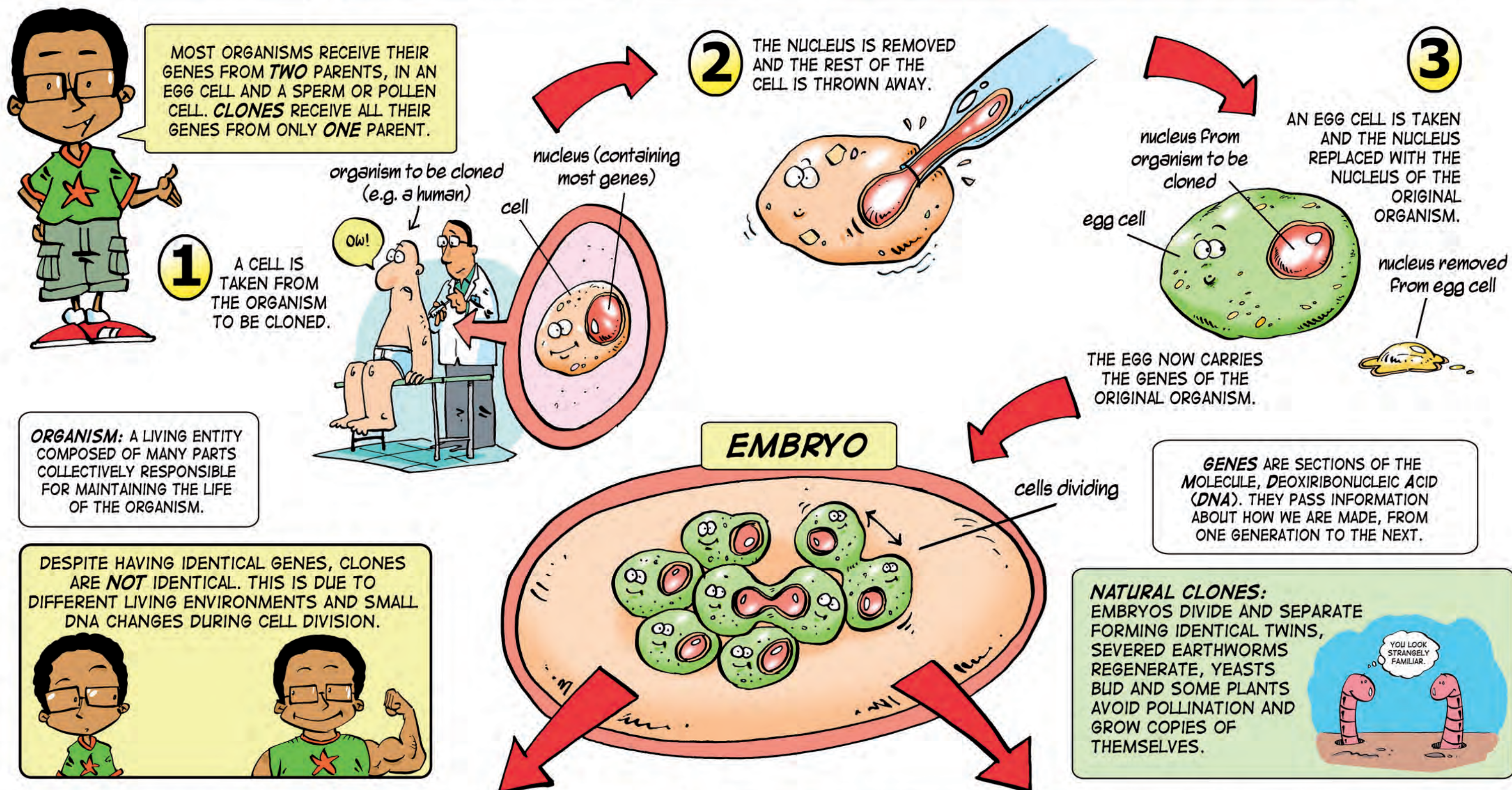
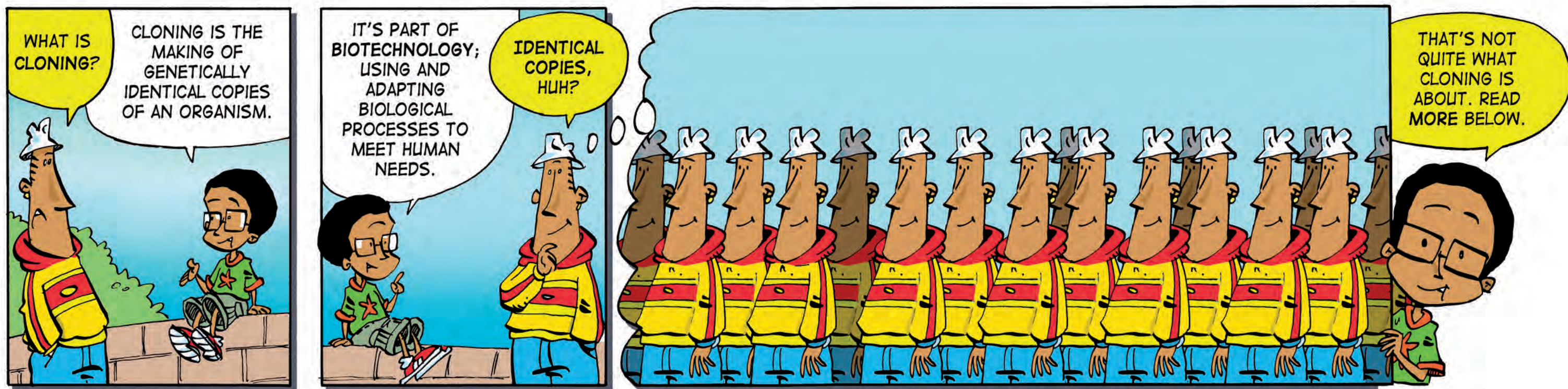


BIOTECHNOLOGY: CLONING



THERAPEUTIC CLONING (GROWING PART OF AN INDIVIDUAL)

normal cell

stem cell

CELLS CAN BE TAKEN FROM THIS EMBRYO. THEY ARE CALLED **EMBRYONIC STEM CELLS**. THEY CAN BE GROWN INTO ANY OF THE BODY'S MANY CELL TYPES.

STEM CELLS CAN POTENTIALLY BE USED TO REPAIR ORGANS SUCH AS THE LIVER, SPINAL CORD AND BRAIN. THEY CARRY THE ORGANISM'S OWN GENES AND ARE THUS LESS LIKELY TO BE REJECTED.

ADULT STEM CELLS ARE FOUND IN FULLY DEVELOPED ORGANISMS (FOR EXAMPLE IN THE BONE MARROW BLOOD AND UMBILICAL CORD). THESE CAN BE STORED FOR LATER TREATMENTS.

REPRODUCTIVE CLONING (GROWING A WHOLE INDIVIDUAL)

IF THE EMBRYO IS PLACED IN A NATURAL ENVIRONMENT (LIKE A WOMB), IT WILL GROW AND DEVELOP AS NORMAL.

FUTHI IS A CALF CLONED FROM A DAIRY COW IN SOUTH AFRICA. IT IS EXPECTED THAT FUTHI WILL BE A GOOD MILK PRODUCER, JUST LIKE HER OLDER TWIN.

CLONING CAN BE USED TO INCREASE POPULATION NUMBERS OF ENDANGERED SPECIES; THE **COELACANTH** IS ONE SUCH POSSIBILITY.

HOWEVER, THE LACK OF GENETIC DIVERSITY MAKES THE SPECIES VULNERABLE TO ENVIRONMENTAL CHANGES LIKE NEW DISEASES.

WHAT DO YOU THINK ABOUT CLONING?

CLONING IS A VERY **CONTROVERSIAL** ISSUE.

ARE YOU DESTROYING LIFE IF TAKING STEM CELLS RESULTS IN THE EMBRYO DYING?

DOES A CLONE HAVE ITS OWN SOUL?

CLONING REQUIRES LOTS OF EGGS. WILL WOMEN BE **EXPLOITED** FOR THEIR EGGS FOR HUMAN CLONING?

INFERTILE COUPLES MAY SOON BE ABLE TO CLONE THEMSELVES.

WHO WILL DECIDE WHO IS CLONED - ONLY THE VERY **RICH**?

SHOULD THERE BE A GLOBAL BAN ON CLONING? REPRODUCTIVE, OR THERAPEUTIC TOO?