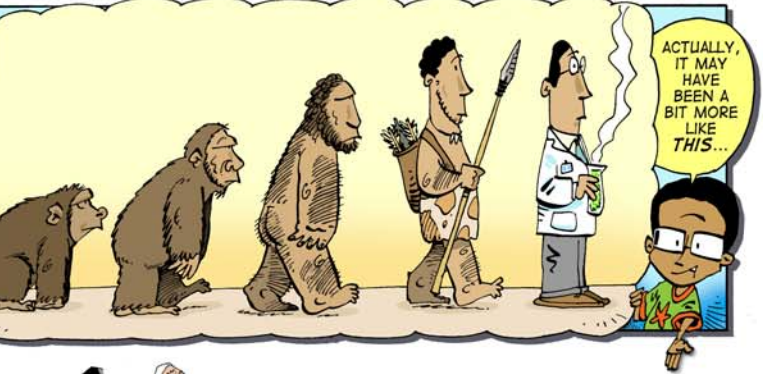


BIOTECHNOLOGY THROUGH THE AGES



4000 - 2000 BC
YEAST IS USED IN EGYPT TO CAUSE BREAD TO RISE. CHEESE AND WINE ARE MADE IN SUMERIA, CHINA AND EGYPT.

1859
CHARLES DARWIN PUBLISHES HIS THEORY OF EVOLUTION THROUGH "NATURAL SELECTION". WITHIN 20 YEARS IT HAS INFLUENCED BREEDERS, WITH MAJOR IMPACT ON PLANT AND ANIMAL BREEDS.

1928
SIR ALEXANDER FLEMING DISCOVERS THAT THE MOULD CONTAMINATING ONE OF HIS EXPERIMENTS KILLS CERTAIN BACTERIA. PENICILLIN IS LATER ISOLATED FROM THE MOULD, LEADING TO THE DEVELOPMENT OF ANTIBIOTICS.

1966
THE "GENETIC CODE" IS WORKED OUT. A SEQUENCE OF THREE NUCLEOTIDE BASES DETERMINES EACH OF 20 COMMON AMINO ACIDS (THE BUILDING BLOCKS OF PROTEIN).

1972
THE DNA COMPOSITION OF HUMANS IS FOUND TO BE 99% SIMILAR TO THAT OF CHIMPANZEES AND GORILLAS.

1973
STANLEY COHEN AND HERBERT BOYER TRANSFER DNA FROM ONE ORGANISM TO ANOTHER. THIS IS THE FIRST SUCCESSFUL TRANSFER OF GENES BETWEEN DIFFERENT INDIVIDUALS.

1974
FREDERICK SANGER DEVELOPS A METHOD FOR DETERMINING THE ORDER OF NUCLEOTIDES IN A DNA STRAND. THIS IS CALLED SEQUENCING.

1982
- A SYNDROME IS DISCOVERED WHICH SEVERELY IMPAIRS THE IMMUNE SYSTEM. IT IS GIVEN THE NAME **AIDS**.
- ACQUIRED IMMUNE DEFICIENCY SYNDROME. IT IS CAUSED BY THE HUMAN IMMUNODEFICIENCY VIRUS, **HIV**.
- BACTERIA ARE GENETICALLY ENGINEERED TO PRODUCE A HUMAN FORM OF INSULIN FOR THE TREATMENT OF DIABETES. UNTIL THIS POINT, DIABETES SUFFERERS USED INSULIN FROM PIGS.

1984
GENETIC FINGERPRINTING IS DEVELOPED. IT IS USED TO LINK A SUSPECT TO GENETIC MATERIAL FOUND AT A CRIME SCENE.

1999
THE EUROPEAN UNION PUTS A MORATORIUM ON NEW COMMERCIAL APPROVALS FOR GENETICALLY MODIFIED (GM) FOOD CROPS.



1994
THE FIRST GENETICALLY MODIFIED (GM) CROP IS APPROVED FOR COMMERCIAL PRODUCTION IN THE UNITED STATES. IT IS THE FLAVR SAVR TOMATO AND IT IS ENGINEERED TO SLOW THE RIPENING PROCESS THUS IMPROVING SHELF LIFE.

1997
THE GENETICALLY MODIFIED ORGANISM ACT (GMO) IS PASSED IN SOUTH AFRICA.

1997
APPROVAL IS GIVEN FOR COMMERCIAL CULTIVATION OF THE FIRST SOUTH AFRICAN GENETICALLY MODIFIED (GM) CROP. IT IS COTTON THAT HAS BEEN GENETICALLY ENGINEERED TO RESIST ATTACK BY CATERpillARS.



1998
APPROVAL IS GIVEN FOR SOUTH AFRICAN COMMERCIAL CULTIVATION OF GENETICALLY MODIFIED (GM) MAIZE.



2000
GOLDEN RICE IS GENETICALLY ENGINEERED TO CONTAIN HIGH LEVELS OF VITAMIN A TO HELP PREVENT BLINDNESS.

2001
THE SOUTH AFRICAN NATIONAL BIOTECHNOLOGY STRATEGY IS PUBLISHED.

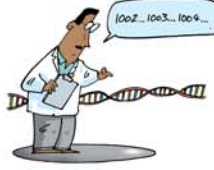
2002
THE HUMAN GENOME PROJECT IS COMPLETED, REVEALING APPROXIMATELY 30 000 INDIVIDUAL GENES. SCIENTISTS GO ON TO DISPUTE THIS FINDING CLAIMING THAT THE NUMBER OF HUMAN GENES IS CLOSER TO 70 000.



2003
THE CARTAGENA PROTOCOL IS IMPLEMENTED. IT IS AN INTERNATIONAL AGREEMENT GOVERNING THE MOVEMENT ACROSS BORDERS OF LIVING GENETICALLY MODIFIED ORGANISMS (GMO'S), E.G. SEEDS.



8000 BC
HUMANS BEGIN TO GROW AND KEEP LIVESTOCK. THE PLANTS AND ANIMALS BEGIN TO IMPROVE AS THE FARMERS SELECT THE BEST OFFSPRING TO GROW THE NEXT GENERATION.



1990
- THE FIRST GOVERNMENT-APPROVED GENE THERAPY IN A HUMAN IS PERFORMED IN THE UNITED STATES, ON A FOUR-YEAR OLD GIRL SUFFERING FROM AN IMMUNE DISORDER.
- AN INTERNATIONAL COLLABORATIVE EFFORT TO MAP ALL THE GENES IN THE HUMAN GENOME IS LAUNCHED UNDER THE SPONSORSHIP OF THE HUMAN GENOME PROJECT.



1997
SCOTTISH SCIENTISTS ANNOUNCE THE BIRTH OF A SHEEP NAMED DOLLY. SHE IS THE FIRST HIGHER MAMMAL TO BE CLONED FROM AN ADULT CELL. THIS CLONING WAS SUCCESSFUL AFTER 276 ATTEMPTS.



2003
FUTHI, A SOUTH AFRICAN DAIRY COW IS THE FIRST HIGHER MAMMAL TO BE CLONED ON THE AFRICAN CONTINENT.

