Pedal power makes perfect sense.

Celebrate the joy of cycling, and discover how bicycles have evolved over centuries to make the world a better place.

Did you know that bikes can power computers, sharpen knives, perform lab tests and light a building, as well as get a sick person to a hospital or a letter across a big city—fast?

Pedal It! celebrates the humble bicycle—from the very first boneshakers to the sleek racing bikes of today, from handlebars to spokes to gear sprockets—and shows you why and how bikes like yours can make the world a better place.

Are bicycles always made of metal?

Who invented the bicycle?

How many parts does a bicycle have?

What is a bicimaquina?

For more books in this series, visit www.OrcaFootprints.com.

Michelle Mulder bought her first bicycle at age fifteen, and cycling has been her favorite mode of transportation ever since. Friends and family in Victoria, BC, are used to her showing up at events in a helmet and a reflective vest. She is the author of Not a Chance, Out of the Box, After Peaches and several other books for young people. For more information about her books, please visit www.michellemulder.com.
Summary: Bicycles can be used for many things apart from transportation.

Bicycles have been popular for over a hundred years, but they’re certainly not fading into the sunset. Around the world, bicycles make big changes in people’s lives every single day.

Dmitry Naumov/Dreamstime.com
For Bob and Betty.
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What do you like most about riding a bicycle? Is it the freedom of flying down the road with the breeze tickling your skin? Do you notice sights and sounds you might miss if you were in a car? Do you thrill at going far and fast on your very own power?

I love cycling for all these reasons. In fact, I love it so much that I've never owned a car. I pedal to the grocery store, to visit friends, to the library and even to local schools to talk to students about my books. When my daughter was eleven months old, I put a child's seat on my bicycle, and when she got too big for that, I got a special kind of bike called a box-bike. It has a wooden box in front big enough to hold her, her best friend and a few bags of groceries.

I love cycling, and I love traveling too. Wherever I go, I notice bicycles. Sometimes they're common. Sometimes they're not, and sometimes people use them in very surprising ways. Once, in Argentina, I watched a man power a knife sharpener by pedaling a bicycle, and I began thinking about just how much a bicycle can do. This book will take you on a ride around the world, where you'll see bicycles being used in some astounding ways. Grab your helmet, hang on, and have fun!
I was fifteen when I bought my first bicycle, and I rode it for almost twenty years. One summer, I pedaled it more than six thousand kilometers (thirty-seven hundred miles) on a trip across Canada. Eventually, it looked so old that friends suggested I buy a new one. I refused until the gear system broke beyond repair. Finally, I donated the bike to Recyclistas, an organization in Victoria, British Columbia, Canada that gives new life to old bicycle parts. I like to imagine pieces of my old bicycle riding around Victoria and maybe even retracing my steps across the country.
The Walking Machine

What’s the most important part of a bicycle: the tires, the chain, the pedals or maybe the brakes? Would you believe that early ancestors of the bicycle had none of those parts?

Picture a time before airplanes and cars, a time when people walked everywhere unless they had horses to ride. In 1817, the German nobleman Baron von Drais got tired of walking and invented a “walking machine” to help him get across his gardens faster: two in-line wooden wheels, connected to a wooden frame, with a handle connected to the front wheel for steering. The rider of the “Draisienne” would swing a leg over the frame, push back with alternate feet and roll forward. Riders could go up to eight or nine miles per hour. Walking pace is about three miles per hour. This increase in speed was exciting to many Europeans, and the Draisienne became a popular fad among those who could afford one.

The Boneshaker

Unfortunately for Baron von Drais, all roads in those days were dirt, gravel or cobblestone, and his new invention didn’t work very well on bumpy surfaces. Eventually, people lost interest in the walking machine.
Within a few years, inventors began to experiment with pedals that would turn the wheels. Early versions of pedals were more like levers. In fact, the earliest pedaling systems were actually hand levers that riders used to add speed while running. No one liked the idea of taking their feet off the ground to ride.

It wasn’t until the 1860s that inventors created a popular pedal. Some people credit French carriage maker Ernest Michaux for the invention, and other people say it was Pierre Lallement, who worked for him. The pedals and cranks were attached to the axle of the front wheel, and the rider could slow down or stop by pedaling backward.

Everyone wanted to try it. Businesspeople saw an opportunity, and bicycle manufacturing took off. Many large cities built schools to teach people to ride the velocipede, which means “fast foot.” Riders needed to have good coordination, be very strong and be willing to bounce around a lot. Velocipedes could weigh as much as 68 kilograms (150 pounds)—the weight of an adult!—and riding them was exhausting. Riding on bumpy surfaces was so uncomfortable that these bicycles were often called “boneshakers.”

On My Route

Almost two hundred years after the Draisienne was invented, “push bikes” are becoming popular again, but this time it’s toddlers who are using them. Bicycles without pedals help small children learn to balance and go fast, even before they have the coordination needed for pedaling. We bought our daughter a push bike when she was two, and now her favorite pastime is soaring along the sidewalk with me running after her!
In 1871, British engineer James Starley began selling the “Ariel,” or high-wheeler, a bicycle that was less painful to ride. Made of metal and with solid rubber tires, these bicycles had a huge front wheel, which helped them go farther with each turn of the pedal. Ariels were much more comfortable and efficient to ride than boneshakers, but much harder to get onto. Here’s what you had to do.

1. Stand behind the bicycle.
2. Put your left foot onto the step just above the little wheel.
3. Use your right leg to push off along the ground, causing the bicycle to roll.
4. When you get enough momentum, straighten your left leg, jump forward into the saddle and start pedaling. Oh, and watch out if you are going down a hill, because the pedals go faster and faster as the front wheel spins faster!

These high-wheel bicycles were known as penny-farthings in England because they reminded people of two coins side by side, a small farthing and a large penny. The new high-wheelers were popular with young men, but families had to be rich to afford them. A bicycle cost as much as an average person earned in six months. Women did not ride high-wheelers very often unless they worked for a circus. Women’s clothing made riding almost impossible. (Imagine riding a bicycle while wearing rigid, tight underclothes and a skirt down to your ankles!) Also, high-wheelers were dangerous to ride. If a dog or a large rock or any unexpected object got under the front wheel, the rider would go flying off and land on his head. In fact, the expression “taking a header” was invented because of high-wheel bicycles.
THE “SAFETY” BICYCLE

How could a bicycle be efficient and safe at the same time? Cycle makers solved that problem in the 1870s, when they moved the pedals from the front wheel to the bicycle frame and attached them to chain drives. (We’ll see how this works in the next chapter.) Now a bicycle with two small wheels could go just as fast as a high-wheeler. This new kind of bicycle was known as the “safety.” John Kemp Starley, James Starley’s nephew, introduced the first successful chain-driven bicycle in England in 1885, and suddenly the high-wheelers were being called “ordinaries” because they weren’t so special anymore.

But while the safeties were safer, they were also less comfortable. Riding a safety was much bumpier than riding a high-wheeler. (Remember the boneshaker that also had a small front wheel?) Tires were still made of solid rubber, so wheels had very little cushioning against the rocks and bumps they rolled over. For a while, bicycle riders had to choose between a safe bicycle and a comfortable one. Then a man in Ireland had a great idea.

AIR IN YOUR TIRES

In 1888, John Boyd Dunlop was a veterinarian, an inventor and father of a boy who loved riding a tricycle. The jarring rides gave the boy headaches, though, and Mr. Dunlop was determined to come up with a solution. What if, instead of using solid rubber, the tires were filled with air?

Mr. Dunlop made three air-filled tires and tried them out on his son’s tricycle; soon bicycle riding changed forever. At last people could choose bicycles that were both comfortable for their bodies and safe for their heads.
With all these new changes, bicycles became more and more popular in Europe and North America. Upper-class families rode bicycles around parks or on Sunday outings, and owning a bicycle became a sign of prosperity.

As time passed, manufacturers worked hard to make bicycles less expensive. People began to use bicycles as a fast, inexpensive way to get around. Women especially liked the new bicycle designs. They were safer and easier to ride, and the chain and mudguards kept women’s skirts reasonably clean. In fact, bicycles became so popular that women’s fashion began to change. Shorter skirts and bloomers (balloony shorts worn under dresses) went from being scandalous in the early 1890s to being popular fifteen years later. By the mid-twentieth century,
North American and European women were wearing trousers, just like men. Some people believe that bicycles have done more for women’s rights than any other object in history.

Children liked bicycles too, but most families couldn’t afford them as toys. Some kids used them for work, though. (Back then, many children worked to help their families. This is still true in many countries today.) Boys as young as ten worked as messengers. Each day they put on uniforms and went to the local telegraph office. There, a man used a special machine called a telegraph to send messages to and receive messages from other telegraph offices. Whenever a message arrived, the operator printed it out and gave it to a bicycle messenger, along with an address. The messenger pedaled the message to its destination. In those days, this was the fastest, most modern way to send someone a message.
Bikes for More Kids

Did you know that many of the people who invented cars started out as bicycle mechanics? Henry Ford, for example, used much of what he knew about bikes to build his first automobiles.

When cars first appeared on the roads in the early twentieth century, they were expensive and exciting. Not only were they faster than bicycles, but the drivers never had to worry about their legs getting tired. As more people bought cars, fewer adults rode bicycles.

More and more children began to ride, though. Basic bicycle design hasn’t changed in one hundred years, but there have been many interesting trends in bicycle styles. In the 1930s, manufacturers added big front lights and shiny parts to make bicycles look like motorcycles. In the 1950s, kids’ bikes looked sleeker, like jet planes. And they must have felt about as heavy as a jet plane too. Some of the bicycles weighed about 29 kilograms (65 pounds)—almost as much as their riders!

Bicycles can now be found around the world, and in many countries they’re the most common form of transportation. They’re cheaper than cars, and lots of people depend on them to get to work, go to school and even to power things like laptops and water filters.

One of the best things about bicycles is how simple they are. And simple technology can make a huge difference to people around the world. But how does it all work?

BIKE FACTS: In the 1960s, toy stores sold battery-powered toys that looked and sounded like motorcycle engines. The idea was to clamp the “motor” between the pedals of a bicycle. With a turn of a key, the bicycle could now roar like a motorbike while the child pedaled down the street!
As automobiles gained popularity, bicycles became cheaper, and more kids got them. Many of those kids dreamed of owning a car someday. These kids have turned their bicycles into something similar to automobiles, just for fun. LORNE SHIELDS COLLECTION

On My Route

These days, a child can ride on an adult’s bicycle in many ways: in a seat near the handlebars, at the back or in a trailer behind or even on the side. I liked having my daughter up front, because I could watch her excitement about everything she saw. And people got excited when they spotted us, too! Almost every time we rode together, someone stopped to ask about the seat. And even when we weren’t with our bike, passersby recognized us as “that cycling family.” Does cycling build a sense of community? You bet!

My daughter enjoys a front-seat view on our bike rides.

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Kids today inhabit a world full of complex—and often mystifying—environmental issues. The Footprints series aims to help kids answer their questions about the state of the natural world with well-researched, simply-expressed information and powerful images. With topics such as food production, water, cycling and sustainable energy, these books will inspire kids to take action.

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