end of the book. There are indeed two very amazing and wondrous examples of life forms in the world where it would be fascinating to learn "why are they like that?".

I am a Christian who believes that God created the world and that His intelligent design made things as they are. Mr. Ryan's religion does not believe that way and so he thinks he will be able to figure out how all of evolution happened by looking at how viruses and symbiogenisis have been part of changing life forms. (That may not be entirely accurate representation of what he thinks, but it is what I've understood with my limited biological background.)

I think there is evolution of things of the same kind. Whatever his religious beliefs, that does not detract from the importance of research he discusses in the advances of medicine. Maybe because of that belief, he and those doctors and scientists researching important possible medical treatments for such debilitating diseases may possibly succeed in finding cures. It is possible that the belief that there is no God forces them to keep going way beyond what someone with that faith may just accept as "the way it is". So, from a macro-evolutionary point of view, I think he is off base; but for important current medical research it is an important book that explains some of the very complicated new directions that need to continue.

Kirsten Stewart says

This is the best popular science book that I have read since Matt Ridley's genome, without the condescending style of writing that I gave come to expect from Richard Dawkins. I have a biochemistry and microbiology background yet found the book challenging and thought-provoking and took my (often quite geeky) respect of the importance of viruses to a new level. I would recommend this to someone who already has an interest and some understanding of the subject matter. And I will be reading it again because I believe that I have more to gain from it

Louise says

A couple of things bugged me about this book.

First, the second half of the book went way off the topic I thought was its focus (the role of viruses in evolution). Fortunately, the material the later chapters covered was really interesting, despite straying from what I thought was the author's main thesis.

Second, I had a lot of problems with the style. I got pretty sick of the way that for every idea or piece of research he described, the author felt the need to start out with "so and so, a researcher at bla bla university, conducted some controversial research in whatever year... They were kind enough to speak to me by phone..." and then proceed to spend sometimes pages giving the exact transcript of his conversation with said researcher. Had this annoying waffle been cutout, the book would have been half the length and much more readable.

Nonetheless, problems with style and structure aside, the actual content of the book was very interesting and the actual research was typically described clearly, which is probably an advantage of the book being written by a clinician rather than a researcher. Overall a worthwhile read if you can put aside the problems described above.

Bethany says

It blew my mind when I first read that 8-9% of our genome consists of endogenous retroviruses, and when I read about the viral role in developing the mammalian placenta. So I looked for a book that would better explain the history of how viruses (our enemies!) have coexisted outside and inside of us. This kinda did, but it kinda didn't. The structure of the book feels somewhat...incoherent. It hops around a lot. There's not much introductory material, such as a general explanation of viral nature and how retroviruses differ from other types of viruses. Though most of the book is about symbiosis (animals co-evolving with viruses) much of the book departs from virus talk to emphasize other evolutionary forces beyond mutation such as hybridization and epigenetics. I had to look up the idea of polyploidy because it wasn't explained too well for a layperson, and if I hadn't previously looked up information about epigenetics mechanisms like methylation and histone acetylation I would have been confused there too. I think this book is probably best suited for those who have more of a medical/science background than I do. 2.5 stars.
