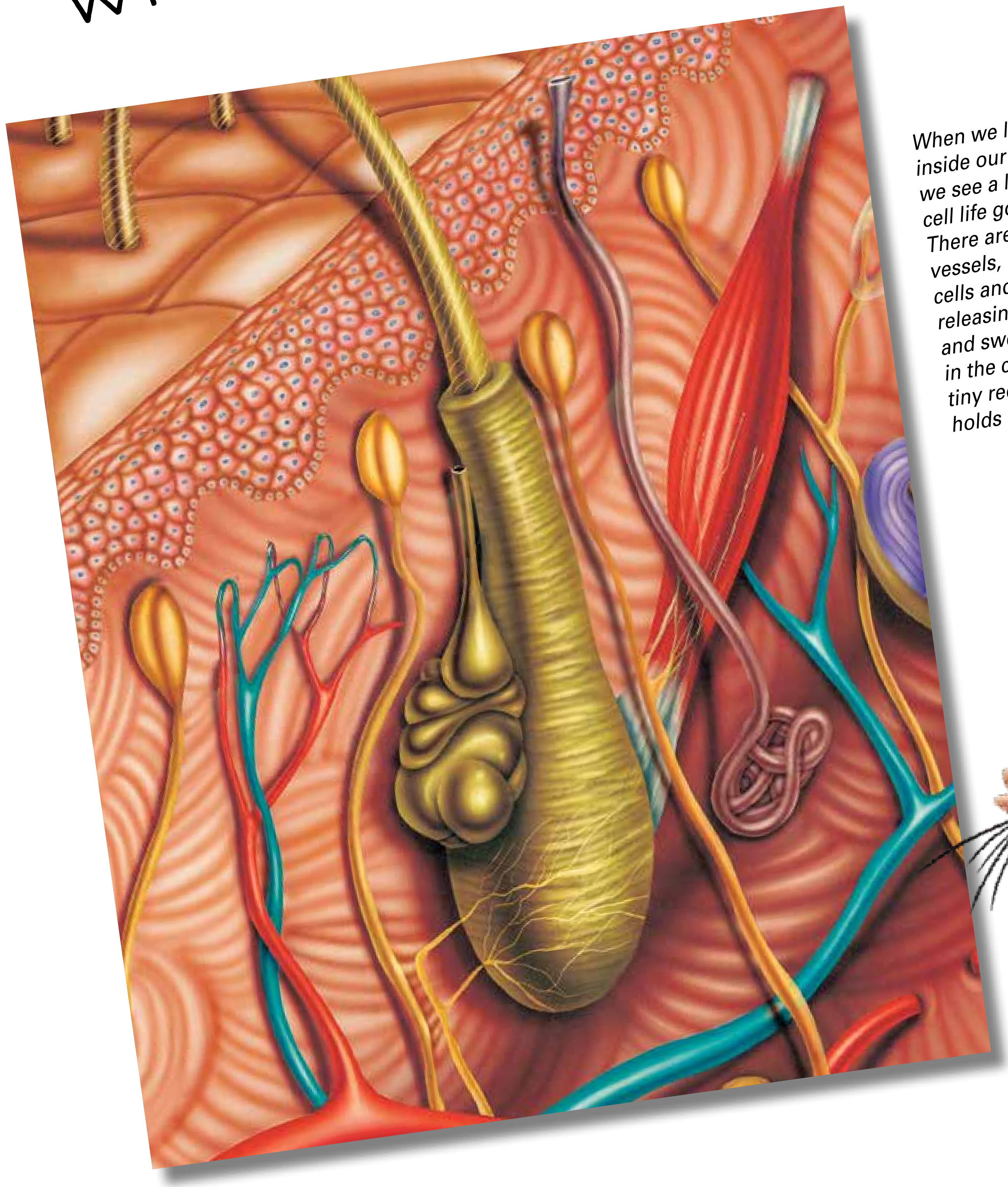
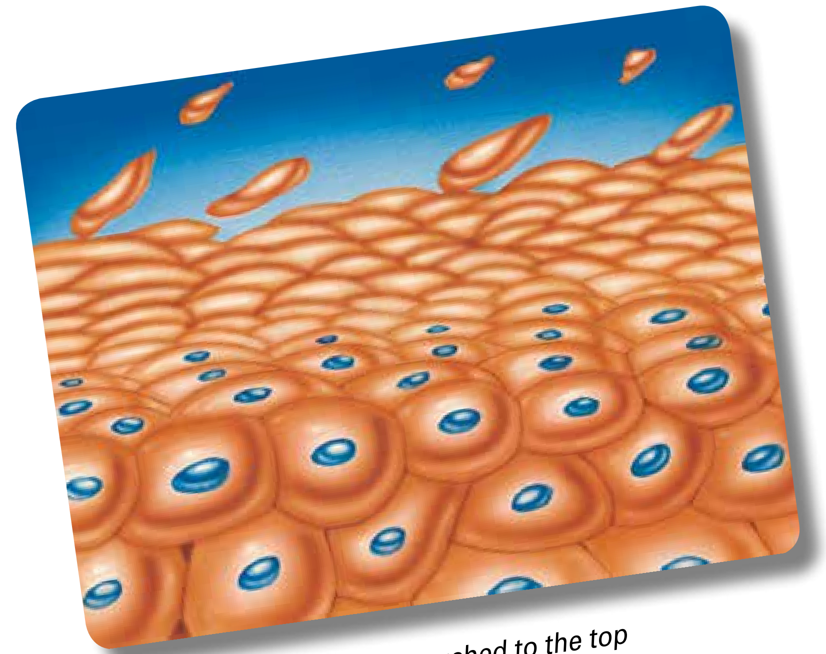
What's happening in our skin?



When we look inside our skin, we see a lot of cell life going on. There are blood vessels, nerve cells and glands releasing grease and sweat. And in the center the tiny red muscle holds a hair root.

Skin cells protect us from dust and dirt and —most importantly—fend off bacteria and other tiny creatures that try to invade us. Some parts of our body, like our heels, have thick layers of skin, while the skin on our lips is thin and sensitive.



Live skin cells die and get pushed to the top where they flake off.

GENE, WHY DO SKIN CELLS DIE?

Because they die after completing their function, and then have a new job even after death: to form a layer that protects the living skin cells underneath. Every second we lose millions of tired skin cells. Fresh cells constantly replace them.

Hair and nails are also made of dead cells. At the hair root, cells divide into new cells. When they die, they join together to form a hair. They are no longer connected to nerves, which is why a haircut doesn't hurt.

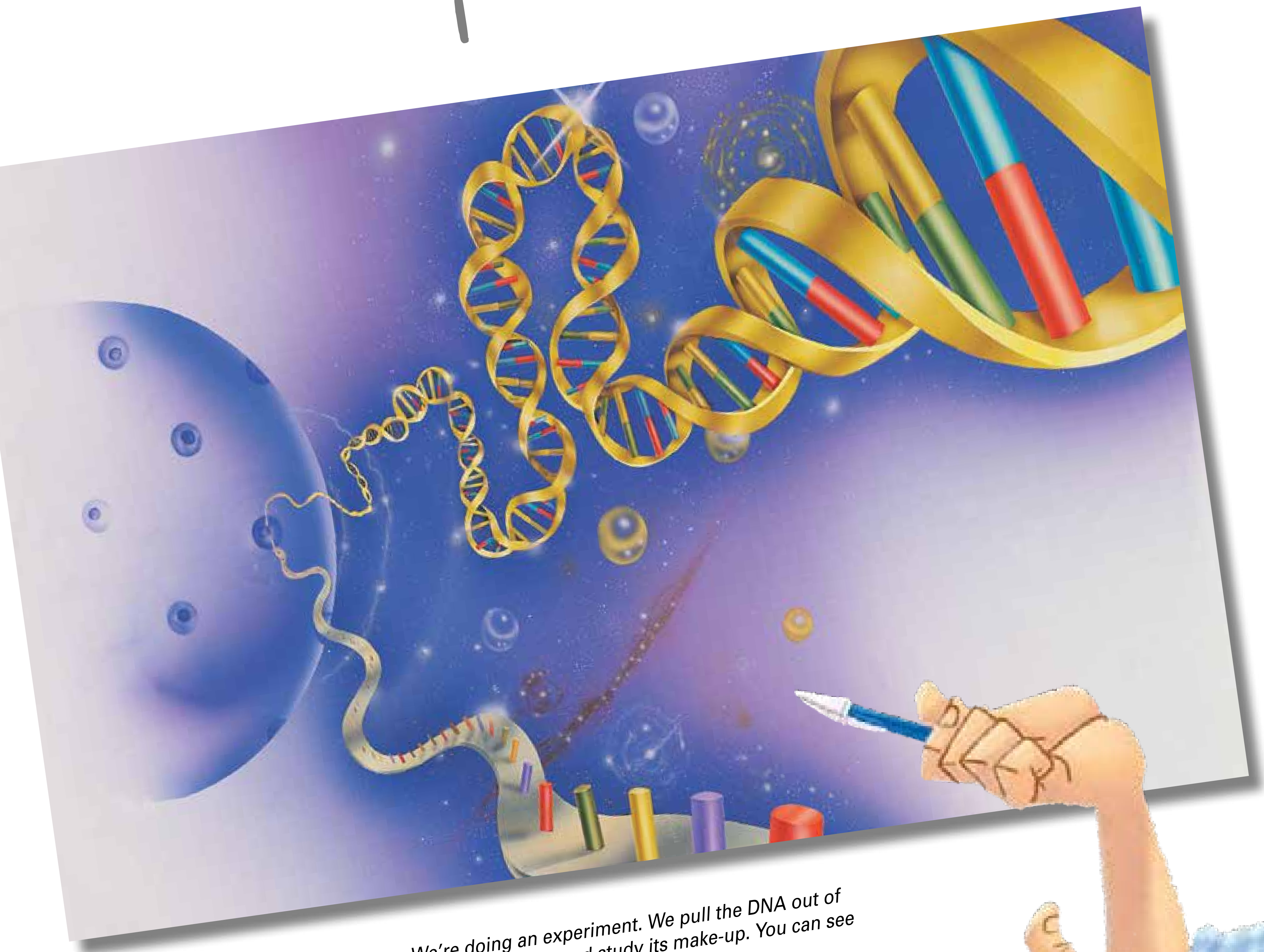
IF MY HAIR IS DEAD, WHY DOES IT HURT WHEN I PULL ONE OUT?

Because the hair root is still connected to tiny nerve cells. Nerve cells even notice when a hair is moved by blowing on it. They let us feel pressure, hot and cold, tickling and pain. And they give commands to all your muscles.

AND WHAT IS THAT LITTLE BAG DOWN AT THE ROOT OF THE HAIR?

That is a gland. It makes a kind of grease that keeps the hair and skin smooth. Other glands produce sweat. And the red tubes are blood vessels. The blood flowing through them brings oxygen and nutrients to the skin.

Perfect planning



We're doing an experiment. We pull the DNA out of the cell's nucleus and study its make-up. You can see half the DNA ladder at the bottom.

The cell needs two things to make proteins: the building blocks and a plan for putting them together in the right order. The building blocks are amino acids (20 kinds of them), and the plan is written on a strand of—get ready—deoxyribonucleic acid. But most people just call it DNA. It contains the recipes for all of the 100,000 different kinds of proteins that work together in your body.

WHERE ARE THE GENES?

DNA comes on very long, incredibly thin strands. To make them fit in the nucleus, they are tightly wrapped up and packaged in 46 pieces called chromosomes.

If we were to pull the DNA out, we'd see a twisted ladder, with each rung made up of two different parts called nucleotides. These are the chemical letters in which the genes are written. We have different nucleotide letters. The short names are A, T, C and G, and we see them here as different colors. Now comes a neat trick. Any nucleotide A letter can only connect to a T, and ant C letter only to G. Later on we see how this buddy system works for copying genes.

HOW DO THE PROTEIN FACTORIES GET THE MESSAGE?

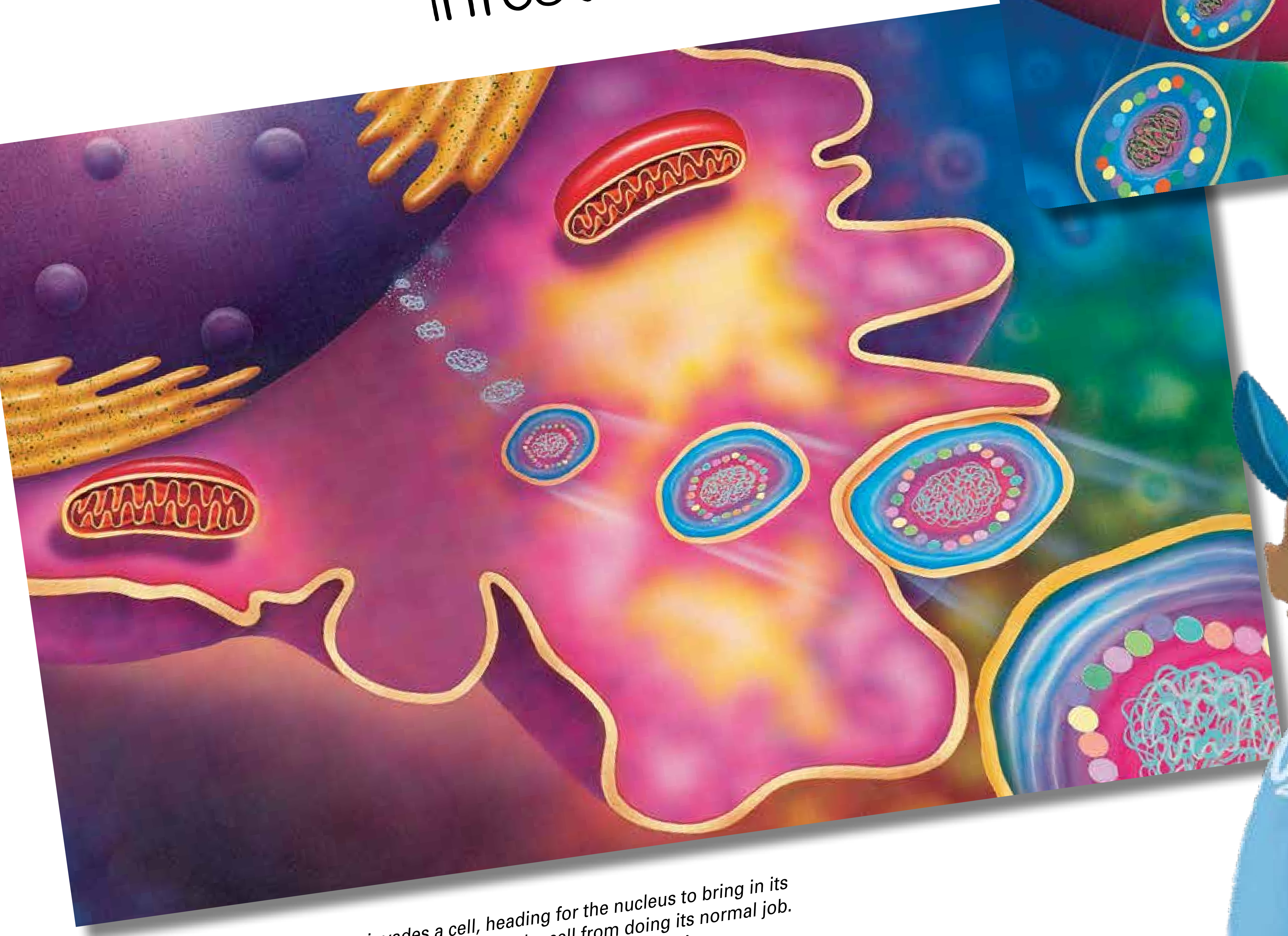
Even with the genes all properly stored in the nucleus, the protein factories still wouldn't know what to do. The ribosomes need the right recipes for making the right proteins.

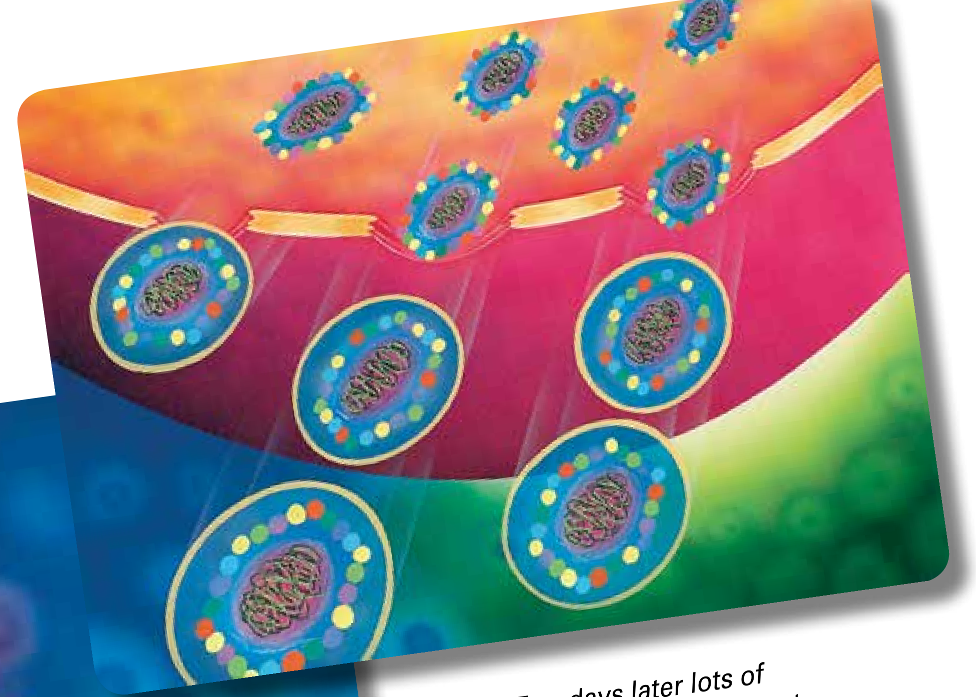
At the bottom, a messenger leaves the nucleus. It looks incomplete with just single nucleotide letters. But that is just the way so ribosomes can read the message perfectly well.

AND WHAT IF THE MESSAGE IS WRONG?

Most proteins have hundreds or thousands of amino acids. Even one tiny typing error in a gene can make the wrong proteins. This is called a mutation. In the worst case, the protein does not work properly, which can cause a disease. But there is also a chance that the mutation makes the particular protein work a little bit better than the original one.

How a Virus infects a cell





Two days later lots of fresh viruses swarm out of the infected cell into the bloodstream.

A virus invades a cell, heading for the nucleus to bring in its viral genes. This will stop the cell from doing its normal job. Instead it starts to make viral proteins and DNA.

Our cells are really good at protecting themselves from invaders, They got gatekeeper proteins on the membrane that normally just open the cell to friends with the right protein key. Viruses are not welcome!

SO, HOW DOES A VIRUS GET INTO A CELL?

A virus with the right key can trick a gatekeeper. Then it happily floats into the cell heading for the nucleus. That is the first part of viral infection, as we can see in the image on the right.

Next comes the really bad news. The viruses carry their own genes into the cell's nucleus: recipes for making fresh viruses. The virus has taken control, and the host cell becomes a slave to the virus. It starts to make viral proteins and DNA, which join together to make many new viruses. Soon masses of fresh viruses swarm out, ready to infect many more cells, and more people.

AND WHY ARE COLDS ONLY IN OUR NOSES AND THROATS?

Because different cells have different gate keeper proteins and therefore need different keys. A cold virus has the key only to nose and throat cells. So it cannot infect cells in other parts of the body. Unfortunately, other viruses can.

Each virus has its particular shape and genes. They infect different cells and can therefore cause a lot of different diseases.