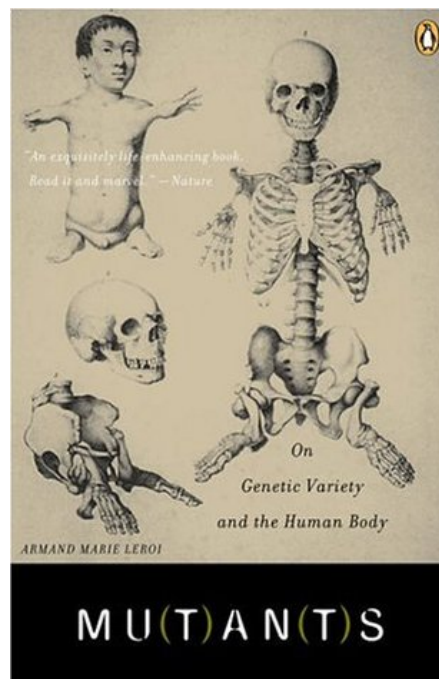




Mutants: On Genetic Variety and the Human Body

Armand Marie Leroi

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Mutants gives a brilliant narrative account of our genetic code and the captivating people whose bodies have revealed it--a French convent girl who found herself changing sex at puberty; children who, echoing Homer's Cyclops, are born with a single eye in the middle of their foreheads; a village of long-lived Croatian dwarves; one family, whose bodies were entirely covered with hair, was kept at the Burmese royal court for four generations and gave Darwin one of his keenest insights into heredity. This elegant, humane, and engaging book "captures what we know of the development of what makes us human" (**Nature**).

Visit Armand Marie Leroi on the web: <http://armandleroi.com/index.html> Stepping effortlessly from myth to cutting-edge science,

Mutants: On Genetic Variety and the Human Body Details

Date : Published January 25th 2005 by Penguin Books (first published 2003)

ISBN : 9780142004821

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Format : Paperback 448 pages

Genre : Science, Nonfiction, Biology, Health, Medicine, Medical, History



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From Reader Review Mutants: On Genetic Variety and the Human Body for online ebook

Cj says

This has to be one of the most boring books I've read in a long time. I'm fascinated by mutations, evolution, DNA etc, and even spent last semester cutting and making recombinant DNA, but this book just bored me to tears.

For people just looking for a 'freakshow' or whatever, look elsewhere, this book is not full of pictures, and isn't geared towards that type of crowd anyways, it's geared towards people (like myself) who are fascinated with how DNA works, and how errors in DNA can happen through translation and transcoding.

This book is also full of very technical terms, that not everybody is going to understand, so if you haven't take some Biology courses, you're going to need to start googling some of the terms.

Chip says

4.5. Extremely interesting look at mankind, what is "normal", and what is not. Chapters include: embryos, limbs, skeletons, growth, gender, skin and even aging (e.g., mutations resulting in accelerated aging; query whether issues related to/resulting from aging are in fact the result of mutations not breed out of us by natural selection due to them, by definition, only becoming issues after people have typically already had children). Even the epilogue, focusing on "racial" variances and beauty, is fascinating. Won (justifiably) several awards.

Andy says

This is a beautifully written elucidation on the effects of variations in the development of the human body. It is by turns technical, philosophical, moving and terrifying, given that the small variations in proteins, cells and enzymes driven by genetic variation can have such startling effects.

I came away from this book with a renewed awe about the complexity of life and the incredible details and hazards of an individual human being built successfully in the womb: the amazing thing for me is not that mutations occur and cause damaging variations, but that out of the immense complexity and the vast odds we can emerge viable, functioning organisms at all. Life is a miracle that we mostly take for granted.

Etta Mo says

i've now read this book twice and all i can say is that leroi has a rare skill; he is able to present dense scientific facts in a way that borders on poetic. his fascination with genetics is apparent in the loving detail with which he writes. i particularly loved the way he started each section with a tale from the annals of

history, giving a very personal voice to each of the "disorders" he describes.

Nathan says

Life is beautiful, but the process of creating life involves variation and some of those variations have horrified and fascinated people through history. This book alternates historical with contemporary understanding of mutants, to powerful effect. A book purely of ancient misconceptions (heh) of science gets dull quickly. A book purely of how we understand biology to work also gets dull quickly. The author's explanation of historical understanding, and the elegant science writing makes this book much easier to read than it could have been.

The science writing makes its subject fascinating: the ballet dance of cells, the chemical flows of choreography, the cause-and-effect of markers, signals, and receptors. The historical accounts of scientific investigation into mutants from 1600s-modern times uncovers our mixed feelings towards mutants, the unpleasant treatment of people by scientists/anatomists, and the giant opaque fog of ignorance through which we shine the weak lamp of science and claim understanding.

Some notes:

- * Deformity taken as mark of divine displeasure

- * "Des monstres" by Ambroise Pare in 1500s marks first earthly (non-supernatural) cause of deformity (pregnant woman looking at something ugly, theory of maternal impressions).

- * teratology = science of monsters

- * Pseudodoxia Epidemica, or enquiries into the very many received tenents and commonly presumed truths (1646) by Sir Thomas Browne, the mythbusters of his day: that the feathers of a dead kingfisher always indicate which way the wind is blowing, that the legs of badgers are shorter on one side than another, etc.

- * William Harvey in 1642 was allowed to dissect deer the king had shot, so saw progress month by month of deer embryos. "I saw long since a foetus, the magnitude of a peascod cut out of the uterus of a doe, which was complete in all its members & I showed this pretty spectacle to our late King and Queen. It did swim, trim and perfect, in such a kind of white, most transparent and crystalline moisture (as if it had been treasured up in some most clear glassie receptacle) about the bignesse of a pigeon's egge, and was invested with its proper coat." Author of this book says: "The King apparently followed Harvey's investigations with great interest, and it is a poignant thought that when Charles I was executed, England lost a monarch with a taste for experimental embryology, a thing not likely to occur again soon."

- * William Harvey's "De generatione animalium" (1651) cover showed Zeus holding egg, egg with slogan "Ex Ovo Omnia" (from the egg, all).

- * "mutations alter the meaning of genes"

- * "each new embryo has about a hundred new mutations that its parents did not have ... about four will alter the meaning of genes by changing amino acid sequence of proteins, three of which will be harmful"

* Ritta and Christina Parodi, conjoined twins. Parents prevented by Parisian authorities from exhibiting the girl(s), had to live in poverty, died at eight months. Body then heavily contested, eventually dissected in the big amphitheatre of Museum of Natural History. Made reputations.

* "Australian Aborigines inscribed a memorial to a dicephalus (two heads one body) conjoined twin on a rock that lies near what are now the outskirts of Sydney." (1300BC)

* "In a Kentish parish, loaves of bread in the shape of two women locked together side by side are distributed to the poor every Easter Monday, a tradition, it is said, that dates from around the time of the Norman conquest and that commemorates a bequest made by a pair of conjoined twins who once lived there."

* *la querelle des monstres* -- the quarrel of the monsters -- was over explanations for deformations: was it God's beautiful mysterious work, or were they accidents? "If bodies were clocks, then there seemed to be a lot of clocks around that were hardly to the Clockmaker's credit". Preformationism (egg holds entire embryo writ small, containing its own eggs which contain ...) vs epigenesis (order emerges spontaneously after fertilisation).

* Sir Thomas Browne called the womb "the obscure world"

* conjoined twins feature inverted organs in the twin: heart on the right, etc. 1 in 8500 infants are born without a twin but with their organs inverted. Most famous was "an old soldier who died at Les Invalides in 1688. Obscure in life -- just one of the thousands who, at the command of Louis XIV, had marched across Flanders, besieged Valenciennes and crossed the Rhine to chasten German princelings -- he achieved fame in his death when surgeons opened his chest and found his heart on the right. In the 1600s Parisians wrote doggerel about him; in the 1700s he featured in the *querelle des monstres* debate; in the 1800s he became an example of 'developmental arrest', the fashionable theory of the day. Were he to appear on an autopsy slab today, he would hardly be famous, but would simply be diagnosed as having a congenital disorder called 'Kartagener's syndrome'."

* Kartagener's people are sterile and with poor sense of smell: cilia and sperm are driven by molecular motors that don't function because one of their proteins is encoded by a gene that is affected in Kartagener's.

I'm not up to page 60 and I'm abandoning this note taking. The book is fascinating, the writing is gently evocative, clear, and engaging.

[update on finishing]

The book is exquisitely crafted: evocative writing and elegant construction. By alternating between the outlandish history (where it's okay to marvel at freaks, as our predecessors did), and the contemporary science (so beautifully described as to make us marvel at the details of miracle of life without feeling, as with so many biological science fact books, that there's so many details and so few principles that it's all dispassionate stamp-collecting), Leroi has created that rare thing: science writing that is both good science and good writing.

Barbara says

If you are interested in biology in general, and genetics in particular, this is a must read. The science is explained with just enough detail to make it accessible to the average reader with a modest scientific

background.

The premis of the book is that we are all mutants, to one degree or another. The relatively small percentage of genetic mutations that cause catastrophic deformities are the focus of the early part of the book. At all times, the author treats those who have genetic mutations and deformity with respect, and there is no "sensationalism" that a book like this could have so easily degenerated into. Much of the material deals with the less obvious mutations that give the human race its great variety.

Rebecca says

All my life, I have groaned inside (and sometimes outside) whenever someone spoke about the "miracle" of giving birth. *How miraculous is it*, I would ask cynically (and overly confident of my cleverness), *if flies and jellyfish do it? In fact, it's only one of the most basic functions living organisms perform, along with eating and pooping*. After reading this book, however, and learning about so many things that can happen during gestation that will render the fetus unviable, I am truly amazed, first, that organisms are born with such basic similarities to other members of their species and, second, that they are born at all. I must admit that reproduction is, indeed, miraculous. Don't get me wrong, my horror at pregnancy has not lessened, especially after reading about the coat of hair fetuses grow at five months and then shed a few weeks later. (And I thought defecating while trying to push the fetus out was horrifying!)

Read more . . .

Beth says

This is a beautifully written book that examines western societies' understanding of genetic mutation, balancing historical interpretation through a lens of faith with modern science that was interesting enough to make me angry when I got interrupted while reading. Honestly, this book is so much better than my review would have you believe.

Brittany says

Fascinating book (very science heavy) that examines things that go wrong with the human genome, often with the intent of learning how normal development occurs. Leroi discusses a huge range of genetic abnormalities in a very humane way while also providing fascinating historical accounts, at times both uplifting and depressing. Illustrations and pictures throughout were both illuminating and heartbreaking, but always serve to illustrate his material. Considering the astronomical number of ways things can go awry during development (each individual sports 300 new mutations on average, after all), it's astounding that most people function normally.

Mark says

Near the end of this book the author pulls out the quote *per molto variare la natur e bella*--Nature's beauty is its variety--and it could be a motto for the book itself. Given that most of the book is about the human body

developing dramatic abnormalities, usually during development, beauty is an odd word. I found some accounts difficult to read. But the ability for human biology to survive and sometimes prosper in so many different forms was just amazing.

The book is a discussion of various conditions that have very visible effects--dwarfism, giantism, Siamese twins, people with no hands or feet, people with hands and feet but no arms and legs, people covered with more hair than Chewbacca, and so on. Some are fatal at birth, some at a young age, but most are not. A surprising (to me) number of people founded lines still prospering today--so a Chinese sailor missing the top of his skull and clavicles founded a line that has several hundred descendants with the same symptoms.

If the existence of a whole family sharing such an unusual trait makes you wonder if scientists can do some sort of genetic analysis and figure something out about how genes interact with the body, well, answering that is the book's main concern. (Spoiler alert: Yes.) Most of the discussion is on gene expression and signalling pathways, in more detail than I expected. I'd call it roughly a Scientific American level of discussion. I'm not well qualified to judge the scientific soundness but in the small number of cases I knew anything at all Leroi seems to have done a good job presenting both conclusions and uncertainty.

The title--presumably picked by the publisher--is misleading though, as many problems are teratogenic or even nutritional and have nothing to do with genetics. (Thalidomide and iodine deficiency induced issues, for example.) I don't begrudge "Mutant" for eye catching value but throwing in "genetic" in the subhead continues the annoying trend in popular science writing of implying everything biological is genetic.

Megan says

The subject of this book cannot help but be interesting, and it has enough real science to actually feel as though you're going in depth into the topic of genetic anomalies.

At a certain point, though, the voice slipped from that of a narrator leading the reader through interesting historical individuals and their accompanying genetics differences--such as conjoined twins and gigantism--into something more akin to a curious scientist dabbling in anthropology. By the end he's wondering whether, despite the obvious and acknowledged social and culture dangers of investigating the genetics of race, it would be worth satisfying our curiosity about it after all?

I found myself feeling vaguely uncomfortable at certain points; his complete bafflement at the fact that a male pseudohermaphrodite would be attracted to women despite being raised as a girl would have been charming were it not so ignorant as to basic understandings of sexual attraction. He talked about male pattern baldness and cures for it, but never talked about female hirsutism except to mention that men don't find it attractive. He discussed red hair in the context of how attractive redheaded women are. His discussion of the history of the clitoris took place entirely out of the actual social context of the medical establishment's history of suppression and denial of women's sexuality. I don't know if I was being overly sensitive or just dealing with yet another male author unaware of his sexist world view and lack of familiarity with modern ideas about sexuality and gender. 2003 was not that long ago.

Overall, an interesting and educational book, but I don't really like the author very much.

Anita Dalton says

I am decidedly a liberal arts kind of woman. I managed to cram enough science into my head to make it (barely) through college and then promptly forgot all of it. Much science seems like magic to me, a sentiment that makes me sound really dumb, but I'm okay with that (though I do need to mention that I understand how magnets work). So it was a little bit of a shock when I realized this was not a book about carny folk and old side-show acts that featured "freaks." I was intimidated by the book and put off reading it.

When I finally picked this book up and gave it a try, it was a marvel at how accessible this book made biology and genetics to a non-science person like me. Moreover, it was an engrossing book, as well. Biology in the micro is a dramatic thing and as Leroi makes the science clear enough that even I can understand it, he shows the drama that takes place in our genetic code. I wish this book, clear and elegant, had been my college biology text. I sure would have enjoyed the class a lot more. Read my entire review [here](#).

Sharon Ryan says

I bought this book because of my interest in the old sideshow/freakshow culture and wanted to learn more about the how and why these things happen. I feel it promotes critical thinking, and now especially with wild propaganda photos running rampant on the internet and social media, and increases one's ability to distinguish between fact and undocumented, un-researched, "shocking" propaganda posts.

Lo says

Trigger warnings!

There are some things in here that aren't in your average book on genetics, so I'm going to make a little list of things to watch out for if you read this. If I've missed anything, let me know and I'll add it. The book as a whole is not offensive at all, see my note after the list.

- fetal development and ways it can go wrong... This is discussed AT LENGTH, and it's not a bad thing, but I could imagine this being a TERRIBLE read if you're pregnant or have been lately.

- discussion of research done on animals... It's not condoned by the author necessarily, but I can picture some of my vegan friends being really upset by some of the details of surgery on fetal rabbits or the many, many things done to mice to advance understanding of genetics.

- super squeamish people will find parts of this uncomfortable, and there are a few disturbing photos... the absolute minimum of this is included, it's much less sensational than any other "cabinet of curiosities" type work, and the cool things you learn make it worthwhile. It's much less intense than a trip to the Mutter museum. But there were a couple of points where even I thought "oh, god, that's... ugh," and I am not easily grossed out. When I was 12, I asked a doctor if I could have local anesthetic and watch my own wrist surgery.

- racial stuff... handled in a pretty classy way by the author, but anything that discusses the history of genetics research is going to include some uncomfortable moments. This includes brief Nazi stuff, and other historical "people did that to PEOPLE?" moments.

The most impressive thing about this book (to me, but there are many positive qualities on display) is how the author includes anything that will further the text, but nothing else. If I wrote this, there would be way

too many digressions about the life stories of the "mutants" and scientists involved and it'd be an Erik Larson style 700 pages. If most scientists wrote this, it probably wouldn't include such a diversity of research and case studies and/or be so clear and plainly but eloquently written. Rarely is opinion mentioned, which is refreshing in writing on genetics; Nazi experiments on siblings, however, are appropriately called out as horrifying. It's impressive that this can be so illuminating and provocative without offending.

As for what's great about this book, I hardly know where to begin. You'd be better served by reading it than the lengthy thoughts it inspired. If you read it on its own, you will find it fascinating if at times a little dry, and you will learn a lot about how genes make people. If, on the other hand, you have a background studying biology, evolution, genetics, biochemistry, or related fields, you will find it connects lots of dots and illuminates a big picture in a really satisfying way. Or at least, that was my experience. And if you make a habit of reading pop books about biology and science, you will probably (like most people here) be amazed how well crafted it is compared to anything like it.

Joan Concilio says

There is a lot of truly fascinating information here about embryology and genetics, and some of the examples of the "mutants" of the past are exceptionally well done. I was expecting more story and less scientific paper, which is why I'm only rating it three stars, for being a bit dense to read in some parts. (I rate myself no slouch in the science department, so if I say it's dense, I really mean it.) But I have to be clear that it's a great piece of work on this topic and well worth the effort.

Ricardo Moreno mauro says

Para todo aquel que le fascine la ciencia,,este va ser uno de sus libros favoritos. El Profesor Leroi, no lleva a entender a los mutantes, que en la historia de la medicina han sido de gran ayuda para entender a biología de los seres vivo. La gracia es que combina de una manera magistral historias humanas con explicaciones científicas al más alto nivel. Personalmente soy científico y creo que su trabajo ha sido espectacular. Tiene una facilidad envidiable de comunicar hechos complejos de una manera simple y amena. Personalmente ya he usado algunos de sus ejemplos en clases y a los estudiantes les ha fascinado. Gracias Prof Leroi por darnos este espectacular libro.

Katia says

This was a fantastic book about the neverending variations in human genetics. Although the subject matter could have come across as prurient or voyeuristic in another author's hands, Leroi treats each case with dignity and class. The actual "mutants" are not the focus of this book - instead, it is an in-depth examination of the scientific basis of each mutation and the variability that makes us all human. Highly recommended for both scientists and laymen...best science book I've read since A Short History of Nearly Everything by Bill Bryson.

J.F. Penn says

Fascinating deep dive into the genetics and environmental impacts on the human body and mind. Definitely a little too technically scientific for a non biologist as myself and I did skip over some parts, but the mutations were so interesting, I persisted. Don't read if you're pregnant or wanting to be, I think this would give some people nightmares. It does me feel that life is a miracle though, when so much can go wrong in the creation of it.

Audacia Ray says

I'm not a dumb lady. But science hasn't really ever been my thing (which is why it's funny that I teach my human sexuality course in a biology department). I've been wanting to read more science stuff but also a little apprehensive about it, so a book about genetic mutations with a cover as awesome as this one was just what I needed. There were pieces of the book that lost me a little bit in their attention to scientific detail, but overall the writing was sharp and often funny, as well as thoroughly thought provoking. The line between mutation and evolution is a thin one indeed, and that's just a piece of what made this book so intriguing. If you want to just dip into this book, you can totally read a chapter here and there. There isn't really a big thread through the whole book, so no reason to feel obligated to read cover to cover. Except that you just might want to read all of it - I did.

My absolute favorite chapter was the one about skin ("A Fragile Bubble"). Leroi teases out fascinating threads about race, culture, and the meaning of hair through this chapter. Plenty of food for thought.

The reason I didn't give the book more than three stars is that the chapter about sex made me kind of furious. There is some really beautiful writing in the chapter about intersex conditions, plus some great historical illustrations. But the underpinings of the chapter are fucked up: Leroi keeps using the word "gender" to mean the biological manifestation of reproductive organs. No. No. NO. Ugh - I really don't understand how competent (though I guess that's questionable) writers/researchers mix up sex and gender, especially in the biological context. Though there has been some (inconclusive) research about the link between gender identity and biological sex (the latter is the combination of hormones, chromosomes, and genitals - so the identified sex at birth doesn't always correspond to biology), gender is an innate sense of being, NOT explicitly biological. Point being, Leroi keeps writing "gender" when he should be using the word "sex" - and it made me want to scream. It also seems like he couldn't really flex his head around issues of queer identities and orientations, which is a pity in an otherwise pretty awesome book.

Ryan says

It took a little while to get into this book. What I thought would be the most interesting mutations - like conjoined twins - were actually the least, which is perhaps why the author chose to put that chapter first. Honestly, the most compelling studies were of things that are not as obvious mutations, like size, skin color or aging. The scientific jargon can get a little intense at times, but it eases up as the book continues, and is worth slogging through. The author treats the subject matter with true humanity - managing to really present cases and histories without seeming exploitative, and explaining not only the what, but truly the why.

I can't explain it, but somewhere along the way this book completely hooked and invaded my mind. It changed the way that I looked and thought about things around me. I'm not sure if there's a tangible explanation. This book is just elegant. It makes you realize the beauty and delicacy of the human genome.
