EXTREME ABILITIES

AMAZING HUMAN FEATS
AND THE SIMPLE SCIENCE BEHIND THEM

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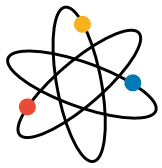


Introduction

TAKING IT *to the* MAX

Over 200 bones. About 640 muscles. Roughly 86 billion brain cells. Your body is complicated, sophisticated, and fascinating. Everything you do—from lifting a spoonful of cereal to your mouth to writing a test—requires many body parts to communicate and coordinate.

For your entire life, your body has been achieving wondrous things. You began balancing on two feet—and then maybe on two wheels. You started counting blocks—and then adding numbers. Every day, your body is using all those parts, from bones to brain, while adapting and learning new skills. And sometimes—just sometimes—the skills go beyond the norm …

In your case, maybe you can cross your eyes or curl your tongue. Maybe you're fantastic at cartwheeling or Hula-Hooping. Maybe you can easily remember tons of weird facts.

The people you'll meet in this book can do amazing things too—even more than amazing—things so extreme, in fact, they might seem impossible. How about hoisting a horse? Walking around the world? Solving tough math problems in mere seconds?

These people will astound you, and their feats may seem magical. But almost all of these amazing achievements can be explained by science—the science of the human body. As we get to know these men and women, we'll explore how their bodies and brains work together to make the seemingly impossible possible. We'll also take a peek at the risks behind these activities—and there are plenty! It's important to remember that the people in this book either were born with these traits or trained long and hard to get them. Never put yourself in danger by trying to copy what they've done.

While we'll tell you some ways you can safely improve your skills in these areas, always respect your own limits. Go slowly, listen to your body, and talk to an adult before pushing yourself. By proceeding at your personal pace, you too might someday have abilities worth bragging about.

Now let's see the crazy things people can do!

Chapter 1

MASTERS of MUSCLE

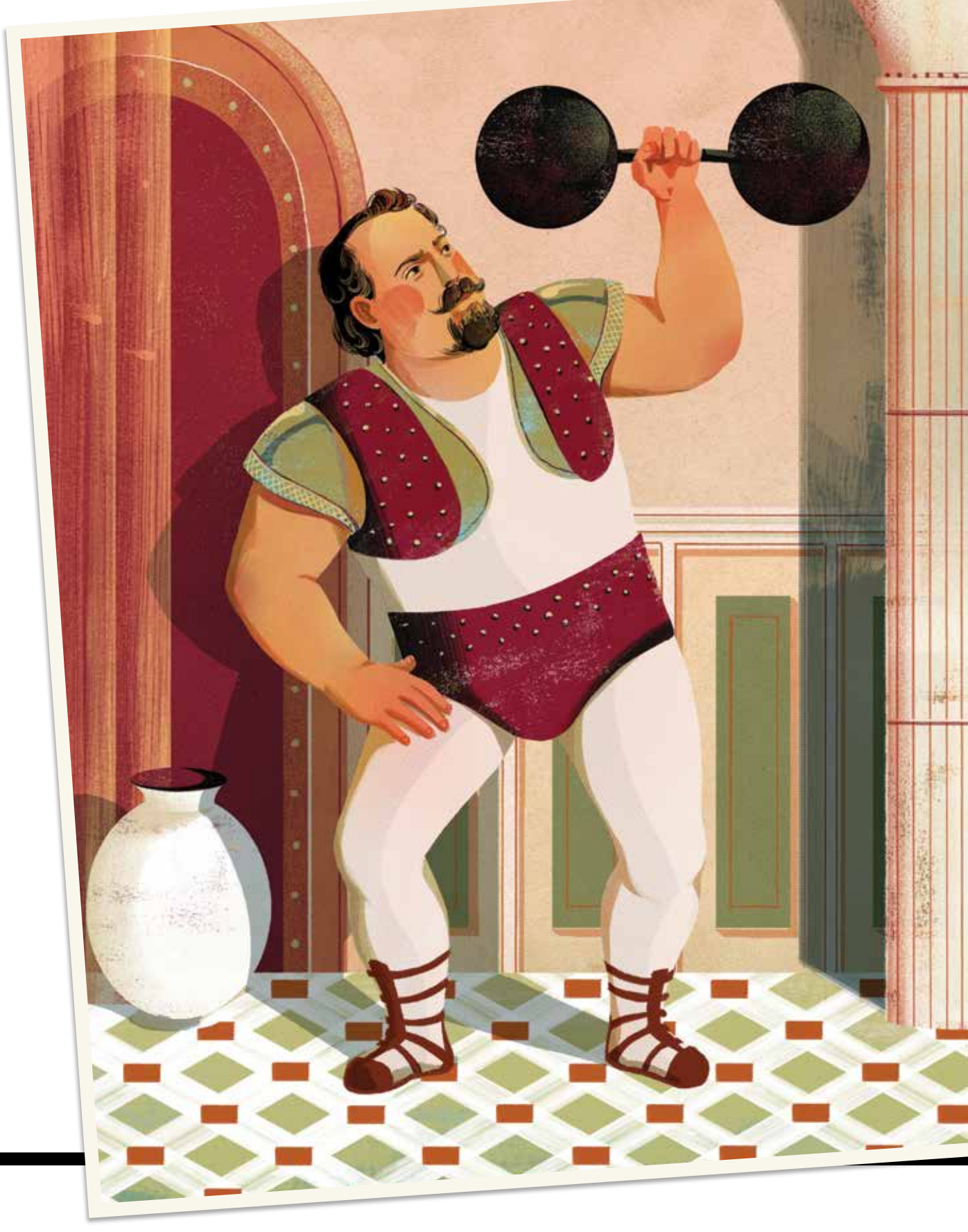
Every seat in the auditorium is filled. More people line the walls, and hundreds of others have been turned away at the door. But despite the crowd, the space is quiet.

It's May 27, 1895. The audience in Boston, Massachusetts, is frozen with anticipation. All eyes are on the man on the stage. Louis Cyr, born in Quebec, Canada, is already famous for his strength, but now he's going to prove without a doubt he's the strongest man of all.

Louis picks 18 men out of the audience, the biggest ones he can find. The men are weighed. They step together onto a platform resting on wooden supports.

Louis bends. He slips under the platform. He rests the top of his back against it. His goal: to lift all 1,967 kilograms (4,336 pounds). Yesterday's newspaper declared in huge letters: "CYR PROMISES A BIG SENSATION TOMORROW MORNING AT 10:50." But can Louis do it?

He heaves. His muscles strain. His legs push. His face turns red. The platform starts to tremble. The platform starts to lift. Finally, it clears the supports. The audience erupts in cheers.



PUMP IT!

Lifting 18 men was just one of Louis Cyr's incredible feats. As a teen, he lifted a large horse off the ground. A decade later, he resisted the pull of four horses—two hitched to each of his arms. Some people have called him "the Strongest Man Who Ever Lived," even though lots of other old-time strongmen were also impressing audiences around the world. With stage names like "the French Hercules" and "the Cannonball King," they were tons of fun to watch.

Today, people continue to astound us with seemingly superhuman strength. Follow the World's Strongest Man contest, which has been running for more than 40 years, and you'll see men hauling two refrigerators at once, flipping huge poles, throwing heavy kegs over a wall, lifting boulders, and more. And check out Canadian Kevin Fast. In 2013, he managed to hike 11 people up on his shoulders, the platform on which they were standing swaying like a raft at sea. The total weight: 777.9 kilograms (1,715 pounds). Not Louis's record, but still mighty impressive.

Women have also racked up some jaw-dropping achievements. In the 1940s—a time when few women lifted weights—Abbye "Pudgy" Stockton had no pudge on her: she was all muscle. Living in Los Angeles, California, and known as "the Queen of Muscle Beach," she could lift her husband above her head.

Then there's Varya Akulova. Born in Ukraine in 1992, Varya could carry her

father on her back by age seven and was already winning weightlifting events. She's been called "the Strongest Girl in the World," while Richard Sandrak, also born in 1992 in Ukraine, has been dubbed "the World's Strongest Boy." Richard could lift three times his own body weight when he was still a kid.

FAST FACT

Plant Power

Trees don't have muscles, but they can still hold up their limbs. That's because they grow muscle-like wood cells that help them bear the weight. The fibers in the cells on the top of the branch lie in a way that enables them to pull up the branch. The fibers in the cells on the bottom of the branch lie in a different way, pushing the branch skyward. Together, these cells keep the bough from drooping.

TEENAGER LIFTS CAR

In 2013, American sisters Haylee and Hannah Smith, aged 14 and 16, lifted a tractor off their father after it flipped over and trapped him. In 2015, 19-year-old Charlotte Heffelmire, also from the States, lifted a truck after a jack collapsed, pinning her father under it.

How did these regular folks, under extreme pressure, develop a temporary strength they never knew they had?

First, the stories are often exaggerated. When someone claims to have lifted a vehicle, they probably lifted only one corner. Three tires remained on the ground, greatly reducing the weight. (Think of your living room couch. All by yourself, you probably can't pick up the whole thing. But try lifting only one corner and you might find success.)

Second, in scary situations, epinephrine (also known as adrenaline) rushes into our blood. This hormone helps us react to "fight or flight" situations, when we have to decide whether to fight something (such as a bear) or run away. Our hearts beat faster and we breathe faster. More oxygen goes to our brains, making us more alert. Additional nutrients flood into our bloodstreams. Although our muscles don't suddenly get as strong as a superhero's, "fight or flight" effects can take the abilities we've got and give them a slightly more powerful push.

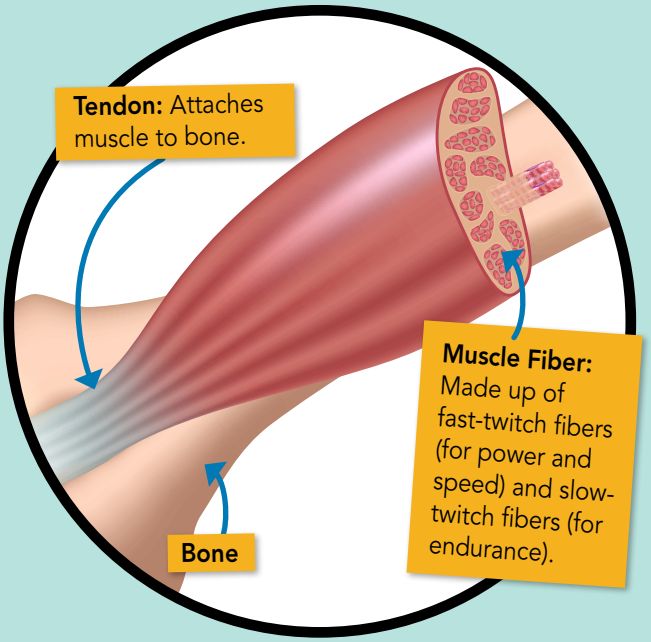
HOW IT'S DONE!

Where does strength—nearly superhuman or just plain human—come from?

For the most part, it comes from our muscles, which are activated by the brain and the rest of the central nervous system. Together, these form the neuromuscular system, which produces movement.

Our muscles are made of millions of tightly packed fibers. When you do an activity that stresses the muscle—like lifting weights—these fibers get damaged. They repair themselves while you rest, getting bigger so they can handle the stress better the next time.

Not all people who stress their muscles will get bulky and mind-blowingly strong, though. Each person has different quantities and types of fibers, and your muscles probably won't grow enough to enable you to lift a fridge.



Your muscles are made up of two types of fibers. Slow-twitch fibers are used for endurance sports, such as long-distance running. Fast-twitch fibers are powerful and used for quick, explosive movements, such as hauling a huge barbell over your head. Your body—and each muscle—has its own combination of these two types.

This means you might be born to be a sprinter, or maybe you're more of a natural at carrying a platform of people on your shoulders. Although you can train to make your slow-twitch fibers stronger and your fast-twitch fibers last longer, you pretty much keep the fibers you've got.

FAST FACT

Toss Me That Straw

Scotland's Highland Games is one of the oldest competitions for strongmen. Introduced in the year 1040, they helped the king decide which men would make the best soldiers. These days, the contestants still vie to toss stones, throw hammers, and lob bundles of straw with a pitchfork.

HAZARD ALERT!

Even if their muscles are packed with the right kind of fast-twitch fibers, people who lift too much weight too quickly may strain or tear their muscles, especially in areas like the shoulders or lower back. And we're not talking about the tiny kinds of damage that help the muscles get stronger, but the bigger kinds that mean something's gone wrong. Extreme lifters can also tear their tendons—the tissues that connect muscles to bone—thanks to lifting heavy weights up and down, up and down, again and again.

STOP THAT!

Your body is filled with chalones. No, these aren't a yummy Mexican meal. They're substances found in the cells of our tissues that regulate their growth.

In the case of our muscles, the main chalone is a protein called myostatin. As our bodies grow, our muscles grow too. Once these muscles get to their proper adult size, there's enough myostatin in them to kick into action. Its job: to tell the muscles to stop getting bigger.

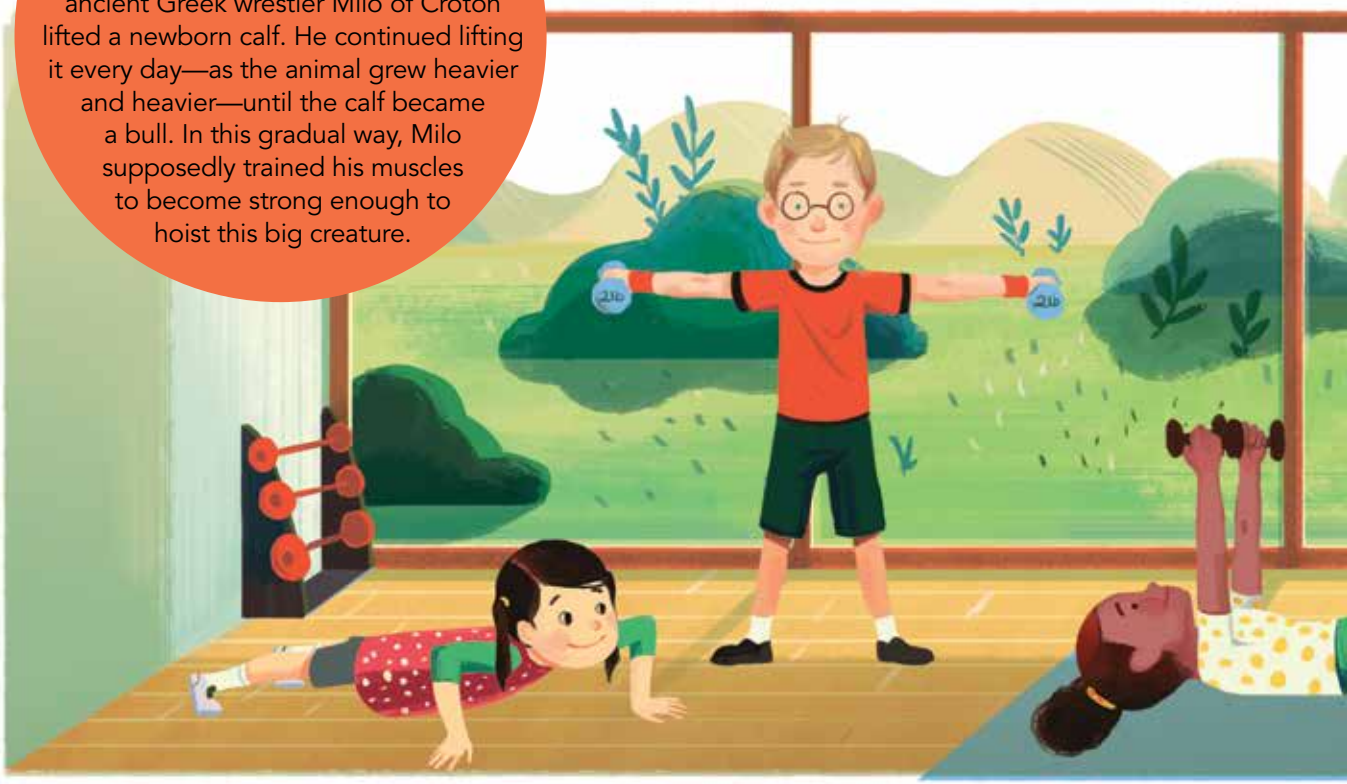
Sometimes, something turns out differently. In the early 2000s, researchers studied one child who lacked myostatin. Even as a baby, he was super muscly. By age four and a half, he could hold a 3-kilogram (6.6-pound) dumbbell in each hand and lift his arms out to the sides. This also may be how other young children can wow us with their age-defying strength. And was it Louis Cyr's secret too? No one knows.

Researchers are now working on how to use myostatin to our advantage—not necessarily to create extra-powerful humans, but to treat diseases like muscular dystrophy that waste away patients' muscles. So far, they've been able to block myostatin in mice and macaques to give them bigger and stronger muscles. But they haven't yet tried it on humans.

FAST FACT

A Beefy Way to Train

Could you lift a full-sized bull? Legend says that in the sixth century BCE, ancient Greek wrestler Milo of Croton lifted a newborn calf. He continued lifting it every day—as the animal grew heavier and heavier—until the calf became a bull. In this gradual way, Milo supposedly trained his muscles to become strong enough to hoist this big creature.



OVER TO YOU

In general, though, weight training is good for you. It can improve your health by lowering your blood pressure. You may sleep more soundly. You may have higher self-esteem as it helps you feel better about your body and its abilities. Since using muscles demands so much energy, training burns calories and helps keep your body lean. If you play other sports, it can help you perform better. And not only will your muscles get stronger, but the good strain on your skeleton helps strengthen your bones.

Even children as young as seven can use light weights. But no matter your age, make sure you get the okay from a doctor before starting. Work with a certified trainer to develop a training

program and learn proper technique—you might hurt yourself if you try to figure out how to use the equipment yourself. Have someone supervise while you work out. Remember to rest between workouts: this is when your muscles repair and get stronger.

Oh yeah, and make sure to think of a great stage name. One day, you might need it!

FAST FACT

As Strong as a Viking

Legend says that 1,000 years ago, a Viking named Orm Storolfsson hoisted the mast of his ship—that's the pole that holds up the sails—onto his shoulders and shuffled a few feet forward. In 2015, Iceland's Hafthór Júlíus Björnsson reenacted this feat, lifting a log onto his back and taking five whole steps. Orm had only managed three!