



Trumped up: Angry white men are believed to be the key demography that helped Donald Trump to secure the Republican nomination for this year's presidential election. If and when disaffected voters make up the majority, progress based on rational thought could be in danger. (Photo: Gage Skidmore/Wikimedia Commons.)

nationalism first, including Republican candidate for the US presidency, Donald Trump, and the leader of the French Front National (FN), Marine Le Pen. Like the Leave campaign in the UK, both are offering simplistic pseudo-solutions to the complex problems of today's world, thus offering comfort to voters who may feel left behind by the rapid changes of modern times.

If Trump were to be elected US President in November, he would likely scale down efforts to limit climate change, which he has called a hoax, setting the world on a path towards climate apocalypse. So far, though, there is very little indication of what — if any — opinions he holds on other environmental and science policies. He has failed to cover them in his speeches and policy statements. Instead, he has directed attention elsewhere, shaping the public conversation such that the bugbears of the angry, left-behind voters he addresses, including immigration, security and national pride, are already much more present in the electoral campaigns than the environmental issues that will in the long term be much more dangerous to voters' livelihoods.

While many cling to the hope that Trump cannot possibly win the election, this hardly seems certain. After all, most people in the UK also thought that the Leave campaign could not win, until it did.

Similarly, Marine Le Pen is currently on track to make it into the run-off of the presidential election next May, but considered unlikely to win. The likely scenario would be an echo of the 2002

election when her father, Jean-Marie Le Pen unexpectedly came second in the first round and thus stood in the run-off against conservative incumbent Jacques Chirac, forcing voters left of the centre to elect Chirac as the lesser evil.

In this historic comparison, however, one has to bear in mind that Marine Le Pen is much more popular and media-savvy than her father and may face a more inept opponent than he did. Moreover, the recent string of terrorist attacks on French territory has strengthened the nationalist and xenophobic mood that tends to boost FN results. Brexit could also help her cause regardless of the way it progresses. Should it work out more smoothly than expected, she will present it as an example to follow with her own referendum, which she has already promised if she becomes president. Should it be delayed or cancelled, it will fit her usual narrative of political elites acting against the interests of the majority of ordinary people.

In spite of the different political situations in these countries, the voters who backed Brexit have many things in common with those who may vote for Trump or Le Pen. Analyses suggest they feel left behind by globalisation and pine for a 1950s style conservative world order based on values like patriotism and traditional family life. Thus, some of the oldest and most stable democracies of the Western world are at risk of seeing their clocks turned back and renouncing many of the progressive developments of the last few decades, from protection of minorities and the disadvantaged through to taking care of the environment. Given the critical state of the environment, a radical U-turn in this area could well set our entire civilisation onto the path towards a decline (*Curr. Biol.* (2013) 23, R1017–R1020).

The lesson to learn — if it's not too late — is that progress guided by science and rational thinking only works in a democracy as long as the broad majority believes in it. Leaving millions of disaffected people behind will inevitably endanger progress and lead to interesting times.

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Book review

A wild life indeed

Jonathan B. Losos

Wild Life: Adventures of an Evolutionary Biologist

Robert Trivers

(2015, Plympton Press)

ISBN: 978-1938972126

In a five-year span in the early 1970s, Robert Trivers published a series of five extraordinarily influential papers [1–5] that provided the theoretical underpinning for much of modern evolutionary biology. These papers cover reciprocal altruism, parent–offspring conflict, parental investment and sexual selection (a book chapter cited more than 10,000 times!), the determinants of sex ratio, and haplodiploidy and the evolution of social organization.

Trivers, just retired from Rutgers University, has now published his memoir — *Wild Life: Adventures of an Evolutionary Biologist* — and like the man himself, it's one-of-a-kind. This is not an intellectual history in which the author walks the reader through the development of his scientific contributions — where the ideas came from, how they were developed, what kind of reception they received from the scientific community and how they eventually gained acceptance and acclaim. Nor is it one of those more personal autobiographies in which the author goes to pains to show how clever he is (and it usually is a man), how extraordinarily multi-talented and what a great life he's had. *Wild Life* tends more to the personal side of this divide, but it's not a book full of braggadocio and preening. No, this is a frank, honest and compelling view of a complicated man who's lived a fascinating life and happens to be a scientist.

That's not to say that Trivers doesn't tell us at all about his science — there are tidbits here and there, most prominently with regard to the focus of much of his recent work, the evolutionary significance of self-deception [6]. But the real focus of the book is his life story, and



Figure 1. A life extending beyond academia.

Bob Trivers and Black Panther leader Huey Newton at the christening of Trivers' twins – Newton was godfather to one of them – April, 1979. Photo by Robert Trivers.

he doesn't whitewash it: we see the many facets of Bob Trivers' life, the highs, the lows, warts and all.

The lows include at least four stays in mental institutions; six arrests ranging from assault to DUI to credit card fraud (most being undeserved and not ending in conviction); being robbed at knife-point, at machete-point, and at gun-point; being stabbed through the hand with an ice pick; numerous fistfights; falling 14 feet into a concrete pit and ten feet down stairs; and having multiple friends murdered in Jamaica. Trivers sums it up accurately, "I think it is fair to say that my decades of fieldwork...have involved more near-death experiences than that of most scientists."

Is there a theme that links his personal and professional life? Indeed there is, as he explains: "I have tried to capture this unusual dimension of my experiences where living life and studying it have merged into one another under extreme conditions—precisely those conditions expected to reveal the underlying dynamics of evolution most clearly."

Trivers doesn't dwell on his academic successes, the huge impact his work has had, the Crafoord Prize in recognition therein,

nor being named by *Time* magazine as one of the 100 great minds of the Twentieth Century. What he does tell us about are the people he met and how they influenced him. Foremost among them are William Drury, a former student of Ernst Mayr, and the great man himself. Mayr played a hugely influential role early in Trivers' career, not least of which involved appearance in a dream, just as Trivers was struggling to understand the significance of haplodiploidy in the context of parent-offspring conflict and social evolution:

"One evening I worked late into night on this problem without making any headway. When I finally retired for the night, I fell off into a restless and troubled sleep. Soon enough, Ernst Mayr appeared to me in a dream. Both of us were inside in an ant nest underground, reduced to the size of ants. As worker ants trundled by...Ernst kept pointing at the queen and saying to me, "Bob, it's the chance of the queen dying; it's the chance of the queen dying...I woke in a cold sweat...I had never known Ernst Mayr to be mistaken in real life, and had no reason to expect him to be mistaken in my dream."

It took him several weeks, but he finally realized that the queen's death would be ruinous to the colony, and thus she had the upper hand in interacting with her daughters, who could not afford to push her too far. This led to the classic paper with Hope Hare in *Science* [5], "Haplodiploidy and the evolution of the social insects."

Another major influence, of a very different sort, was the Black Panther leader Huey Newton (Figure 1). Shortly after moving to the University of California, Santa Cruz, Trivers was asked through intermediaries to hold a private tutorial on evolution with Newton, who at that time was in jail. Trivers readily agreed, and the meetings led to a mutually instructive and long-term friendship that included Trivers joining the Black Panthers, an American revolutionary group of the 1960s and 1970s dedicated to bettering the lives of

African-Americans, often through confrontational and violent means. Trivers' experiences as a Black Panthers member, ultimately leading to Newton throwing Trivers out of the party for his own good, are recounted in Chapter 11, "Hanging with Huey."

Scattered throughout the book are accounts of Trivers' interactions with other leading evolutionary biologists of the day, and he doesn't hold back, either positive or negative. For example, W.D. Hamilton had "one of the most creative minds I have ever met in biology" and George Williams "was a beautiful man, with a very simple and clear style of thinking and a warm and humble personality." On the other hand, he didn't have much good to say about Stephen Jay Gould, who "missed the larger interesting science by embracing a self-serving fantasy." Stories about Irv DeVore, Jane Goodall, Richard Dawkins and others provide insights as well. There's also the time Trivers smoked pot with reggae great Peter Tosh backstage during intermission at a Harvard concert.

And the stories aren't limited to humans (Figure 2). My favorite concerns the small blue lizard who became a drinking buddy, regularly joining Trivers on his porch in Jamaica for an afternoon constitutional, the lizard lapping the



Figure 2. Lizard man.

Anolis garmani, one of the Jamaican lizards studied by Trivers. Photo by Jonathan Losos.

sweet ginger wine Trivers set out. Trivers even records the poem he wrote to the lizard, which goes in part:

*We are just friends, man
Blue Lizard and me*

We meet in the afternoon

*You on your perch
Me in my chair*

*We are just friends, man
Afternoon friends*

*You like ants
I like sardines*

I should warn readers that some of Trivers' description of interactions with women do not comport with contemporary ideas about political correctness. On the other hand, he rails against Jamaican treatment of homosexuals and has been an outspoken proponent of gay rights on the island.

Robert Trivers is a complex individual who, as the book reveals, has lived a much more turbulent life than most scientists. Whether this tumult has been responsible for the great contributions he has made is a point for debate, though he certainly argues for the connection. Regardless, the book is aptly titled and is an entertaining and heartfelt entrée into the life of this major figure in the field.

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Q & A

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Born in Quebec and raised in Nova Scotia, Canada, John Archibald is a Professor of Biochemistry & Molecular Biology at Dalhousie University in the province's capital city of Halifax. After a Ph.D. in 2001 in the laboratory of Dalhousie molecular evolutionist W. Ford Doolittle, he carried out postdoctoral studies with Patrick Keeling at the University of British Columbia. He returned to his alma mater as a faculty member in 2003. Archibald's research has focused on the evolutionary history of eukaryotic cells and their organelles, with particular emphasis on the origin and spread of chloroplasts by endosymbiosis. He is a Senior Fellow of the Canadian Institute for Advanced Research (Integrated Microbial Biodiversity Program) and a Fellow of the American Academy of Microbiology. In 2012 he was a Visiting By-Fellow at Churchill College, University of Cambridge. He is the author of One Plus One Equals One: Symbiosis and the Evolution of Complex Life (Oxford University Press, 2014), which chronicles the transformation of endosymbiotic theory by molecular biology.

If you hadn't made it as a scientist, what would you have become? I'd like to think I could have become a full-time writer, but I doubt this would ever have occurred to me had I not been a scientist first. I hated writing as a kid and didn't really become interested in books until the age of 20 or so. My first serious goal in life had nothing to do with science. I wanted to be a professional cyclist.

Cycling? Yes, but having spent time road racing in Belgium — one of the meccas of the sport — I learned that I was nowhere near talented enough to make it as a pro. It was a bitter pill to swallow at the time, but I don't regret trying and my experiences taught me a lot about life.

Such as? The idea that you can do anything you want if you just try hard enough? Rubbish! I quit racing cold turkey in 1992 and drifted around for a



bit, struggling to figure out what to do next. I had promised my parents that I'd go back to school if and when the bike-racing gig fell flat. At the time I had no intention of keeping that promise, but in the end university seemed like the only reasonable thing to do, even if I didn't know quite where it would lead. I put my heart into it, just as I had done with cycling, and good things happened.

So what led you to biology? Other than being class clown, it was the only subject I found interesting in high school. I don't remember much, but I do recall dissecting a fetal pig and learning about heredity. Don't get me wrong, I wasn't *that* interested, but I guess I have always been curious about the world and my place in it. I also have a long-standing fascination with organized religion. As a young teenager I remember discussing the nature of the universe with a friend whose family was religious. I said "but if the universe is expanding, what is it expanding *into*?" He covered his ears and told me to shut up — he couldn't stand to even think about it! I later read Richard Dawkins' *The Blind Watchmaker*, and it was like flicking a switch. The world suddenly made a lot more sense to me. As time went on I realized that I had a passion for big questions in evolution, and became smitten with the idea that DNA could be used as a tracker of history — this led me to molecular biology and genomics. I could easily have been drawn to other 'big picture' disciplines such as cosmology were it not for the fact that I was lousy at math. I still am.

You recently published a trade book on symbiosis and cell evolution.