



The Sports Gene: Inside the Science of Extraordinary Athletic Performance

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In high school, I wondered whether the Jamaican Americans who made our track team so successful might carry some special speed gene from their tiny island. In college, I ran against Kenyans, and wondered whether endurance genes might have traveled with them from East Africa. At the same time, I began to notice that a training group on my team could consist of five men who run next to one another, stride for stride, day after day, and nonetheless turn out five entirely different runners. How could this be?

We all knew a star athlete in high school. The one who made it look so easy. He was the starting quarterback and shortstop; she was the all-state point guard and high-jumper. *Naturals*. Or were they?

The debate is as old as physical competition. Are stars like Usain Bolt, Michael Phelps, and Serena Williams genetic freaks put on Earth to dominate their respective sports? Or are they simply normal people who overcame their biological limits through sheer force of will and obsessive training?

The truth is far messier than a simple dichotomy between nature and nurture. In the decade since the sequencing of the human genome, researchers have slowly begun to uncover how the relationship between biological endowments and a competitor's training environment affects athleticism. Sports scientists have gradually entered the era of modern genetic research.

In this controversial and engaging exploration of athletic success, *Sports Illustrated* senior writer David Epstein tackles the great nature vs. nurture debate and traces how far science has come in solving this great riddle. He investigates the so-called 10,000-hour rule to uncover whether rigorous and consistent practice from a young age is the only route to athletic excellence.

Along the way, Epstein dispels many of our perceptions about why top athletes excel. He shows why some skills that we assume are innate, like the bullet-fast reactions of a baseball or cricket batter, are not, and why other characteristics that we assume are entirely voluntary, like an athlete's will to train, might in fact have important genetic components.

This subject necessarily involves digging deep into sensitive topics like race and gender. Epstein explores controversial questions such as:

Are black athletes genetically predetermined to dominate both sprinting and distance running, and are their abilities influenced by Africa's geography?

Are there genetic reasons to separate male and female athletes in competition?

Should we test the genes of young children to determine if they are destined for stardom?

Can genetic testing determine who is at risk of injury, brain damage, or even death on the field?

Through on-the-ground reporting from below the equator and above the Arctic Circle, revealing conversations with leading scientists and Olympic champions, and interviews with athletes who have rare genetic mutations or physical traits, Epstein forces us to rethink the very nature of athleticism.

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Ben says

A fascinating, though uneven, look at what we know about the nature versus nurture debate. The first half, as Kate pointed out, is really a refutation of Malcolm Gladwell's *Outliers*. Epstein first cites the 10,000 hour rule that is accepted in pop science as the amount of time to become an expert to explain how professional baseball players are able to hit a pitch that the human eye is in fact incapable of tracking across the plate (long story short, they develop a database of where balls are likely to end up based upon lots of experience). This also explains why those same baseball players cannot hit a softball pitcher because the information is totally different. Incidentally, he cites a study showing that Albert Pujols is only in the 66th percentile *of adults* in reaction time. But Epstein then goes on to show how the 10,000 hour rule is not a hard and fast rule, but rather an average, meaning some people may get to elite status after 3,000 hours; some may never get there at all.

After a pretty good chapter on male vs. female athletes, the book moves on to a discussion of training patterns and regimens. This too is quite strong, though also boils down to the similar idea that the general way people respond is an average and there is a distribution within that. Still, the idea that people start at different baselines of fitness and where they can move or improve from there is radically different is somewhat interesting.

Probably my two favorite chapters are those on what Epstein calls the "Big Bang of Body Types," and one that then applies that to the NBA. The Big Bang argument is basically tailor made for a Moneybox post. It alms about how we moved from a world where all athletes shared roughly the same height and weight characteristics to one of extreme specialization. As a result, our sprinters have gotten taller, our gymnasts shorter, our linemen heavier, and our basketball players taller. It's an interesting argument that's less actually about genetics and more really a focus on sorting and markets and the economic effect of internationalizing certain sports.

This internationalizing effect becomes pretty interesting in the NBA chapter. There Epstein discusses how even though even a "short" NBA player is still at the far right end of the human male height distribution, and that we've basically done a better job finding the tall people across the world to get them into the NBA as we tapped out our domestic supply of capable athletes at necessary heights. As an example of this phenomenon, he discusses how the average height of the European players in the NBA is actually greater than that of the American players. Also fascinating is his projected breakdown of height versus probability of playing in the NBA. If you are 6'2" you have a 5:1,000,000 chance of playing in the NBA. Growing two inches more brings the odds up to 20:1,000,000. But someone 6'10" to 7' your odds are about 3.2 percent (or 32,000:1,000,000). But the craziest thing is he estimates that 17 percent or about one out of every six of American men between the ages of 20 and 40 who are at least 7 feet tall are in the NBA right now. What's particularly crazy about that is some people get to that height due to pituitary issues that would preclude them from likely being able to play basketball (though some like Gheorge Muresan did). Sort them out and that means the odds are likely even higher. It's true what they say "you can't teach height."

Also fascinating tidbits from the NBA chapter:

* The difference between the average NBA player and the average man is greater than the difference between the average WNBA player and the average woman, likely because we haven't sorted as effectively since its not as financially remunerative to play in the WNBA.

*Wingspan in excess of height matters beyond height at a certain point. The average NBA player's ratio of wingspan to height is greater than the ratio at which concerns about Marfan's syndrome arise. The only players in 2010-11 with wingspans shorter than their heights? J.J. Redick and Yao Ming.

*Height and wingspan can predict about half of a player's likely defensive rebounds.

*Height differences in a population is 80 percent genetics, 20 percent environment.

*White players generally have a lower wingspan to height ratio than black players.

Unfortunately, a big chunk of the book is less about the genes behind sports and athletes than it is about running in particular. These parts raise some interesting discussions about the pairing of high altitude lifestyles in places like Kenya combined with a low-income lifestyle that leads to highly successful endurance athletes, as well as some stuff on the racial divide in athletics that is pretty well handled given how rarely that seems to be discussed intelligently. None of this is bad per se, but it feels one or maybe two dimensional. It's a discussion of one specific skill executed either quickly in the form of sprinting or excruciatingly over lengths of time that you'd have to be a crazy person to do in the form of distance running. There's not as much explaining what might make someone good at football or hockey (there's no refutation of the Gladwell birthdate part of *Outliers*).

Apart from one chapter that talks about sled dogs and work ethic, there's not as much talk about grit or determination, which isn't surprising given how tough a thing that is to quantify. But it does sort of play into the difficult argument that Epstein threads at the end. It's clear that some genetic things clearly do give people an athletic advantage. Yet there are plenty of people with talent who do not make it into professional athletics while less-skilled ones do. And even those that do make it have to work hard to get there. Some may not work as hard as others, but it does take work and practice and time--also more predictive time spent practicing, as experts tend to do. But how much this hard work or dedication stuff is innate versus developed also matters, since that would explain who engages in that hard training and who doesn't.

Finally, I do wish there'd been a bit more about team sports or things that go beyond just running. One way to have done this would be to discuss more about vision or hearing or other senses, particularly for basketball. You always hear a lot about a player's "court sense." Is that meaningless numbo jumbo? A code word for lots of accumulated practice time and the same memory database that explains baseball hitting? Or something else? It would be very interesting to know more about that. Still, at a certain point books like this are limited by the research they can draw on and it might just not be there. But all in all it's still worth a read.

Ward Muylaert says

Nice book, bit of a pointing out of all the ways genetics and hard work will affect how well you do at sports and how hard of a time we still have understanding any of it. On the other hand, I don't feel like I walked away from this book with any new insights on the matter, besides the knowledge that that it is the limit of our scientific understanding now. I did learn a bunch of examples though, so that's something?

Benjamin Hola says

3.5/5. Great pre-cursor to this book is the movie Gattaca.

David says

This book was fantastic. A scientific look at gene breakdown and how it affects sports and athletic ability. It was a real eye-opener to DNA and genetic testing. Terrific and intelligent discussion on human performance and the impact of genetics on sports. Highly recommend.

Wendy says

This is a fascinating book, irrespective of your interest in sports. The content - nature vs. nurture in the realm of extraordinary athletic performance - is super interesting, and the execution is admirable. Epstein is a great writer, and specifically handles issues like race with complete sangfroid so as to diffuse any potential minefields entirely without losing the ability to discuss the topic. In another writer's hands, this could have been a disaster. Super compelling. Tip of the hat to Radiolab for the recommendation!

Robert Meyro says

[(myself included) (hide spoiler)]

Chelsea K says

Absolutely one of the most interesting nonfiction books I have read in a long time. If you love sports and you love science you will probably like this. Excellently researched, excellently written.

Scot says

Most thinking and observant people, based on accumulating evidence, have moved beyond the old "Nature v. Nurture" simplistic either/or dichotomy to try to better understand the complex ways these two categories interplay and interact, both over the course of any given individual's life, and over broader ranges of time for larger groupings of related peoples, in creating just who we are and offering potential or setting limits for what we might become. David Epstein, a reporter for *Sports Illustrated*, gathers here, in a very readable, well documented, and sweeping review, an assessment as of 2013 as to how much we now know about the distinct (and interwoven) roles of genetics and cultural (as well as physical) environment in creating elite athletes. Just what is inherited and what isn't? How much can early training of the gifted make a difference? Can anyone, with enough of the right training and practice, rise to the level of a superstar? What different genetic traits or cultivated skills are most crucial across different types of sports, and how do the two

correlate in creating a champion? This philosophical question arises as well: based on what we can learn about people's genetic predispositions, how could or should this information be used?

I enjoyed this book very much, both for the wide range of different types of sports covered and for the wide range of human cultural groups visited and investigated. We learn about track stars from Jamaica, marathon runners from Kenya, cross country skiers from Finland, water polo superstars from Croatia, and many more. (We even move beyond humans for one chapter on the genetics of creating the best dog teams to win the Iditerod, which made me nostalgic for the huskie/malamute kennels my family had when I was a teen.) It is fascinating to me how complexly genetic instructions are overlaid within our DNA materials, and what just one tiny genetic mutation might achieve. What we have already learned is remarkable, but to use a metaphor Epstein himself employs, we are only beginning to scrape the tip of the iceberg. No matter what your particular special sport or sports of interest might be, a lot of useful knowledge and also some riveting tales of both personal triumph and incredible fortitude in the face of challenge can be found here. Some implications of concerns to arise in the future are suggested (some already beginning) about how much about a person's future predispositions or limitations, already encoded in their DNA, could or should be available to others (like for instance, future possible employers or insurers).

Delway Burton says

This is an important and brave book. Any discussion of human performance based on DNA is a big no-no. Its the scientific 900 pound gorilla. Politicians, celebrities, academicians, coaches, and CEO's have all fallen hard at the mere hint of it. The link of performance or worth based on our genes has a sad history stretching across the millennia as genocide and more recently eugenics. The all-wise media seems to ignore the fact that the very essence of life is our DNA and that to a great degree living things preform based on the code found there. At the human level we have the additional nature vs. nurture argument which Mr. Epstein does an excellent job of balancing. He mixes his personal experiences and travel, from the Cockpit Country of Jamaica, to the highlands of Kenya, to the arctic circle in Finland, with the hard science of human athletic performance based on known science. I was aware of some of the results he discusses, but many were a total surprise. For example, the primary characteristic of major league baseball hitters is not their reflexes or strength, but rather they possess Superman vision. He draws no conclusions other than to point out that genetics seems to curiously find an opportunity. On the nurture side he points out that the presence of a sports culture, the promise of reward, and ability to train and train very, very hard brings results. He also points out what we should all remember is that the Olympics and indeed professional sports of any kind represent the elite not the mean. This is a great read for anyone who enjoys the pageant of world sport.

Nicholas says

I found Epstein's book to be a revelation. It contains a strongly reasoned argument about the impact of genetics on sport that does not pander to tired biases. Because there is a long history of horrid biases and some of humanities greatest crimes have been justified based on the alleged genetic superiority or inferiority of certain groups, many scientists have been justifiably leary of writing about the impact of genetics on athletic achievement.

Epstein does so very well. He write from data and he avoids making generalized judgements. I'd like to use his writing style as a primer for undergrads. This is how you write from evidence and avoid writing from conclusions based on that evidence.

It is not a perfect book, but it does so many things so well that it is difficult to fault him for neglecting the impact of performance enhancing drugs on athletic results.

Overall, this is destined to be a classic popular work in sports-science. It could also be sub-titled: how Malcolm Gladwell is wrong and misleading, but Epstein even has the grace to completely show-up Gladwell's arguments without turning this into a personal fight. (Gladwell has made a lot of money off of "10000 hours of practice is all that is needed for success" arguments. Epstein shows what the study this gloss is based on really showed and pointed out its shortcomings. 10000 hours will make anyone better, but it is incontrovertible that some people can benefit more from practice than others.

In any case, if you are at all interested in sport, genetics, or popular writing from research that is done very well, Epstein's book is for you.

David Ball says

Another book I enjoyed immensely but have doubts whether I can do it justice. Epstein bucks the conventional "we're all created equal" philosophy to show that a combination of genetics and environmental factors explain why East Africans run far and West Africans run fast (it's altitude and skinny calves for the former, and Caribbean history and sickle-cell traits for the latter). His arguments are sophisticated, well researched and compelling. He completely runs circles around the pop sociologists who believe that 10,000 hours of practise is all it takes to excel at a chosen subject (10,000 hours is an average - some people need far more, some far less, and some will never achieve greatness no matter how hard they try). Along the way you also learn, perhaps unsurprisingly, that Major League Baseball players have exceptional eyesight, but cannot hit the best women's softball pitcher; testosterone makes people run faster, and can vary quite dramatically, naturally, between people of the same sex; and certain body types respond to training, others don't. Ultimately there is no magic formula for athletic prowess: it's about getting a person with the right DNA in the right sport at the right time. Quite often the very best are genetic freaks, quite literally. Fascinating stuff. I also find it encouraging that Epstein can discuss genetic differences openly and intelligently without being accused of racial profiling.

Tim says

Epstein brings a lot of data to the book, and it works to give you some idea behind where the current state of science is with respect to elite athletics. He's good with the stories around the athletes as well, though there have certainly been better writers to handle this weaving of anecdotes with science and data (Michael Lewis immediately springs to mind). It does get a bit repetitive after a while, and while I was quickly sucked in, and devoured the first half of the book, I had to work to finish it. Recommended, especially for parents of athletic kids.

Allen Adams says

<http://www.themaineedge.com/sports/th...>

For as long as competitive athletics have existed, we have sought understanding of what allows a good athlete to become great or a great athlete to become truly elite. Is greatness destined, present since birth on a genetic level? Or is it possible for an athlete to become great through hard work and a beneficial environment? The argument has gone on for years, with plenty of good reasons to come down on either side.

So – nature or nurture? Which is it?

That's the question that David Epstein attempts to address with his new book "The Sports Gene: Inside the Science of Extraordinary Athletic Performance" (Current, \$26.95). Epstein enthusiastically tackles the subject, with intensive research and a multitude of in-depth interviews. He talks to top-of-the-field scientists and elite athletes alike, looking for any and all information that might provide some insight toward answering that age-old question. Genetics? Or environment?

Perhaps unsurprisingly, it turns out to be a little bit of both.

"The Sports Gene" is filled to the brim with information from both sides of the debate; Epstein puts all of his cards on the table, to the point where he occasionally (and unapologetically) offers conflicting data within the same chapter. He has no desired endpoint; he's not trying to prove one side or the other correct. He is simply fueled by that same deep curiosity that many of us have. We just want to know: are great athletes born or made?

The amount of ground that Epstein covers is extensive. For example, he addresses the concept of the "10,000 hour rule" – the one that states that 10,000 hours of practice will allow the practitioner to master a particular skill – that was popularized by notables like Malcolm Gladwell. According to the science, it isn't necessarily that easy – it turns out that the range varies considerably on an individual basis. So while practice is certainly necessary, there's no doubt that innate talent can drastically reduce the amount needed.

On the genetics side, Epstein ventures into some controversial territory when he begins looking into genetic studies involving race and/or gender. It turns out that there are all sorts of race- and gender-based genetic truths out there, indicating inherent predispositions toward certain basic physical attributes. However, it also turns out that there is no way of knowing which of the millions upon millions of potential mutations serve as the keys to elite athletic ability. The human genome is simply far too vast to be adequately explored at such a level of specificity.

And beyond the introduction of new ideas, Epstein also offers evidence that some of the old ideas we hold true are inaccurate as well. Skills we believe to be innate – things like reaction time – turn out to have learnable components, while things we perceive to be voluntary behaviors – such as a will to win – actually have a basis in genetics.

This book is sports science at its absolute best. Epstein takes a number of significant studies and conversations with world-renowned scientists and manages to boil them down into language that is both accessible and accurate. He also interviews elite athletes and coaches and offers a real sense of the time and

devotion that it takes to become the best of the best. Both sides are brought together seamlessly, resulting in an utterly fascinating work - a thought-provoking read that manages to be densely packed with information without ever becoming overwhelming.

“The Sports Gene” doesn’t offer a definitive answer in the “nature versus nurture” debate, but it doesn’t have to. Instead, it makes an invaluable contribution to the conversation, giving readers the opportunity to inform themselves about both sides of the coin. Anyone with even the most tangential interest in the science behind sport would be hard-pressed to find a more informative and interesting book.

David says

This book is an exploration of many of the factors that influence the performance of top-flight athletes. The book starts out with a fascinating, attention-getting description of a challenge softball game. A pro softball team challenges a pro baseball team to a softball game. The young woman softball pitcher approaches the pitcher's mound, and her entire team sits down on the field! They realize that there is no possibility for any of the baseball team to hit the ball! And they are absolutely right--the opposing team never makes a hit! David Epstein explains why this happened, but while exceedingly impressive, the reason has absolutely nothing to do with genetics. It has to do with training, and the subconscious cues that ball players learn with lots of practice.

It used to be thought that fast reaction time is a useful prediction of future great baseball player. But now, it turns out, reaction time is not useful at all. The best baseball players have average reaction times. Instead, the most useful predictor is visual acuity. A good baseball (or softball player) uses his special visual acuity to view the pitcher's muscles during a wind-up, to glean a better estimate of the nature of the pitch.

This first two chapters are very reminiscent of the style of Malcolm Gladwell's *Outliers: The Story of Success*, and even mentions Gladwell's misunderstanding of the 10,000 hour "rule". But after this tangent, the book begins the real subject matter, the implications of genetics on the very best athletes. A central theme of the book is that each sport favors a different set of body attributes. Some sports favor short, stocky body types, others favor tall ones, some favor thin legs, others favor thick, muscular legs. A good sports coach will recognize when a young athlete is better suited to some other sport than the one he (or she) is presently practicing. The book is full of anecdotes where a good coach steers an athlete in some other direction, with wonderful results.

For example, a woman named Alisa Camplin who competed in gymnastics, track and field, and sailing was directed to aerial skiing. With her lack of experience, she was completely accident-prone as she broke a rib on her first jump, and hit a tree on her second. While she competed in the Olympics at Salt Lake City in 2002 she was like "a giraffe on roller skates." But she won a gold medal!

Another important theme in the book is the dichotomy between nature and nurture. Epstein shows that having the right genes is essential to becoming a top athlete in a sport. Practice and experience are essential for some sports, but not so much in others, as long as the right genes are present. The style of this book is truly wonderful. Epstein blends long, interesting anecdotes with good scientific explanations of physiology and genetics. I'm not a sports fan, but Epstein made the subject come alive for me.

Shawn says

Is elite athletic performance the result of nature (our genes) or nurture (environment and training)? Yes, according to David Epstein's *The Sports Gene*. This engaging and illuminating work is a pleasure to read. The anecdotes are amazing and humanize the scientific questions and issues raised by the role of genes in sport. Epstein does a great job of reporting the science without getting too technical, but without dumbing it down or sensationalizing it. He clears away the misunderstandings and misuse of the effect of genes. We often, he shows, misascribe the influence of genes: over-attributing them in some cases while failing to see their role where there is a significant influence.

Part of the story here is that genes play significant and important roles in athletic performance, but Epstein is careful not to overplay this. First, the target of his work here is extraordinary and elite performances. These are athletes that are already well off the curve. What he finds here isn't going to necessarily translate back to the rest of us who live in the heart of the bell curve. Second, Epstein doesn't want to disrespect or downplay the importance of the effort and hard work of these elite athletes. Yes, they often have amazing genetic gifts, but without the effort and practice, these gifts won't amount to anything. (At the same time, the book looks at the genetic contributions for effort-taking and practicing.)

Another important theme of the book is that a better understanding of the genetic roots of performance can help us improve performance. The differences in our genetic propensities (our genotype) require, in many cases, different kinds of training and practice. Our bodies react to training and practice differently and so, to understand better how to improve our skills and outcomes, we have to understand better how we respond to the environment and training. One person's strenuous cardio workout might be overkill (tragically quite literally in rare cases) for another.

Epstein doesn't tackle the issue of genetic manipulation (or gene-doping) head on, but it certainly lurks throughout the book. Over the last century, the scientific and technological influence on training for athletic performance has increased immensely. As our knowledge of the human genome and genetic technology increases, will we see this influence extend beyond training into the athlete's genetic makeup? Epstein's tentative response is that, given the state of the science, there is just too much unknown at this point to do this in any extensive or effective way.

But that knowledge is coming; it is more of a when than an if. I am fairly certain that as the knowledge increases, so will the use of this knowledge to improve performance. Epstein is agnostic, ultimately, on the wisdom or morality of doing this. That wasn't the point of the book, so it is no fault. But his work suggests much about this possible future. Personally, I think that, as with most scientific and technological advances, this will generally be a boon for human civilization and for sport. I am not utopian, though, and recognize that it will come with some harms and dangers. This is in part why it is important to get a better understanding of the science and learn more about how nature and nurture interact.

Another moral question not raised by Epstein, but suggested by his book, is how our understanding of the influence of our genes on performance affects our evaluation of doping. If some people have natural advantages conferred by their genotype, then is it really unfair for someone without those genetic advantages to use a drug to produce a similar effect? For example, Finnish athlete Eero Mäntyranta has a genetic variation that makes his red blood count as much as 65 percent higher than that of an average man (274). His body is able to move oxygen to muscles much better than most and this (all other things being equal) gives

him an advantage in endurance sport. This is quite similar to the effect of taking EPO as a performance-enhancer. If one of the goals in athletic competitions is a level starting point for athletes, then maybe we ought not ban EPO. That is, maybe, allowing EPO would level the field for athletes that do not have the benefit of genetic advantages. Is there a moral difference (putting aside for the moment the wrongness of the rule-violation) between someone who has a performance advantage from their genotype and someone who has a performance advantage from taking a substance? In more fundamentally, it begins to challenge the traditional concepts and evaluations of doping and performance enhancing.

While Epstein doesn't deal with these issues, the book is good place to learn (in a non-technical way) about the scientific foundation for answering these kinds of moral and philosophical questions. For that reason alone it worth a read. But it is also quite interesting on its own terms.

Dillon says

Super informative. Covers the characteristics that help comprise excellence in various sports and the genetic traits that give rise to those characteristics. One big revelation to me was the scientific evidence that how people respond to training is genetic - I'd seen that anecdotally but it's helpful to see that in the science. Also that thing about NBA players having disproportionately long arms, even the short ones - or Kenyans more likely to have a bone structure that is conducive to endurance running. Overall a fun read too. The book is emphatic that genes alone don't make an athlete. I found myself mulling over various moments I've witnessed or been a part of in sport/athletic training - like my struggling so hard to run a mile in eight minutes in middle school while most of my friends zoomed by, or that time an eighth grader walked into our high school weightroom and bench pressed 315 lbs, or the random super-athletes at LA fitness. This book lends some insight to the enormous variance you find in any sport.

Nicholas Sparks says

As a former college athlete, I found this investigation into what makes great athletes absolutely fascinating. David Epstein shows that there's a lot of complicated middle ground to explore when it comes to the question of nature versus nurture.

Book says

The Sports Gene: Inside the Science of Extraordinary Athletic Performance by David Epstein

"The Sports Gene" is an enjoyable book that shares the latest of modern genetic research as it relates to elite athleticism. In the never-ending quest to settle the debate of nature versus nature, David Epstein takes the readers on a journey into sports and tries to answer how much does each contribute. This fascinating 352-page book includes the following sixteen chapters: 1. Beat by an Underhand Girl: The Gene-Free Model of Expertise, 2. A Tale of Two High Jumpers: (Or: 10,000 Hours Plus or Minus 10,000 Hours), 3. Major League Vision and the Greatest Child Athlete Sample Ever: The Hardware and Software Paradigm, 4. Why Men Have Nipples, 5. The Talent of Trainability, 6. Superbaby, Bully Whippets, and the Trainability of Muscle, 7. The Big Bang of Body Types, 8. The Vitruvian NBA Player, 9. We Are All Black (Sort Of): Race

and Genetic Diversity, 10. The Warrior-Slave Theory of Jamaican Sprinting, 11. Malaria and Muscle Fibers, 12. Can Every Kalenjin Run?, 13. The World's Greatest Accidental (Altitudinous) Talent Sieve, 14. Sled Dogs, Ultrarunners, and Couch Potato Genes, 15. The Heartbreak Gene: Death, Injury, and Pain on the Field, and 16 The Gold Medal Mutation.

Positives:

1. Well-written, well-researched book. Epstein is very engaging and keeps the science at a very accessible level.
2. Fascinating topic that sports fans will enjoy. A look at elite athleticism through the eyes of science. Sports elites. I'm there!
3. Epstein does a fantastic job of skillfully handling the very sensitive topic of race and genetics. Any minor miscue and it would have derailed the book but Epstein never lets that happen and should be commended for his utmost care.
4. There are very few books on this interesting topic and this one covers multiple sports. And behind it all is the quest to find what's behind elite athleticism, "The question for scientists is: What accounts for that variance, practice, genes, or something else?"
5. You are guaranteed to learn something new. As an avid sports fan and reader, I didn't expect to learn too many new facts but I am always humbled and pleasantly surprised when I do.
6. The importance of experience in athletics. "Studies that track the eye movements of experienced performers, whether chess players, pianists, surgeons, or athletes, have found that as experts gain experience they are quicker to sift through visual information and separate the wheat from the chaff."
7. Golfers will pick up a valuable scientific tip...I'm not going to spoil it here.
8. The 10,000 hours rule in perspective. "Studies of athletes have tended to find that the top competitors require far less than 10,000 hours of deliberate practice to reach elite status. According to the scientific literature, the average sport-specific practice hours to reach the international levels in basketball, field hockey, and wrestling are closer to 4,000, 4,000, and 6,000, respectively."
9. Understanding the importance behind visual acuity and its importance in sports like baseball. "Coincidentally, or perhaps not, twenty-nine often is the age at which visual acuity starts to deteriorate and the age when hitters, as a group, begin to decline."
10. Important lessons shared, "To this day," Woods said in 2000, "my dad has never asked me to go play golf. I ask him. It's the child's desire to play that matters, not the parent's desire to have the child play."
11. Addressing the differences in gender. "Much of sexual differentiation comes down to a single gene on the Y chromosome: the SRY gene, or "sex determining region Y" gene. Insofar as there is an "athleticism gene," the SRY gene is it." Great stuff!
12. So who was the greatest high-school athlete of all time according to ESPN? Find out.
13. The impact of the Human Genome Project as it relates to sports. The naturally fit six...
14. The science behind muscle growth. "Something that myostatin does signals muscles to cease growing. They had discovered the genetic version of a muscle stop sign. In the absence of myostatin, muscle growth explodes." A lot of good information here.
15. Discusses physical traits by sport that give the athletes innate advantages over the competition. "The height of a sprinter is often critical to his best event. The world's top competitors in the 60-meter sprint are almost always shorter than those in the 100-, 200-, and 400-meter sprints, because shorter legs and lower mass are advantageous for acceleration."
16. A cool look at the NBA. My favorite team of all time, the 95-96 Chicago Bulls (Jordan, Pippen and Rodman). Some eye-opening facts concerning wingspan.
17. Scientific observations, "Low-latitude Africans and Australian Aborigines had the proportionally longest legs and shortest torsos. So this is not strictly about ethnicity so much as geography."
18. Race and genetic diversity. "Kidd's work, along with that of other geneticists, archaeologists, and paleontologists, supports the "recent African origin" model—that essentially every modern human outside of

Africa can trace his or her ancestry to a single population that resided in sub-Saharan East Africa as recently as ninety thousand years ago." Honestly, where would we be without understanding the grand theory of evolution? An excellent chapter, worth the price of the book.

19. Mind-blowing facts, " In an example particularly relevant to sports, about 10 percent of people with European ancestry have two copies of a gene variant that allows them to dope with impunity." Wow!

20. An interesting look at Jamaican sprinting and Kenyan long-term running. What's behind the success?

"Consider this: seventeen American men in history have run a marathon faster than 2:10 (or a 4:58 per mile pace); thirty-two Kalenjin men did it just in October 2011." Say what?

21. The honest limitations of the young science of genetics, "Just as it is tough to find genes for height—even though we know they exist—it is extraordinarily difficult to pin down genes for even one physiological factor involved in running, let alone all of them."

22. Is motivation genetic? Interesting.

23. Genetic diseases. "According to statistics that Maron has compiled, at least one high school, college, or pro athlete with hypertrophic cardiomyopathy (HCM) will drop dead somewhere in the United States every other week."

24. An excellent epilogue on the perfect athlete, "In reality, any case for sports expertise that leans entirely on either nature or nurture is a straw-man argument."

25. Notes and selected citations included.

Negatives:

1. Football is the most popular sports in America bar none but wasn't really given as much paper as I was hoping for; sure you get some stories about Jerome Bettis, Herschel Walker, head injuries and weight lifting...but not the treatment a sport of its magnitude would warrant.

2. The science is very basic and done so to reach a larger audience. Links or an appendix would have given curious readers more to immediately munch on.

3. At no fault of the author, the science of genetics is still too young to be able to answer the most demanding questions to a satisfactory level.

4. No formal separate bibliography...you have to surf through the notes.

5. Few links.

In summary, the perfect summer book. This was a page-turner of a book that provides us a glimpse into elite athleticism through the eyes of science. David Epstein provides sports enthusiasts with a scientific treat. One thing is perfectly clear...genetics is very complex and we are in its infancy. That being said, it's fascinating science and its increased understanding will continued to be applied to the world of sports.

Epstein provides readers with an excellent appetizer of things; if you are interested in how genetics is being applied to extraordinary athletic performance, I highly recommend this book!

Recommendations: "Outliers" by Malcom Gladwell, "Drive: The Surprising Truth about What Motivates Us" by Daniel H. Pink, "The Power of Habit" by Charles Duhigg, "Subliminal" by Leonard Mlodiknow, "Running Science" by Owen Anderson, "Your Inner Fish" by Neil Shubin, "The Making of the Fittest" by Sean B. Carroll, "The 10,000 Year Explosion" by Gregory Cochran and Henry Harpending, "Relics of Eden" by Daniel J. Fairbanks, "Why Darwin Matters" by Michael Shermer, "Only a Theory" by Kenneth R. Miller, "The Greatest Show on Earth" by Richard Dawkins and, "Why Evolution Is True" by Jerry A. Coyne.

Kelly says

Highly engaging look at how nature and nurture contribute to talent and performance in sports. Although the

general thesis - "It's both - and in complicated and unexpected ways!" - isn't exactly groundbreaking, Epstein explores how this operates in a range of different sports, from sprinting to long distance running to high jumping to skeleton to basketball. Some fascinating factoids - for example, those famous short NBA players? They have SUPER long arms. I quibble with the level of certainty implied in the discussion about why women's bodies differ from men's in ways that make us slower, worse at throwing, etc., only because I'm pretty sure that all theories about WHY humans evolved a certain way are theories, and damned difficult to prove or disprove. HOW we evolved - sure. But WHY? Not so sure.

Overall, one of the better popular science books I've read in a while, so kudos to the author!

Don't go all Jonah Lehrer on us... ;-)

Mac says

It's both nature and nurture, at least from David Epstein's point of view, and to be sure there are many other opinions expressed in this book.

Like a good writer, Epstein includes plenty of anecdotes, quotes, and stories that humanize the book and make it enjoyable to read. And he adds the occasional analogy to clarify the science ("it's both hardware and software.")

Like a good reporter, Epstein has evaluated numerous research studies to accompany his stories and support his point of view. However, for me, he over reports the studies with much too much science. Yes, it may be good to know that a particular gene is over represented in certain athletes, but I don't need to know which gene, how it was discovered, when, and by whom.

So the stories are great; the conclusions are interesting, but I'd like much of the science focused on the big picture, not the details. Then I'd more easily understand and recall the main points of the book, and I would have enjoyed it even more.

Note. Epstein seems to have successfully navigated the sports gene waters without crashing on the shore of racial outrage. I believe that's because he presents his information in a balanced, nonprejudicial way. Here (to argue against my earlier point), the sheer volume of research described is useful because that research makes it evident there are genetic physical differences among populations. So Epstein's reportorial balance and breadth of research provide insights without arousing animus (at least, I'm not aware of any).
