TIMELINE – CHAPTER 8

THE HUMAN ORGANISM AND BIOTECHNOLOGY

1998 First culturing of human stem cells

In the United States, scientist James Thomson successfully cultured stem cells of human embryos. Succeeding generations of cells could be sustained in the laboratory, then frozen for use in research and treatment of certain illnesses. This type of cell can regenerate in any organ of the human body. In 2003 another group of American scientists was able to produce human stem cells from milk teeth.

1997 First clone of a mammal: the sheep Dolly

In April 1996 a group of Scottish scientists succeeded in cloning the first mammal. The result was a sheep named Dolly (in homage to singer Dolly Parton), in all ways identical to the sheep named Belinda, the cell donor. Some time later the scientists discovered that Dolly was ageing too rapidly—as if her age was combining with the age of the sheep donor. Dolly, suffering from premature arthritis and respiratory problems, was euthanized in February 2003. Since the cloning of Dolly, several other animals have been cloned successfully. An extraordinary discovery, cloning poses many ethical questions.

1978 Birth of first baby created through in-vitro fertilization

The name Louise Brown is well known around the world: she was the first test-tube baby (conceived in a laboratory through in-vitro fertilization, then implanted in the mother's uterus). She was born in England and is now the mother of a child conceived naturally. English physicians Patrick Steptoe and Robert Edwards were responsible for perfecting the technique that made this birth possible. The success is the origin of techniques for treating infertility. In the years following, many babies were born thanks to this technique in India, the United States, France and other countries. The first test-tube baby in Québec was born in 1985. To date an estimated three million test-tube babies have been born.

1972 First genetically modified organism (GMO): bacteria introduced to genes

The first genetically modified organism was a bacterium into which American scientist Stanley Cohen and his team successfully introduced a gene from the DNA of an African amphibian. In 1978 a synthetic gene for human insulin was introduced into *Escherichia coli* bacteria so it would produce human insulin. Tobacco became the first lab-produced GMO in 1983. In 1995 the first genetically modified vegetable was placed on the market: a slow-ripening tomato.

1939 First culturing of plant cells

In 1902 Austrian botanist Gotlieb Haberlandt developed a method for culturing plant cells; the cells lasted for a few months, but did not reproduce. In-vitro culturing of plant tissue was developed in the 1930s to promote reproduction of plants not easy to propagate. In 1939 French scientist Roger Gautheret successfully cultured carrot tissue. The same year in the United States P. White was able to culture tobacco cells. In the early 1950s French scientists G. Morel and C. Martin successfully regenerated entire dahlia plants from healthy cell cultures.

1928 Discovery of penicillin

The first known antibiotic came from a mould called *penicillium* (*Penicillium notatum*). English biologist and pharmacologist Alexander Fleming made this discovery by accident when he left open bacteria cultures in his lab and observed that no bacteria developed around a certain mould. He thus identified penicillium, then isolated penicillin. Scientists earlier had observed competition among microorganisms, either by different bacteria or by bacteria and mould. Later in the 1940s a German named Chain and Australian Howard Florey continued the research and discovered the mechanics of the composition of penicillin, which prompted its use for medical purposes.

1907 First culturing of animal cells

American biologist Ross Harrison introduced a new technique for in-vitro culturing of animal cells (tissue culturing) using the nerve cells of frogs. He discovered that if provided with proper nutrients in the right conditions, the cells could be grown outside the organism in a lab. Cell culturing had been attempted by other scientists before him, but none had succeeded. In the 1950s culturing of animal cells became common practice.

1897 Discovery of viruses

Since antiquity the Greeks, Egyptians and Romans described illnesses such as poliomyelitis that are due to viruses without knowing their cause. With development of the microscope at the end of the 17th century, the existence of microorganisms and bacteria was discovered. Later, in 1897, Dutch bacteriologist and botanist Martinus Beijerinck, who was studying the mosaic disease of tobacco, discovered a pathogen (agent of infection) smaller than a bacterium that was the cause of the affliction. He called it *virus*, a Latin word meaning "poison." Thanks to the electronic microscope invented in the 1930s, the structure of viruses can now be observed.

1885 First successful trial of vaccine against rabies

Following the work of Edward Jenner on a vaccine to combat smallpox, French chemist and physicist Louis Pasteur perfected the concept of vaccine and explained the general principle: through contact with a low dose of an infectious substance, an organism learns to defend itself against a future attack. He went on to develop a vaccine for rabies, which a human can contract after being bitten by a rabid animal.

1863

Introduction of pasteurization

French chemist, physicist and biologist Louis Pasteur is well known for his invention of a process for preserving food, which came to be called *pasteurization* in honour of its creator. In this process, a liquid such as wine or milk is heated to eliminate most of the bacteria and mould it contains. For the work he conducted on microorganisms, Pasteur is considered a key founder in the field of bacteriology.

1798

Creation of the first vaccine

As early as the 12th century, Muslim doctor Averroes observed that smallpox (caused by a virus) never affected the same person twice. This idea was explored further by English doctor Edward Jenner. He observed that those who had contact with sick cows never developed smallpox. He injected his patients with a tiny quantity of the bovine form of the disease, cowpox, and observed that they never became ill. This was the first smallpox vaccine, which spread throughout Europe. The term *vaccination* comes from this first vaccine and from the Latin word *vacca* ("cow"). Nearly two centuries later, in 1980, the World Health Organization deemed that smallpox had been eliminated.

1674

Discovery of the existence of microorganisms

During his work on improving the microscope, Dutch naturalist Antonie Van Leeuwenhoek began his discoveries about microorganisms. Before this time, the processes of fermentation and mould were a mystery. Van Leeuwenhoek never made a connection between these processes and microorganisms, but he did discover the existence of living things invisible to the naked eye.

CIRCA –3000

Oldest evidence of yogurt production

There is proof of the existence of fermented dairy products (such as yogurt) around the third millennium B.C. Early yogurt was made from goat or sheep milk and believed to have many virtues—some civilizations considered it as a miracle product. In Ancient Greece, yogurt was used to heal digestive conditions. In 16th-century France, yogurt was brought from Turkey to soothe the digestive troubles of King Francis I. Yogurt as it is known in North America originated in Bulgaria. Yogurt did not appear in Canada until the 1930s and became popular only in the 1970s.

BETWEEN –6 000 AND –10 000

Beginning of the production of cheese, leavened bread and wine, and the cultivation of wheat and barley

Cheese-making techniques have been known in the Middle East since prehistoric times, when milk was curdled, then drained. In Ancient Egypt, priests were guardians of the secrets of cheese-making. Early bread was flat until the Egyptians added leavener—a technique discovered by accident. Bread was made with water or milk and with barley or millet flour. Wine originated in Iran, where ancient jars of cultivated grape seeds have been found. In Ancient Egypt, grape-growing was an organized practice. Many ancient civilizations had a god of wine. This was also the beginning of agriculture, with large-scale growing of wheat and barley crops.