Know-it-All!

THE HUMAN BRAIN IN 30 SECONDS

30 AMAZING TOPICS FOR BRILLIANT BRAINS EXPLAINED IN HALF A MINUTE

CLIVE GIFFORD
ILLUSTRATED BY WESLEY ROBBINS

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Contents

About this book

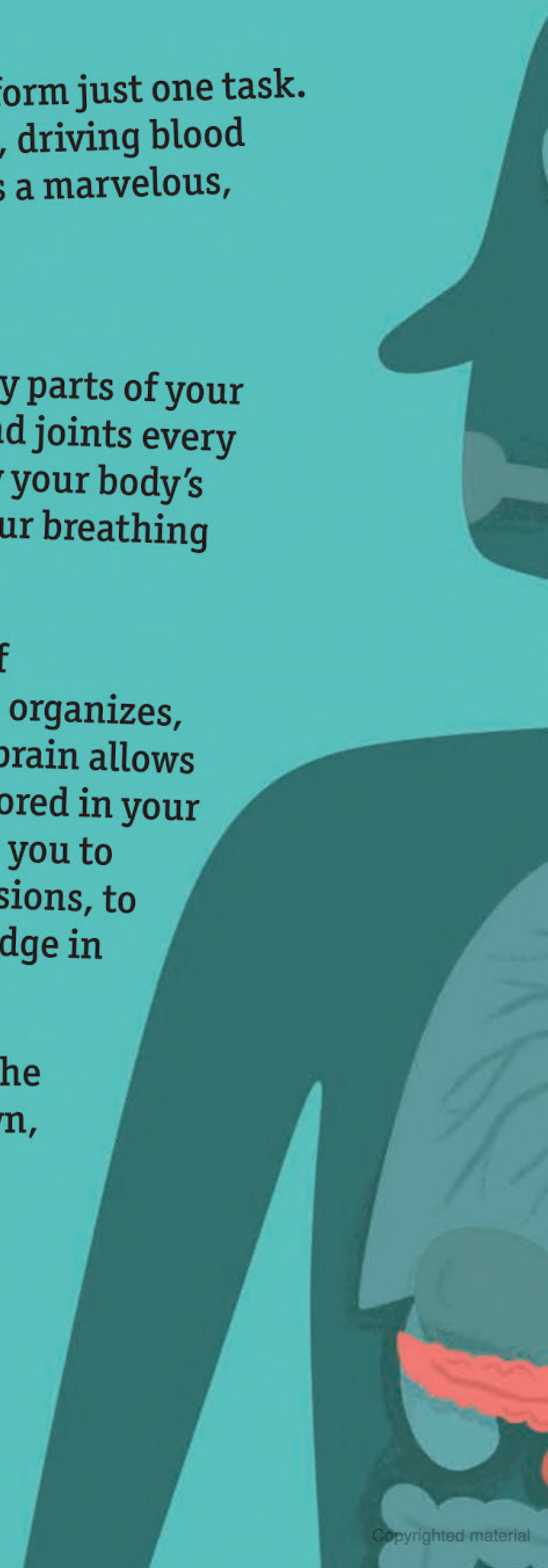
... in 60 seconds

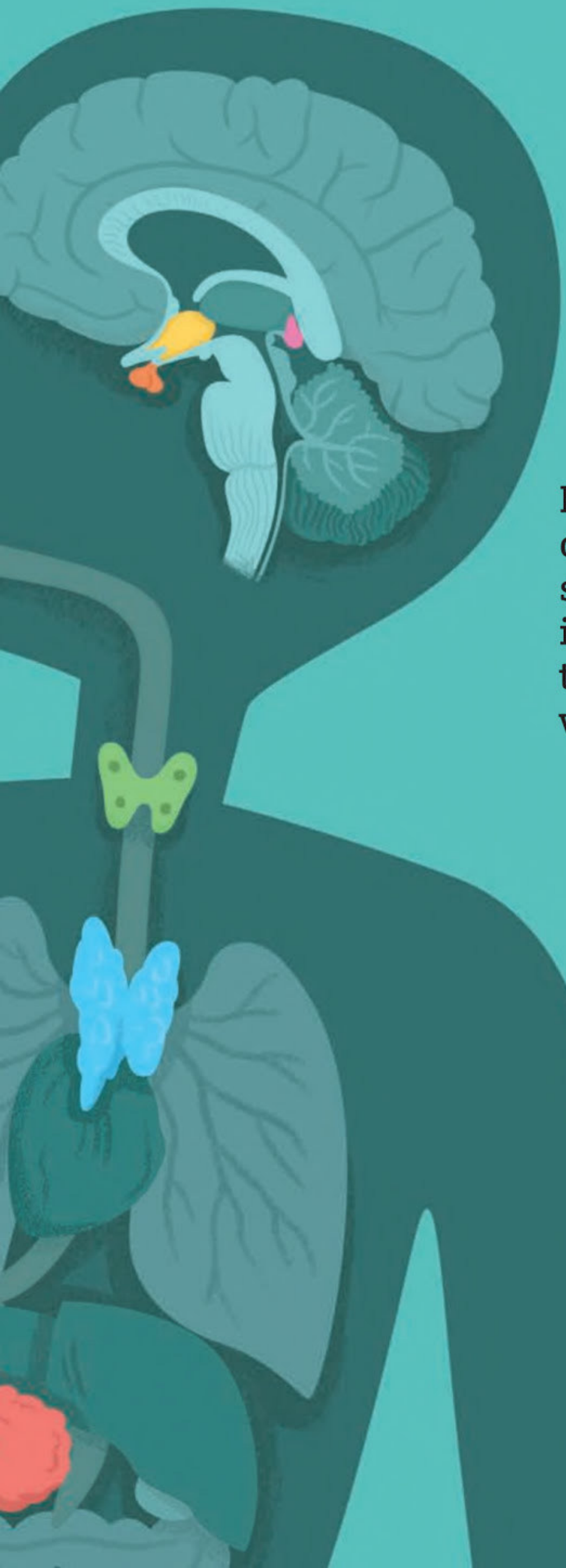
Most parts of your body are designed to perform just one task. For example, your heart is a powerful pump, driving blood around your body. Your brain, in contrast, is a marvelous, multitasking miracle!

For starters, it controls almost all of the many parts of your body, sending out instructions to muscles and joints every time you move. It monitors and controls how your body's systems are working, such as the speed of your breathing and your heart rate.

Your brain also deals with the constant flood of information sent to it by your senses. It filters, organizes, and acts on the signals it receives. Your clever brain allows you to remember situations, facts, and skills stored in your memory—months or years later. It also enables you to react quickly to events, to think and make decisions, to plan ahead, solve problems, and gather knowledge in many different ways.

And it does all of these things almost all of the time. Your busy, busy brain barely slows down, even when you're asleep. Whew!





This book whisks you and your brain through a range of mind-blowing topics. It looks at what actually happens inside your head, how the brain works, how it deals with and stores information, and how it helps make you who you are.

Each topic has a page to read as fast or slow as you like, and a speedy summary to give you the vital facts in seconds. The illustrations give you the information in an easy-to-grasp, visual way.

Activities and experiments throughout the book encourage you to play brain detective, and investigate the object that Nobel Prize-winning scientist David H. Hubel described as "like nothing else we know of in the universe."

Meet your brain

Everything you do, think, and feel, and all your body parts that keep you alive are controlled by something that looks a little like a whitish-gray cauliflower. Your brain weighs approximately 3 lb (1.4 kg), about three times the weight of a chimpanzee's brain and over five times the weight of a lion's. It may not look impressive from the outside, but your brain is an extraordinary powerhouse of activity that needs looking after!

Glossary

amygdala A small, almond-shaped part, deep in the brain, that is involved with emotions and memory.

brain stem The lower part of the brain that connects to the spinal cord.

cell One of the tiny units that make up living things. The human body consists of millions and millions of cells of different types.

cerebellum The part of the brain that coordinates your body's movements and keeps you balanced.

cerebrospinal fluid A clear liquid that surrounds the brain inside the skull and protects and nourishes it.

cerebrum The largest part of the brain, responsible for handling memories, thoughts, and feelings, and senses such as touch.

coordinate To make the different parts of your body work well together.

corpus callosum A large bundle of nerves that connect the right and left halves of the brain.

cortex Also known as the cerebral cortex, this is the surface layer of the cerebrum.

EEG Short for electro-encephalogram, this is a medical test used to record electrical activity in the brain.

glucose The main type of sugar made by the body from food. It is carried through the bloodstream to provide energy to the cells of the body.

hypothalamus A small but vital part of the brain that performs a range of jobs, including helping to control sleep, thirst, and body temperature.

meninges Sheets of tissue that cover the brain and help protect it.

MRI Short for Magnetic Resonance Imaging, this is a way of examining brain activity by observing changes in the amount of blood flow and oxygen carried around the brain.

nerves A bundle of long fibers made up of nerve cells. Most nerves carry signals to and from the brain.

oxygen A gas that is taken in from air during breathing and carried around the body in the bloodstream. Oxygen is essential for the body to release energy from food.

spinal cord A thick bundle of nerve fibers that runs from the base of the brain through the spine and that allows the brain to control the body.

thalamus Part of the brain that relays signals from the senses to other parts of the brain and connects different parts of the cortex together.

three dimensions (3D) If you can see things in 3D, you can see they have not only height and width, but also depth.

tissue A collection of cells that form the different parts of humans, animals, and plants.

voluntary To do something that you want to do, and are aware of wanting to do, such as moving your hand to pick something up.

Brain box

... in 30 seconds

Thinking may sometimes be hard, but your brain is soft and squishy. It feels a little like tofu or jelly. Something that soft could easily get damaged out in the open, so fortunately your brain has several layers of protection.

Your brain sits inside a large bony skull. This is made up of eight different plates of bone, together called the cranium, as well as the bones that form your face. Wrapped around the brain are three sheets of tissue called meninges. The outer one, the dura mater, is especially tough. Together, these tissues help protect the brain.

Your brain is always swimming. It floats in around 4½–5½ oz (130–160 ml) of liquid called cerebrospinal fluid. This cushions it like a shock absorber and makes the brain lighter, so you don't have all 3 lb (1.4 kg) of its weight pressing down on the brain stem.

Your brain is well-protected against small bumps and knocks, but a major impact could cause brain damage. It might make a fragment of skull puncture the meninges and tear brain tissue. That's why wearing a helmet when cycling or skateboarding is such a good idea.

3-second sum-up

Your skull, meninges, and cerebrospinal fluid protect your brain.

3-minute mission Egg head

You need: • 2 fresh eggs • 2 watertight plastic containers with lids • Water

1 Imagine each egg is a brain. Place an egg in each container and fill one with water. Seal both containers with the lids.

2 Drop the containers on the ground from the same height to give them a big bump. One egg may end up scrambled, but the other one should be fine. Which one survives and why?

Answer on page 96.