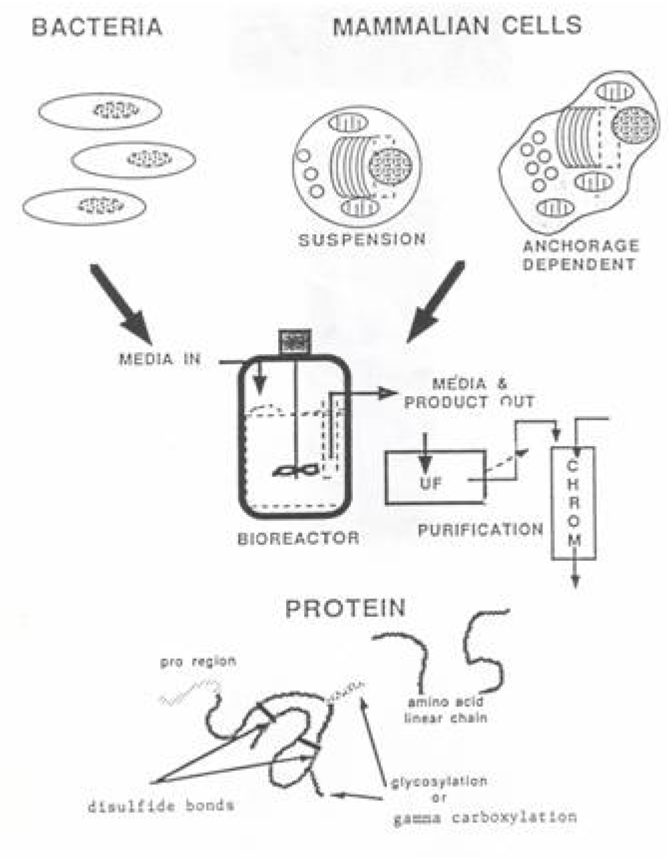


Figure 1. Recombinant production systems

Table II. PRODUCTS OF MAMMALIAN CELL CULTURE

ARTIFICIAL SKIN, NERVES, VEINS, ETC.
CELLS FOR IMMUNOTHERAPY
HUMAN GROWTH HORMONE
MIXED ALPHA INTERFERON
TPA, UK, PUK
EPO
AHF
VACCINES
LYMPHOKINES
MONOCLONAL ANTIBODIES

Table III. WHY MAMMALIAN CELLS ?

BECAUSE THEY DO THINGS BACTERIA DON'T !
CORRECT FOLDING
CLIPPING
GLYCOSYLATION
GAMMA CARBOXYLATION
SUBUNIT ASSEMBLY
SECRETION FOR EASIER ISOLATION

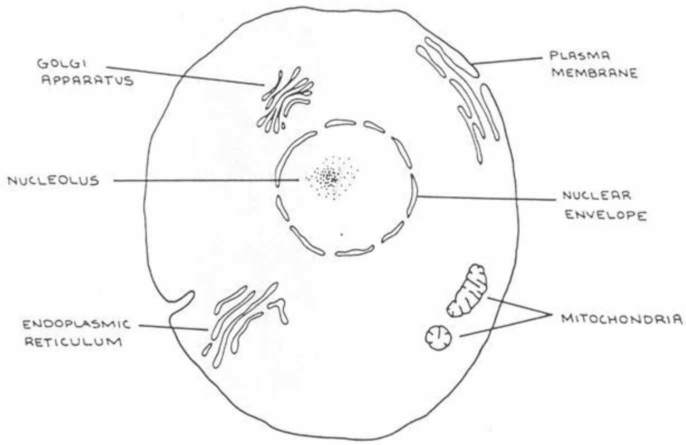


Figure 1. Major Components of Mammalian Cell

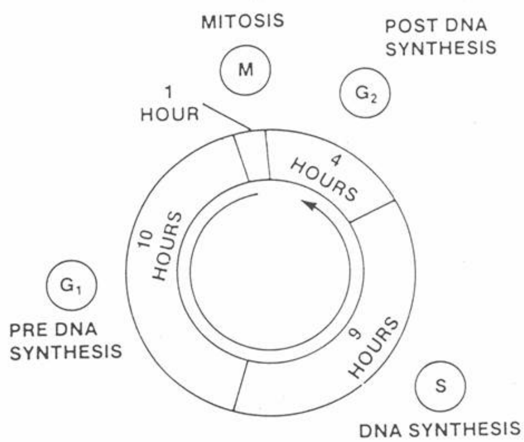


Figure 2. Typical Mammalian Cell Replication Phases

INDUSTRIAL MAMMALIAN CELL CULTURE

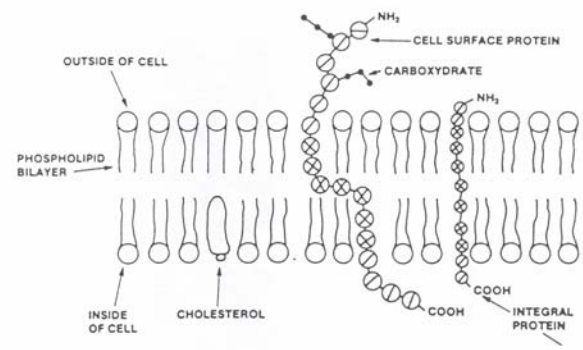


Figure 3. Plasma Membrane of Mammalian Cell with Typical Components

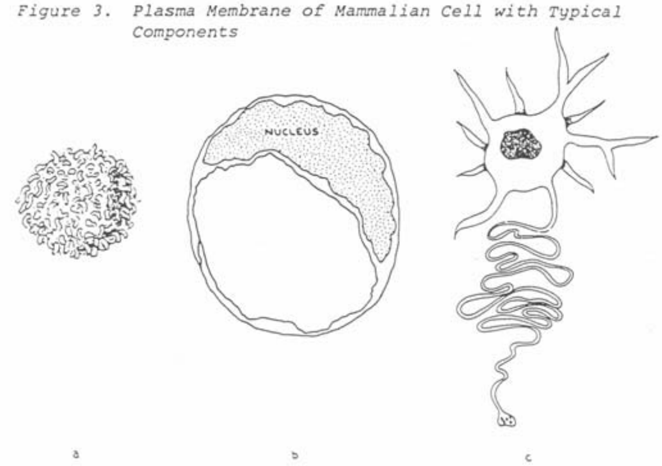


Figure 4. Three Examples of the Two-Hundred Different Types of Differentiated Cells in the Developed Body of Vertebrates: a) Lymphocyte, b) Endothelial Cell, c) Neuron

Table 2. Some common cell strains and cell lines

Name	Species of Origin	Tissue of Origin	Ploidy
3T3	Mouse	Connective Tissue	Aneuploid
CHO	Chinese Hamster	~~Lung~~ Ovary	Diploid
BHK21	Syrian Hamster	Kidney	Pseudo-Diploid
FS4	Human	Foreskin	Diploid
WI-38	Human	Embryonic Lung	Diploid
HeLa	Human	Carcinoma of Cervix	Aneuploid
BW5147	Murine	Thymus	Aneuploid

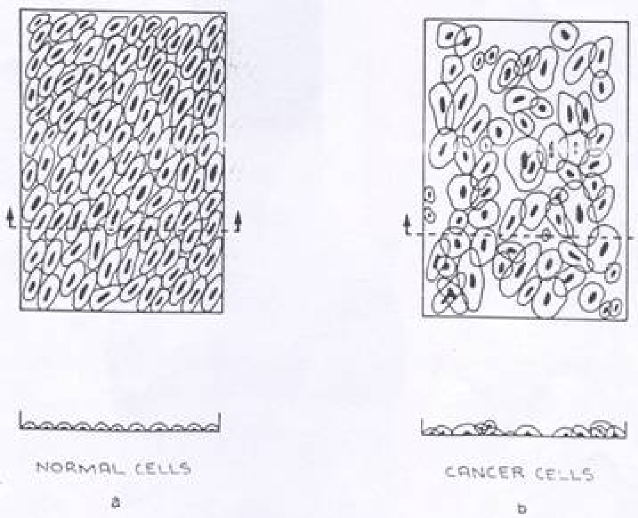


Figure 7. (a) Normal Cell Growth from a Cell Strain on a T-Flask: It is a Monolayer and It is Oriented.
(b) Cancer Cell Growth from a Cell Line on a T-Flask: It is a Multilayer and It is Random.

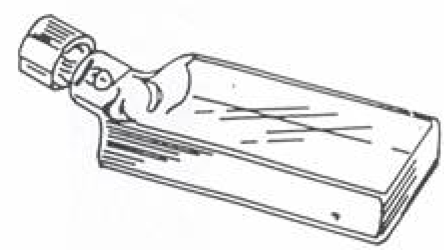
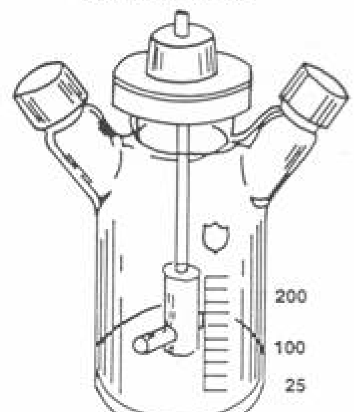


Figure 8. T-Flask Cell Culture Reactor for Anchorage-Dependent Cells



†U.S. Pat. No. 3,622,129

Figure 9. Suspension Cell Culture Spinner Reactor

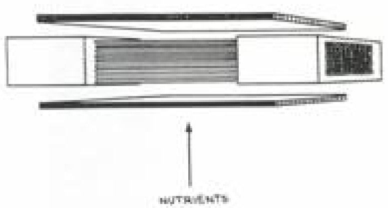


Figure 19. Flat Bed Hollow Fiber Cell Culture Reactor

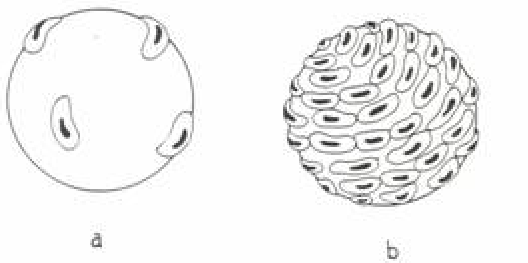


Figure 20. Cell Growth on Microcarriers: a) Microcarrier Inoculated with Few Cells; b) Microcarrier Surface Confluent with Growing Cells

- CULTIVO DE CELULAS VEGETALES
- Regeneración de Plantas
- Micropropagación.

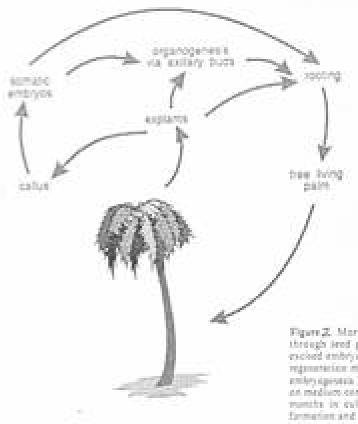


Figure 1. Date palm culture in vitro

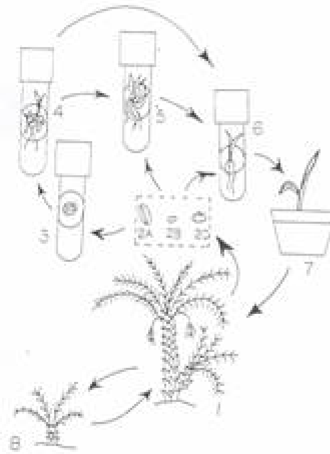


Figure 2. Morphogenetic potential of the date palm in vitro. (1) In nature, date palms are propagated through seed germination or rooting offshoots (8). (2) Various explants such as lateral buds (2A), excised embryos (2B) and shoot tips (2C) can be cultured and used to produce plantlets. A number of regeneration methods such as embryo culture (4), organogenesis via axillary budding (5), or somatic embryogenesis (3 and 4) can be employed. Note that these events can intertwine. (3) Explants planted on medium containing 0.45 µM 2,4-D produce nodular callus and somatic embryo formation after 2–6 months in culture. (4) Transferring callus to medium devoid of 2,4-D results in macroembryo formation and germination. (5) Plantlets and shoot derived from zygotic and somatic embryos, lateral buds, and shoot tips cultured on medium containing 0.54 µM NAA and 44.4 µM BA produce axillary bud outgrowths. (6) Rooting of lateral buds, shoot tips and plantlets on medium containing 0.54 µM NAA. (7) Free-living palms obtained through tissue culture.

- producción de metabolitos secundarios

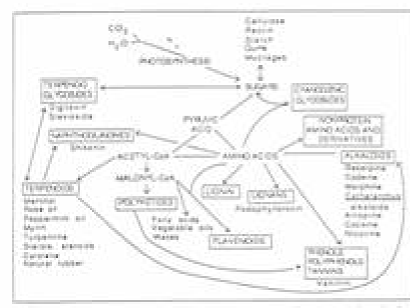


Figure 3 Biosynthetic routes in higher plants to some important chemicals. (After Balandrin et al., 1985).

-REGULACIÓN DE LA SÍNTESIS DE ENZIMAS

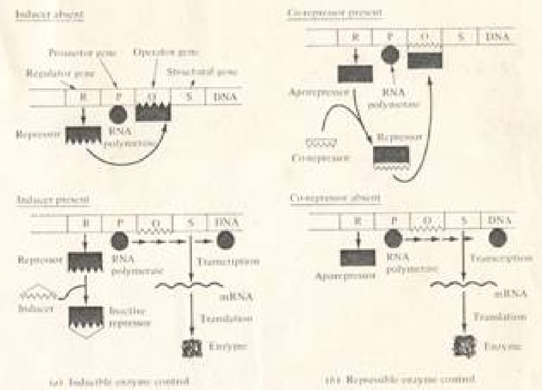


Figure 8 (*a*) An inducer acts by inactivating repressor so that the repressor does not bind to the operator gene and block transcription of the structural gene. (*b*) A (co-) repressor combines with an aporepressor to form an active repressor, which can block expression of the structural gene by binding at the repressor gene. In this manner synthesis of repressible enzymes is controlled. [*Reprinted from A. L. Demain, Theoretical and Applied Aspects of Enzyme Regulation and Biosynthesis in Microbial Cells, in L. B. Wingard, Jr. (ed.), "Enzyme Engineering,"* Interscience, New York, 1972.]

Figure 9 In the lac operon, a single regulator-operator pair of genes controls synthesis of three proteins with related biological functions.

Table 6.4. The bacterium *Pseudomonas multivorans* can utilize any organic compound in this list as its sole carbon source†

Carbohydrates and carbohydrate	Caprylate	Aspartate
derivatives (sugar acids and	Pelargonate	Glutamate
polyalcohols):	Caprate	Lysine
Ribose	Dicarboxylic acids:	Arginine
Xylose	Malonate	Histidine
Arabinose	Succinate	Proline
Fucose	Fumarate	Tyrosine
Rhamnose	Glutarate	Phenylalanine
Glucose	Adipate	Tryptophan
Mannose	Pimelate	Kynurenine
Galactose	Suberate	Kynurenate
Fructose	Azelate	Other nitrogenous compounds:
Sucrose	Sebacate	Anthranilate
Trehalose	Other organic acids:	Benzylamine
Cellobiose	Citrate	Putrescine
Salicin	α-Ketoglutarate	Spermine
Gluconate	Pyruvate	Tryptamine
2-Ketogluconate	Aconitate	Butylamine
Saccharate	Citraconate	Amylamine
Mucate	Levulinate	Betaine
Mannitol	Glycolate	Sarcosine
Sorbitol	Malate	Hippurate
Inositol	Tartrate	Acetamide
Adonitol	Hydroxybutyrate	Nicotinate
Glycerol	Lactate	Trigonelline
Butylene glycol	Glycerate	Nitrogen-free ring compounds:
Fatty acids:	Hydroxymethylglutarate	Benzoyl formate
Acetate	Primary alcohols:	Benzoate
Propionate	Ethanol	*o*-Hydroxybenzoate
Butyrate	Propanol	*m*-Hydroxybenzoate
Isobutyrate	Butanol	*p*-Hydroxybenzoate
Valerate	Amino acids:	Phenyl acetate
Isovalerate	Alanine	Phenol
Caproate	Serine	Quinate
Heptanoate	Threonine	Testosterone

† R. Y. Stanier, M. Doudoroff, and E. A. Adelberg, "The Microbial World," 3d ed., p. 70, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1970.