

SPIES



TWO WORKING AS ONE

"We have just one more investigation," says Peppi. "It centers on two systems that work so closely together we've got to explore them at once. We're going to look at muscles and bones—the musculoskeletal system."

"If we're going to explore this system in any detail, we're in for a long trip," says Bollo, taking a look at the anatomy guide. "It says here that adults have 206 different bones and more than 650 muscles!"

"Don't worry, we're not going to visit every bone and muscle in the body. We'll just hit some highlights. What we see will give us a good idea of how the human musculoskeletal system works."

The Skeleton: Holding It All Together

"Before we begin our adventure inside the human body, let's take a moment to get the big picture," Peppi says. She reaches into her briefcase. "To help us out, we're going to

use these special photographs, called X-rays. Doctors on planet Earth use X-rays to see what's going on inside the human body. Usually, X-rays are used to explore a single bone or joint—maybe a broken hip. But here's one that shows



Peppi introduces Bollo to the human musculoskeletal system.

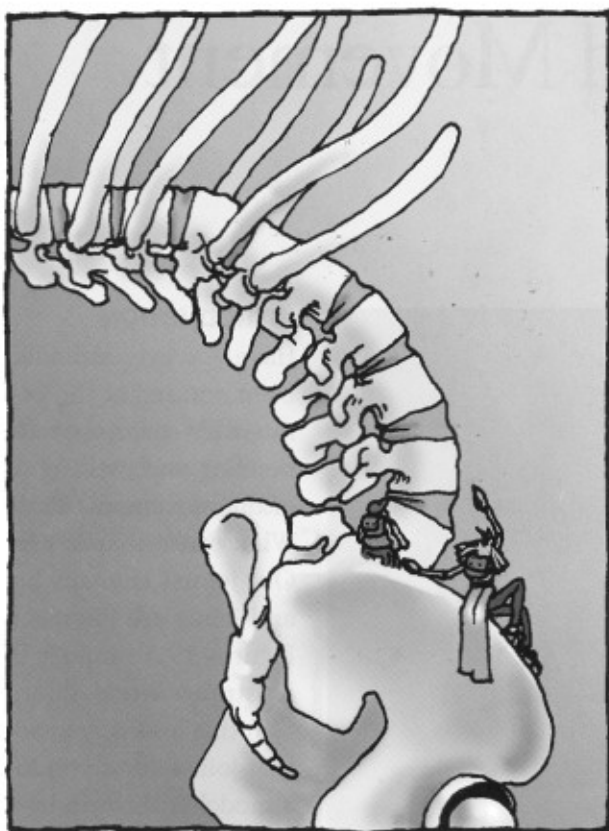
us the entire human skeleton.”

“If we didn’t already know what humans looked like, this X-ray of the skeleton would be a big help,” says Bollo. “A head, two arms, two legs—it’s all there.”

“Right. And each bone has a special purpose. The tiniest bones are in the middle ear—they are less than 1 centimeter long. But look at the bone in the upper leg. It’s the longest bone in the human body. It’s the femur, or thigh-bone. In a woman of average height, the femur is usually about 45 centimeters long. The femur is also very strong.”

“How strong?” asks Bollo.

“Bone can be as strong as steel in resisting tension,” says Peppi. “And the comparison with steel is useful in another way. That’s because the skeleton is the body’s support system—much like steel girders are the support system for a building.”



Bollo is convinced that the spine is one of the wonders of the human body. Do you think he is right?

“The backbone looks different from the bones in the legs or arms,” says Bollo, looking closer. “It’s divided into bumps and spaces.”

“Yes. The bones of the arms and legs are straight. Although they are quite strong, they don’t bend. That’s one reason that bone can fracture. But the spine—

the backbone—is a series of 24 small bones, called vertebrae. Because of the discs, which create cartilaginous joints between the vertebrae, the spine is flexible. Humans can ‘bend over backwards,’ as well touch their toes and perform acrobatics. The discs also act like shock absorbers.”

“Interesting!” says Bollo. “I’m beginning to see why humans can be such great athletes. They can jump and withstand pressure. Their bones are strong, yet the joints make them flexible. Anything else I need to know?”

“One more thing. The bones not only support the body but also protect it. Look, for example, at the skull. Pretty solid, right? That’s so it can protect one of the human’s most valuable organs—the brain.”

“And look at the ribs—they surround the heart and lungs, kind of like a cage,” says Bollo.

“You’ve got it,” replies Peppi. “Now that we understand the framework, let’s move inside.”

“Ready when you are,” Bollo replies. “I can’t wait to see how many of those muscles and joints I can check out for myself.” □