

Gut instinct: the miracle of the parasitic hookworm

When Jasper Lawrence heard of a radical cure for his allergies, he decided to give it a go: he went to Africa and infected himself with a blood-sucking parasite. Now he's cured, and he believes hookworm can help people with asthma, diabetes and MS. Only one problem – he's on the run from the law



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The Observer, Sunday 23 May 2010

There are hard sells and there are hard sells. "If I were a charlatan," Jasper Lawrence tells me, "I would be flogging flower essences or herbal supplements." He would not, I guess it is fair to say, be trying to market over the internet "blood-sucking parasitic worms that live in your gut for five years". And neither, he argues, would he have lately left behind his home in California, his children and his friends, and gone on the run from the American authorities in order to stay out of prison and in business (for the 180 clients who rely on him). If Jasper Lawrence is not a charlatan, then, he is at least a man on a high-risk mission.

As one of the proofs of that mission, Lawrence – an intensely articulate and bright-eyed 46-year-old – has only to point to the location of our interview. We are sitting in a cottage garden on the southern edge of Dartmoor, and in the afternoon sun the air is thick with spring pollen. In previous years, Lawrence says, he would not have been able to talk out here for five minutes without succumbing to the chronic hay fever and seasonal asthma that have afflicted him nearly all his life. The only reason he can now, he suggests, is that out here on the patio we are not alone. Also in attendance, in Lawrence's small intestine, are 50 hookworm (*Necator americanus*), which are, he believes, not only his livelihood but also his saviours.

Jasper Lawrence's journey to this curious belief began in this house – which belongs to his aunt – nearly six years ago. He was living at the time in Santa Cruz, California, his marriage was on the rocks, and he had come here on holiday with two of his five children. It had been a while since he had seen his Aunt Mary – who had informally adopted him as a teenager – and when she opened the door to him, she could not hide her shock.

Lawrence, a wiry man, had gained nearly four stone. The weight gain was a symptom of his reliance on the oral steroid Prednisone, which, at the time, he says, was his only defence against the asthma that left him constantly breathless. His inhalers did not work, he had to rest halfway up a flight of stairs, he could no longer play with his kids. By chance, his aunt had recently heard a BBC radio documentary about the possibilities of parasitic hookworm as a treatment for allergies, and she mentioned the programme to Lawrence. He subsequently spent all night trawling the internet, reading research, following links, and by the morning was convinced that there was only one way he could cure himself: he needed parasites.

The research that so excited Lawrence was a development of the so-called "hygiene hypothesis". This theory, first developed by David P Strachan in the *British Medical Journal* in 1989, suggests that many of the "modern" illnesses that have grown exponentially in industrialised western countries – allergies, asthma, type 1 diabetes, Crohn's disease, irritable bowel syndrome, multiple sclerosis and possibly rheumatoid arthritis and autism, and others – are the result of inappropriate autoimmune responses. The development of chlorinated drinking water, vaccines, antibiotics, and the sterile environment of early childhood have, the argument goes, as well as preventing infection also upset the balance of the body's internal ecology. Inflammatory responses that evolved through millions of years in the certain presence of "old friends" – parasites and bacteria – have been thrown wildly out of kilter in their absence, causing autoimmune illnesses, in which the body's immune system turns on itself, and oversensitivity to harmless antigens such as pollen, or dust, or cats, or particular food groups.

The story that most interested Lawrence was the ongoing research of Professor David Pritchard, an immunologist at Nottingham University. While in the field in Papua New Guinea in the late 1980s, Pritchard noted that patients infected with the *Necator americanus* hookworm were rarely subject to the whole range of autoimmune-related illnesses, including hay fever and asthma. In the years since, Pritchard had developed a thesis to support this observation through painstaking clinical trials (which began after he infected himself with 50 hookworm). The thesis proved that hookworm, in small numbers, seemed able to regulate inflammatory immune responses in their hosts. (Dr Rick Maizels, at Edinburgh University, has subsequently identified the process – involving the white T-cells in the blood that regulate immunity – that allowed this to happen.)

"When I read that stuff," Lawrence recalls, "everything immediately made sense to me. In our obsession with cleansing and sterility, with the eradication of parasites, we had thrown the baby out with the bath water. The central idea is that our bodies have an internal ecosystem. One of the ironies of this, to me, is that everyone is concerned about biodiversity in the outside world, and saving the rainforest, but we've also screwed up the biodiversity inside us."

And so Jasper Lawrence set out on what became a compulsive and somewhat desperate quest. Despite the fact that perhaps one billion people in the world still live with hookworm, getting infected in the developed western world is not an easy thing. The drift of our culture has long been to eradicate parasites – or "symbions", as Lawrence prefers. To begin with, he tried to get accepted as a participant on one of the various studies investigating the phenomenon. But when that proved fruitless he determined to go to Africa and become infected.

Prior to this trip, he recalls, he contacted "all the clever people I knew who worked in medicine. I sent them all the research and asked them their opinion. They all said the same thing: 'Yes, it appears safe, but I would not advise you to do this; you need to wait 20 or 30 years for all the studies to come in. For a molecule to be identified and a drug to be tested...'"

You don't have to talk to Lawrence for long to realise he is not a man who might be prepared to wait 20 or 30 years for anything. Instead, he took a plane to Cameroon.

The life cycle of *Necator americanus* is not an attractive one. Hookworm infiltrate a new human host when larvae, hatched in human excrement, penetrate the soles of the feet, enter the bloodstream, travel through the heart and lungs and are swallowed

when they are coughed up from the pharynx. Only in the small intestine do they mature into adults (just under 1cm long), where they can live an average of five years latching on to the intestinal wall, siphoning off tiny amounts of blood, and – this is the crucial part – "regulating the volume" of immune responses. They mate inside the host, with females laying up to 30,000 eggs per day, up to 50m eggs during a lifetime, which pass out in faeces. In the tropics, in places where there is an absence of both toilets and shoes, extreme cases of hookworm kill 70,000 people a year, and afflict many others with anaemia; they exacerbate malnutrition and stunted growth in children. There are crucial caveats to these scare stories, however. Hookworm cannot and do not replicate in the gut. They are not infectious. In small numbers they are considered harmless, and very easily eradicated. And their life cycle is fatally interrupted by the introduction of either shoes or plumbing.

Lawrence is a practical man, and he weighed up the risks. In Cameroon he spent a couple of weeks travelling to remote villages, discovering where the local latrines were and wandering around the area without shoes.

What did the people make of this behaviour? "Typical reactions would range from being laughed at – what's that idiot doing walking round where I take a shit? – to anger: a lot of them were convinced I was there to steal some aspect of their essence. I got shaken down a lot."

He did have doubts. When he had told friends what he was going to do, they freaked out. Because his journey coincided with him having left his wife, people thought he was having a crisis or a breakdown. "You can't help but be a bit scared," he says. "The big fear was that I'd come back with the wrong disease, river blindness or elephantiasis, or Dengue fever, or whatever. On the other hand I had seen exactly how my life had declined in the last five years with asthma. Modern medicine seemed to have nothing to offer me except palliative drugs. So really, I felt there wasn't a choice for me." Disgust was hard to overcome. "I was only able to take my shoes off the first time because I couldn't face going back and telling people I hadn't been able to do it."

When he returned to Santa Cruz from Africa, Lawrence did not know if he had come back alone. "I hadn't seen any benefits after a few weeks, though I had some symptoms," he says. "After six or eight weeks you will have embryos in your faeces, so I packaged up my samples and sent them off to the lab, and I got a negative. What I didn't realise was that because American labs never see parasites, they don't know what they are looking for."

Then, he recalls, one day in the spring he was out driving and he made what for him would ordinarily have been a huge error. "I had the window of my car rolled down," he says. "Normally if I did that at the start of spring I would spend the rest of the day blowing snot, swollen red eyes, the works. But it didn't happen."

The acid test was cats. Lawrence was so allergic to cats that if he touched one and touched his face he would get a red mark. His eyes would swell shut. "So I deliberately exposed myself to a cat, which wasn't difficult because my ex-wife had decided to favour cats over my health. So I went to her house and petted the cat. And nothing happened." In that moment, Lawrence's fate was sealed. "I had known," he says, "that if it worked the way the science suggested it would, I would have to try to get that knowledge out to the world."

Lawrence does not have a conventional background as a medical pioneer. His childhood was characterised by insecurity. His father was a "brilliant and disturbed" systems analyst in the early days of computing and his parents moved to New York

from England in 1968, in search of the summer of love. They split up and Lawrence roved around the States with his hippy mother and her sometimes violent boyfriend until, at 14, he persuaded her to let him escape to the stability of England and be taken in by his aunt. He was identified as a gifted child but he never fulfilled that potential, dropping out of his Oxbridge group in hard sciences, dabbling in drugs. At 19 he took himself back to America, got a job digging irrigation ditches, sold second-hand cars for a while, and eventually, having married, set up his own advertising agency serving Silicon Valley clients: "I was in the right place at the right time for the dotcom thing – so I made a ton of money, hired 30 people, and then lost all the money and fired them again." The experience served him well. Before he set up his business selling worms (Autoimmune Therapies) the salesman in Lawrence recognised there might be challenges. "You have to bear in mind that buying a blood-sucking intestinal parasite off a stranger without a college deg-ree over the internet is not most people's first choice of remedy. People come to us when they are desperate."

Several of the people who came originally had been involved in clinical trials with hookworm or whipworm (Lawrence prefers to call them "helminths") and were among those who had seen their symptoms – of Crohn's or hay fever or multiple sclerosis – go into lasting remission. Lawrence makes startling claims about his cohort of clients: that all 15 of the people he "treats" for multiple sclerosis are in remission, for example. The claims are impossible to verify, though there is an open and extensive online forum for users of the therapy, and the people I later speak to – a former headmaster from Nottingham, John Scott, for example, whose allergies were so bad that he was living on powdered food supplements and now reports a near normal diet – certainly support a degree of both Lawrence's evangelism and his frustration that the findings are not more widely known and studied.

"You have all this and no one is making a move on it?" he asks from time to time. "I mean, am I the only fucker on the planet reading this science? I'm not. All the drug companies know about it. But there is a huge disincentive for them to do anything about it. You can't patent a hookworm."

Lawrence is, of course, his own factory farm. "All I have to do," he says, "is recreate the tropics in a container, give the helminth something clean to migrate through, so you don't have to come anywhere near human excrement, then pick them off the surface of that, wash them repeatedly in various antimicrobials and antibiotics, and then package them up in sterile liquid and they are ready to go. They will live about a month like that. They are delivered to clients as a patch, and they go from there." He sells five years of treatment – with extensive support services – for \$3,900, a figure he justifies with the comparative cost of MS drugs for example, which might be closer to \$150,000.

For three years Lawrence's business was growing slowly and, to judge from the thousands of postings on the internet forums, with an almost universally positive response. Then, last November, the US Food and Drug Administration (FDA) knocked on his door in California. Lawrence's helminths could variously have been classified as a vaccine or a medical device (into which category fall increasingly widely used maggots and leeches) or a pharmaceutical. "To our misfortune," he says, "an unknown bureaucrat decided to classify it as a pharmaceutical."

To begin with, because there had been no complaint about Lawrence's service from any of his clients, the FDA agent suggested he only needed to bring his website into compliance. The mood, however, changed on a second visit. "The agent was clearly uncomfortable being there because he knew what was going to happen to us," Lawrence says, running through a list of possible outcomes that included, he believes,

in comparable cases, "Swat teams in the morning, detention before trial, million-dollar fines, prison sentences, blacklisting. This is the first week of November. I decided on the spot we had no option but to leave."

He and his new partner Michelle, who he had known since teenage days in Devon, made this decision in part because they feared for their liberty, but also because he felt he had a duty to his mission. "For three years I had been listening to a tiny trickle form this great torrent of human misery that is brought about by autoimmune disorders. And I believe we had a solution."

The FDA left at 5.30pm on a Friday, promising to return on the Monday. By 1am on Saturday Lawrence and Michelle were walking across the border into Mexico at Tijuana – where he knew there was no passport control – holding hands. "I had scraped \$6,000 together largely by running out on our rent, got a couple of backpacks, some sleeping bags, sensible shoes and a mosquito net. We went two days without food. Took a 36-hour bus to Guadalajara, stayed in a hotel which turned out to be a whorehouse. We eventually calmed down enough to get a plane to Cancun, and a bus to Belize, and made our way back to Britain."

He still does not know if his paranoia was justified. The FDA is continuing its investigation but will only inform him of the charge if he appears in person. He continues to move around Britain and won't disclose his address; he talks eventually of hiding out in Central America, directing his anger against the "system" which mitigates against his kind of therapy. "You know," he says, "if you watched late-night television in America and you were at all credulous you would believe that baldness, obesity and small penises could be cured with a pill. But as soon as you come up with something that does work, you are in an environment that is set up to deal with vast billion-dollar corporations with phalanxes of lawyers and researchers. Helminthic therapy could have been accommodated into the category of probiotic or supplement, like a live yogurt – it's the same principle. The organism is larger, but the numbers are way smaller."

The pioneer of this potential therapy, Professor David Pritchard, at Nottingham University, is of course more circumspect about the possibilities. After a terse exchange of emails with Lawrence a couple of years ago he cut off correspondence. Having conducted positive trials with Crohn's disease and hay fever, however, and with an NHS-funded study under way to look at MS, Pritchard has suggested he understood the motivations of Lawrence's unregulated efforts and the demand out there for the therapy. But he does not appear to approve of Lawrence's business, and did not respond to interview requests for this article. He places his faith in the conventional means of identifying – and patenting – the molecular mechanisms that produce the response and has admitted he cannot envisage patients lining up at clinics to receive patches of parasites alongside vaccinations. "The worst-case scenario would be to cause damage," he has said. "I'm nervous about deliberate infection, but I feel the hypothesis should certainly be tested."

Dr Rick Maizels at Edinburgh University is also at work on research into finding the "drugs from bugs" that will replicate the helminth effect, and other studies are ongoing across the world, in Brisbane, Denmark, Buenos Aires and elsewhere. Maizels sees no harm in Lawrence's efforts to short-circuit that lengthy and slightly unfocused process – "There seems little risk," he says, "in that we know low levels of hookworm are relatively harmless, but neither is it an open-and-shut case that the parasites will work in every or any patient." Maizels believes the hygiene hypothesis behind this effect is

gaining wider credence, and is certain that helminths have the ability to "calibrate the autoimmune response" but says that "how much they turn it up and down, and how precisely they do it, is still to be discovered. There may yet be adverse response. The fact is we do not know." That knowledge will only begin to be revealed "in a decade or more of trials".

Creating another drug, however, will not, to Jasper Lawrence's fertile mind, represent a solution. It is the live aspect of the therapy that he believes gives it its efficacy. If scientists really believe the hygiene hypothesis he argues, then what they need to be investigating is not the lucrative possibility of a patented formula, but the ways in which the public might be educated in the idea of co-evolution, our symbiotic relationship with our internal fellow travellers. Lawrence is nothing if not an idealist. "When I was 17 I read *The Selfish Gene*," he says. "I needed a framework, a philosophy to describe the universe to me. I considered religion for a while, but *The Selfish Gene* delivered. Once you realise we are vessels for our genes, then all sort of things follow." The logic of his therapy, he argues, is one of them. "If it is allowed to develop, the use of benign organisms could be as big as antibiotics. Well-baby checkups, if I succeed, will include deliberate infection with a variety of protozoa and bacteria and helminths starting at age two, because the effect of these things in a child seems profound..."

He veers quickly from that hope to the reality of his situation, however. The imagined education process will, he knows, always be dogged by the fact that our cultural norms are very anti-parasite and worm, and that is partly because in their most extreme forms they make for great television. "I understand how the world works, but I am still angry. An enlightened country could easily do a crash programme to test this, and the benefits and savings would be immense... The truth is, though, I think I am going to be discredited by the media or marginalised by the law, and the idea will be snuffed out."

It won't be for the want of trying. The previous weekend Lawrence and Michelle had been to a wedding at which the bride had recently been diagnosed as having multiple sclerosis. Inevitably, Lawrence took on the role of the Ancient Mariner, telling his story to anyone who would listen. Their wedding present was 50 hookworm. Surprisingly or not, the bride returned it unopened.

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