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PATENTS AND LITERATURE

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The objective of this section is to keep readers aware of significant inventions and trends in industrial research as well as to highlight those areas of research that may lead to new biotechnological opportunities. Four major areas of biochemistry will be covered, corresponding to enzymes, cells, bioproducts, and nucleic acids. The patent section will briefly cover each area in every issue of the journal. The literature section will focus on one area per issue.

PATENTS

This section will identify patents and published patent applications from the international patent literature. The title, name(s) of the inventor(s), the patent number, the date of filing, the assignee, and a short description of the invention will be given. Copies of the US patents can be obtained for $1.00 each from the Commissioner of Patents and Trademarks, Washington, DC 20231.

Enzymes

Immobilization of Starch-Degrading Enzymes

M. Yoneyama
US 4,338,398 (Mar. 13, 1980)
Kabushiki Kaisha Hayashibara Seibutsu Kagaku Kenkyujo

Starch-degrading enzymes are crosslinked in a manner that does not substantially insolubilize them and then they are physically adsorbed onto a water-insoluble carrier. The resultant immobilized enzymes have high activity and the carrier can be easily recycled.

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Immobilization of Enzymes

P. Cremonesi
US 4,338,401 (Aug. 4, 1980)
Italfarmaco S.p.A.

A polysaccharide, a vinyl monomer, and an enzyme are mixed with a metallic salt catalyst and then UV-irradiated to form a polysaccharide copolymer with enzymatic activity.

Process for the Enzymatic Production of Peptides

J. T. Johansen; F. Widmer
US 4,339,534 (Apr. 2, 1980)
De Forenede Bryggerier A/S

L-Specific serine or thiol carboxypeptidase enzymes are used to catalyze the synthesis of peptide bonds in a procedure that is not limited to specific amino acid components and does not involve any risk of subsequent hydrolysis of the internal peptide bonds.

Process for Recovering Enzymes from Blood

J. T. Johansen
US 4,341,867 (May 13, 1980)
De Forende Bryggerier A/S

Superoxide dismutase, catalase, and carbonic acid anhydrase can be recovered from blood cells by alcohol lysis of cells and denaturation of hemoglobin. The procedure does not denature the enzymes, which can be recovered in solution in high yield on an industrial scale.

Process for Producing Heparinase

R. S. Langer, Jr.; R. Linhardt; C. L. Cooney; P. M. Galliher
US 4,341,869 (Aug. 25, 1980)
Massachusetts Institute of Technology

Heparinase is produced in a chemically defined medium containing a heparinase inducer and purified using hydroxylapatite.

Immobilized Restriction Endonucleases

J. G. Chirikjian
US 4,342,833 (Apr. 17, 1978)
Bethesda Research Laboratory

Restriction endonucleases immobilized to water-insoluble matrices have enhanced stability and can be used to obtain DNA fragments in relatively low salt media.

Enzymes Bound to Polyurethane

L. L. Wood; F. J. Hartdegen; P. A. Hahan
US 4,342,834 (May 11, 1976)
W. R. Grace & Co.

An aqueous dispersion of an enzyme is mixed with an isocyanate-capped polyurethane under conditions in which the polyurethane foams and the enzyme becomes bound to the foam.

Magnetic Support Matrix for Enzyme Immobilization

L. J. DeFilippi
US 4,343,901 (Oct. 22, 1980)
UOP, Inc.

A magnetic support matrix is prepared that contains an inorganic oxide with ferromagnetic particles dispersed throughout its interior, and a polyamine crosslinked with an excess of a bifunctional reagent so as to furnish available functional groups. The matrix does not decrease loading of the subsequently immobilized enzyme nor alter its properties.

Production of Immobilized Glucose Isomerase

S. Ushiro
US 4,343,902 (Dec. 19, 1980)
CPC International Inc.

An aqueous suspension of cells of a glucose isomerase producing microorganism is treated with a non-ionic surfactant that solubilizes the enzyme in the cells, but does not solubilized cellular polysaccharides. The glucose isomerase in the resultant suspension can be adsorbed onto an ion exchange resin in the absence of contaminating polysaccharides that inhibit the adsorption.

Process for Obtaining Cholesterol Esterase from Microorganisms

K. Beaucamp; M. Nelboeck; H. Gauhl; H. Seidel; W. Gruber; H. Brunner
US 4,343,903 (Aug. 6, 1980)
Boehringer Mannheim GmbH

When cultured in a medium containing lecithin as inducer, *Candida rugosa* and *Pseudomonas sp.* produce cholesterol esterase.

Synthesis of Ribosides Using Bacterial Phosphorylase

T. A. Krenitsky; J. L. Rideout
US 4,347,315 (Apr. 25, 1980)
Burroughs Wellcome Co.

Substituted imidazo pyridines may be easily ribosylated with a ribose donor system comprising ribose-l-phosphate and a phosphorylase type enzyme. The enzymatic method has several advantages over the chemical method in that it is stereospecific, adaptable to large scale production, and offers improved yield.

Process for Producing Glucose Isomerase

C. E. Brownewell
US 4,348,480 (Jun. 4, 1980)
Miles Laboratories

Bacillus licheniformis ATCC 31604 produces a glucose isomerase when cultured under aerobic conditions.

Process for Decreasing the Thermal Stability of Microbial Rennet

D. A. Cornelius
US 4,348,482 (Sep. 10, 1979)
Miles Laboratories

Hydrogen peroxide is used to oxidize at least a portion of the methionine residues in *Mucor* microbial rennet thus reducing the thermal stability of the microbial enzyme to that of calf rennet when heated at the same temperature.

Process for Producing Heat-Resistant Acetate Kinase

M. Kagayama
US 4,349,631 (Nov. 21, 1980)
Unitika Ltd.

A heat-resistant acetate kinase can be produced efficiently on an industrial scale by culturing cells of Strain UK 788 (FERM-P No. 5141), a thermophilic *Bacillus stearothermophilus*.

Process for Obtaining Glucose-Isomerase

N. L. Agudo; M. F. E. Miguel; M. A. A. Escobar; E. P. Olivet; J. M. F. Garvajosa
US 4,351,903 (Oct. 31, 1981)
Compania Espanola de Petroleos, S. A.

A strain of the species *Streptomyces griseoflavus* A-40 (NCIB-11542), when cultured continuously or discontinuously under aerobic conditions, makes glucose isomerase that can be recovered from the medium.

Preparation of a Novel NADP-Linked Alcohol–Aldehyde/Ketone Oxidoreductase from Thermophilic Anaerobic Bacteria for Analytical and Commercial Use

J. G. Zeikus; R. J. Lamed
US 4,352,885 (May 9, 1980)
Wisconsin Alumni Research Foundation

An NADP-specific thermostable oxidoreductase has a unique preference for secondary alcohols, but will react with primary alcohols, ketones, and aldehydes. Strains from the group *Thermonanaerobium brockii* and *Clostridium thermohydrosulfuricum* are cultured at a temperature between 50 and 75°C to produce the enzyme.

Cells

Lactate Dehydrogenase Mutants of *Streptococcus mutans*

J. D. Hillman
US 4, 324,860 (Oct. 6, 1978)
Forsyth Dental Infirmary for Children

Streptococcus mutans strains that have a single point mutation in the structural gene for lactate dehydrogenase make no detectable lactic acid when incubated in

the presence of glucose. These strains are effective in controlling the incidence and severity of dental caries in animals.

Process and Apparatus for Growing Animal Cells

J. R. Birch; T. Cartwright; J. A. Ford
US 4,343,904 (Aug. 21, 1980)
G. D. Searle & Co.

Animal cells are grown in a cylindrical vessel containing a stack of parallel spaced-apart discs inclined at least 5° from the horizontal and mounted to a rotatable axial shaft. The vessel is vertically disposed and contains an external pumping loop for the continuous circulation of the vessel contents from the bottom to the top as the axial shaft is rotated.

Test for Teratogenic Potential Employing Hydra

E. M. Johnson
US 4,346,070 (Apr. 11, 1980)
Thomas Jefferson University

Artificial embryos of *Hydra attenuata* comprising Hydra cell pellets are contacted with compounds of unknown tetratogenic effect. The minimum concentration of the agent required to interfere with the development of the embryo is compared to the minimum concentration of the same agent that is toxic to normal adult Hydra. The mammalian teratogenic potential of the compound is indicated by the degree of difference between the concentrations.

Microbiological Epoxidation Process

C. T. Hou; R. N. Patel; A. I. Laskin
US 4,347,319 (Oct. 24, 1980)
Exxon Research & Engineering Co.

Methane-utilizing obligate and facultative methylotrophs carry out the epoxidation of C_2-C_4 *n*-alkenes, dienes, and vinyl aromatic compounds under aerobic conditions in an aqueous medium.

Immobilization of Microorganisms in Gelled Carrageenan

G. B. Borglum
US 4,347,320 (Nov. 24, 1980)
Miles Laboratories, Inc.

Microorganisms are mixed with an aqueous solution of kappa-carrageenan and the resultant mixture is gelled by the addition of an epihalohydrin : alkylene

polyamine polymer or by the addition of polyethyleneimine. Preferred microorganisms are *Saccharomyces cerevisiae* and *Aspergillus niger*.

Method for the Production of Chromiun Yeast

L. E. Skogerson
US 4,348,483 (Jan. 23, 1981)
Universal Foods Corporation

An aqueous suspension of live yeast cells are treated with a water-soluble nontoxic chromium salt under nongrowth conditions to permit the absorption of significant amounts of intracellular chromium ion. The product is useful as a dietary chromium supplement.

Antibody Production from Hybrid Cell Line

G. Galfre; C. Milstein; B. W. Wright
US 4,350,683 (Jan. 3, 1980)
National Research Development Corporation

A rat myeloma cell line having the C.N.C.M. designation I-078 has been produced that is capable of fusion with immunocytes from sensitized animals and has several advantages over mouse myeloma cell lines presently available.

Method for Determining Biochemical Oxygen Demand

S. Suzuki; I. Karube
US 4,350,763 (Apr. 7, 1980)
Ajinomoto Company Inc.

Immobilized microorganisms capable of aerobically metabolizing organic matter in an aqueous liquid consume oxygen at a rate that is a precise measure of the biochemical oxygen demand of the liquid. A membrane-type oxygen-sensitive electrode is used to determine the rate of oxygen consumption. The procedure takes less than 2 h compared to the conventional 5-d test.

Diffusion Bioassay for the Quantitative Determination of Mutagenicity

T. E. Awerbuch
US 4,352,880 (Sep. 17, 1979)
Massachusetts Institute of Technology

A culture of living cells, the cells being a tester strain for mutagenesis, is spot tested with potentially mutagenic agents. The test agent diffuses outwardly from the spot to produce a ring shaped mutagenic band. The degree of mutagenicity is related to the length of the radius of the ring.

Process for Treating Wastewater Containing Phenolics and Microorganisms Capable of Degrading Phenolics

L. J. Pillis; L. T. Davis
US 4,352,886 (Jan. 27, 1981)
Sybron Corporation

Pseudomonas putida CB-173 (ATCC-31800) is added to wastewater under aerobic conditions for a time sufficient to degrade the phenolics into compounds capable of being further degraded by other organisms.

Methods and Article for Culturing Differentiated Cells

L. C. M. Reid; M. Rojkind
US 4,352,887 (Oct. 29, 1979)
Albert Einstein College of Medicine of Yeshiva University

The use of extracellular matrix fibers derived from connective tissue as culture substrates enables successful in vitro culturing of differentiated cells with significant retention of their differentiated character.

Novel Strain of *Bacillus licheniformis* Useful in the Production of Glucose Isomerase and Method of Screening Bacillus Mutants for Ability to Produce Glucose Isomerase in the Absence of Xylose

G. Boguslawski; M. J. Rynski
US 4,355,103 (Jan. 23, 1981)
Miles Laboratories

Bacillus licheniformis (ATCC 31667) is resistant to 2-deoxyglucose and produces glucose isomerase in greater quantities in a fermentation medium devoid of xylose than in a medium when xylose is present. The strain requires methionine, niacin, riboflavin, and thiamine for growth.

Bioproducts

Process for Recovering Hydrocarbons from Hydrocarbon-Containing Biomass

T. A. Weil; P. M. Dzadzic; C. C. J. Shih; M. C. Price
US 4,338,399 (Sep. 15, 1980)
Standard Oil Company

Whole plant biomass containing hydrocarbon-containing laticifers is hydrolyzed in the presence of cellulases, hemicellulases, and pectinases to produce a hydrocarbon product. A major portion of the enzymes can be recovered from the hydrolysis products and recycled in the hydrolysis reaction.

Alpha-Amylase Inhibitor from a Streptomycete and Process for Its Preparation

V. Oeding; W. Pfaff; L. Vertesy; H. L. Weidenmuller
US 4,339,436 (Feb. 23, 1981)
Hoechst Aktiengesellschaft

Streptomyces tendae 4158 (ATCC 31210) produces a peptidic glycoside hydrolase inhibitor with a molecular weight of 5000–10,000 and an isoelectric point of 4.4. The inhibitor is useful for the regulation of blood sugar levels in the treatment of diabetes or adiposity.

Process for Preparing Long-Chain Dicarboxylic Acids by Fermentation

K. Kato; N. Uemura
US 4,339,536 (Jun. 3, 1980)
Nippon Mining Co., Ltd.

A culture of *Candida tropicalis* produces a long-chain dicarboxylic acid in a liquid medium containing a straight-chain saturated hydrocarbon as substrate.

Electrochemical Conversion of Biomass

A. Eskamani; H. D. Derner
US 4,341,609 (Feb. 26, 1981)
The Standard Oil Company

Plant biomass is treated in the anodic section of an electrochemical cell in the presence of an electrolyte solution. The treated biomass is more susceptible to enzymatic cellulose hydrolysis.

Majusculamide C

R. E. Moore; J. S. Mynderse
US 4,342,751 (Mar. 9, 1981)
Eli Lilly and Company

Lyngbya majuscula, a deep-water blue-green alga, produces majusculamide C, a novel peptide compound that inhibits fungal plant pathogens. The peptide is isola-

ted by extracting the alga with an organic solvent and isolating the compound by chromatography.

Immobilized Hemoglobin, and Processes for Extracting Oxygen from Fluids Using the Same

J. Bonaventura; C. Bonaventura
US 4,343,715 (Oct. 10, 1980)
Duke University

An oxygen carrier such as hemoglobin or hemocyanin is immobilized in a wide variety of polymer matrices. The immobilized carrier is capable of reversibly binding and releasing oxygen.

Cocoa Product and Process of Preparation

I. B. Eggen
US 4,343,818 (Apr. 21, 1980)
Societe d'Assistance Technique pour Products Nestle S.A.

An amylase hydrolyzate of a low fat cocoa slurry is treated with alkali and then heated to make a new cocoa product.

Process for Preparing Esters of Human Insulin

J. Markussen
US 4,343,898 (Feb. 10, 1981)
Novo Industri A/S

An insulin compound is transpeptidized with an L-threonine ester in a mixture of water and a water miscible organic solvent in the presence of trypsin.

Process for the Production of Acrylamide Using Microorganism

I. Watanabe
US 4,343,900 (Oct. 6, 1980)
Nitto Chemical Industry Co., Ltd.

A microorganism with nitrilase activity makes a high quality aqueous solution of acrylamide when cultivated in a medium containing acrylonitrile, an alkali metal carbonate or bicarbonate and an organic carboxylic acid.

Process for the Manufacture of Aldonic Acids by an Enzymatic Method

G. Coppens
US 4,345,031 (Jan. 15, 1980)
Solvay & Cie

Glucose is converted to gluconic acid in the presence of glucose oxidase and a gas containing oxygen.

Method for Producing L-Arginine by Fermentation

K. Akashi; Y. Nakamura; T. Tsuchida; H. Yoshii; S. Ikeda
US 4,346,169 (Sep., 15, 1980)
Ajinomoto Company, Incorporated

Mutants of *Brevibacterium flavum* or *Corynebacterium acetoacidophilum* produce L-arginine in the culture medium under aerobic conditions. The mutant is resistant to ketomalonic acid, fluoromalonic acid, monofluoro-acetic acid or aspartate-antagonist.

Production of Epoxides Such as Propylene Oxide Using Packed Catalytic Bed Containing Moist Resting Cells Exhibiting Oxygenase Activity

C. T. Hou
US 4,348,476 (Jan. 22, 1981)
Exxon Research and Engineering Co.

A gaseous source of oxygen and a gaseous oxidizable organic substrate are passed through a stationary catalytic bed containing resting cells exhibiting oxygenase activity until the oxidative state of at least a portion of the substrate is increased.

Process for Producing L-Tryptophan or Derivatives Thereof Using a Microorganism

A. Mimura; Y. Takahashi; K. Yuasa; M. Shibukawa
US 4,349,627 (Jun. 17, 1981)

An *Enterobacter sp.* produces L-tryptophan or a derivative when cultured in a medium containing an indole compound, ammonium ion, and either serine or pyruvic acid.

Method for Producing Ethanol with Immobilized Microorganisms

I. Chibata; J. Kato; M. Wada
US 4,350,765 (Jun. 5, 1980)
Tanabe Seiyaku Co., Ltd.

Microorganisms immobilized in a sulfated polysaccharide gel produce ethanol in high concentration of 75 mg/mL or above in a nutrient culture broth containing not more than 100 mg/mL sugar. The organisms are from the genera *Saccharomyces* and *Zymomonas* and they are immobilized in a dense layer near the surface.

Pentose Syrup Production from Hemicellulose

R. I. Mehlberg
US 4,350,766 (Aug. 1, 1980)
Purdue Research Foundation

In a packed bed reactor, hemicellulose material is hydrolyzed with sulfuric or hydrochloric acid and leached with an aqueous medium by percolation. The percolation medium is recovered and contains at least 5% pentoses.

Production of 2-Ketogluconic Acid and Hydrogen Peroxide

S. L. Neidleman; W. F. Amon, Jr.; J. Giegert
US 4,351,902 (Jun. 16, 1980)
Cetus Corporation

Glucose is first oxidized to D-glucosone or D-glucono-δ-lactone using either pyranose-2-oxidase, glucose-2-oxidase, or glucose-1-oxidase. The intermediate lactone is then reacted with oxygen and either pyranose-2-oxidase or glucose-1-oxidase to produce hydrogen peroxide and 2-keto-D-gluconic acid.

Xanthomonas Biopolymer for Use in Displacement of Oil from Partially Depleted Reservoirs

W. C. Wernau
US 4,352,741 (Jun. 2, 1981)
Pfizer Inc.

A mutant strain of *Xanthomonas campestris* produces a xanthan that is completely pyruvate-free. This reduction in the ionic character of the polymer minimizes its incompatibility with calcium and other ions and is especially useful for enhanced oil recovery where high brine applications are involved.

Production of Xanthan Gum by Emulson Fermentation

L. G. Maury
US 4,352,882 (Sep. 8, 1981)
Kelco Biospecialties Limited

An aqueous *Xanthamonas* culture medium is dispersed in a water-insoluble oil that substantially decreases the viscosity of the fermentation medium and promotes a higher polymer content.

Encapsulation of Biological Materials

F. Lim
US 4,352,883 (Mar. 28, 1979)
Damon Corporation

A core biological material such as cells, enzymes, hormones, or antibodies is encapsulated in a semipermeable membrane that excludes large molecules. The material is encapsulated in a water soluble gum that can be gelled into discrete, shape-retaining, water-insoluble temporary capsules. The surface layer of the temporary capsules is crosslinked to produce the semipermeable membrane. The gel within the membrane may be reliquified.

Process for Preparing Glyceraldehyde from Glycerol with Methanol Dehydrogenase

H. J. Wolf
US 4,353,987 (Jun. 11, 1981)
The Upjohn Company

The enzyme methanol dehydrogenase or a methanol dehydrogenase producing bacterium either in free or in immobilized form is capable of converting glycerol to glyceraldehyde.

Method of Preparing a Low Calorie Beer

W. F. Line; V. K. Chaudhary; E. Chicoye; R. J. Mizerak
US 4,355,047 (May 13, 1982)
Miller Brewing Company

A pullulanase from rice cleaves alpha-1,6 linkages of unfermentable limit dextrins to form alpha-1,4-dextrins that can be converted to sugars by alpha-1,4-carbohydrases. The sugars are fermented by yeast, thereby reducing by about 30–80% the residual limit dextrins in the extract to obtain a low calorie beer that contains a greater proportion of alcohol.

Production of Muconic Acid

P. C. Maxwell
US 4,355,107 (Jul. 27, 1981)
Celanese Corporation

A fluorescent *Pseudomonas* strain produces muconic acid in a medium containing oxygen and toluene. The strain has no catechol 2,3-oxygenase enzyme nor does it have an active muconate-lactonizing enzyme.

Nucleic Acids

Mature Protein Synthesis

W. Gilbert; K. Talmadge
US 4,338,397 (Apr. 11, 1980)
President and Fellows of Harvard College

A nonbacterial DNA fragment that codes for the precursor of a selected protein or polypeptide is inserted into an appropriate cloning vehicle. After transformation of an appropriate host cell with the hybrid gene, the bacterial host secretes the selected protein in a mature form, thereby avoiding the need to treat the protein further to remove the signal sequence or other chemical substitutents.

Co-Integrate Plasmids and Their Construction from Plasmids of *Escherichia* and *Streptomyces*

J. J. Manis; S. K. Highlander
US 4,338,400 (Jan. 26, 1982)
The Upjohn Company

Hybrid plasmids pUC1026 and pUC1027 lack a locus in the pUC6 genome that causes the genetic instability of other dual vector pUC6:pBR322 recombinant plasmids in *E. coli* hosts. The stabilization process can be used to make other stable plasmids.

Hybrid Plasmid of pBR322 and *Streptomyces* Plasmid and *E. Coli* Containing Same

F. Reusser; V. S. Malik
US 4,343,906 (Aug. 21, 1979)
The Upjohn Company

Large amounts of plasmid pUC3 DNA can be produced by first joining it to pBR322 and then cloning the hybrid plasmid into *E. coli* HB101.

Method for Producing L-Lysine by Fermentation

K. Sano; T. Tsuchilda
US 4,346,170 (Jul. 23, 1980)
Ajinomoto Company Incorporated

A DNA fragment with genetic information controlling L-lysine production is inserted into a vector and then introduced into an *E. coli* host cell. The host cell produces L-lysine in a yield higher than artificially induced mutants.

Method for Producing L-Threonine by Fermentation

K. Miwa; T. Tsuchida; O. Kurahashi; S. Nakamori; K. Sano; H. Momose
US 4,347,319 (Apr. 2, 1980)
Ajinomoto Company Incorporated

A DNA fragment possessing genetic information relating to L-threonine synthesis is obtained from a mutant of *E. coli* resistant to alpha-amino-beta-hydroxy-valeric acid. When a plasmid containing this fragment is introduced into an *E. coli* strain that does not require L-threonine, the host cell produces L-threonine in a yield much higher than previously known L-threonine producing mutants.

Plasmid Vectors, Production and Use Thereof

N. H. Carey; J. S. Emtage; W. C. A. Tacon; R. A. Hallewell
US 4,349,629 (May 29, 1980)
G. D. Searle & Co.

Plasmid vectors are prepared with a Hind III insertion site adjacent to a tryptophan promoter and a gene for tetracycline resistance. The vectors are suited to receive at the Hind III site an inserted eukaryotic DNA fragment, the transcription and translation of which is under the control of the tryptophan promoter.

Microbiological Synthesis of Beta Endorphin

J. D. Baxter; I. Fettes; J. Shine
US 4,350,764 (Mar. 10, 1980)
The Regents of the University of California

A DNA fragment containing the entire coding region for murine β-endorphin with the exception of the C-terminal glutamine was modified, transferred to an expres-

sion transfer vehicle, and expressed as a fusion protein. After in vitro modification to yield the mature β-endorphin, the biological activity of the mammalian hormone was demonstrated.

Method for Single Nucleotide Alteration

C. P. Bahl
US 4,351,901 (Mar. 24, 1980)
Cetus Corporation

A ribonucleotide or a protected deoxyribonucleotide corresponding to the desired altered nucleotide is attached to the end of a single strand gene fragment that extends up to the position before the nucleotide to be altered. The fragment is annealed to a template and extended complementary to the template. The resulting partially mismatched double-stranded DNA is used to produce a pure DNA gene containing an altered deoxyribonucleotide at the single desired position.

Chemical Synthesis Apparatus for Preparation of Polynucleotides

R. Bender; P. D. Duck
US 4,353,989 (Jan. 19, 1981)
Bio Logicals, Inc.

Polynucleotides are synthesized in a stepwise fashion from a polymer support from which the first unit is linked. The reaction vessel is the reaction column containing the polymer supported product. A series of reaction bottles are connected to the reaction column by means of a fluid conduit.

Recombinant DNA

B. Lavetsky; Alford; J. I. Mao; D. T. Moir
GB 2 091 271 A (Jul. 28, 1982) UK Patent Application
Collaborative Research Inc.

The calf genes for rennin and pre-prorennin have been cloned into *E. coli* host cells that are capable of expressing rennin and pre-prorennin. *Saccharomyces cerevisiae* may also be used as host cell.

LITERATURE SURVEY

The objective of the literature survey is to make a thorough, recent review of publications in one specific area. This issue's survey will be on nucleic acids. Future

surveys will be on enzymes and cells. The articles will be chosen for their impact on current biotechnology processes and for their potential to break new ground that may lead to new applications. The entries are listed in alphabetical order by the first author's name.

Nucleic Acids

1. New Approach to Tryptophan Production by *Escherichia coli:* Genetic Manipulation of Composite Plasmids In Vitro, S. Aiba, H. Tsunekawa, and T. Imanaka, *Appl. Environ. Microbiol.* **43,** 289–297 (1982).
2. Transformation of *Bacillus* Protoplasts by Plasmid pTP4 DNA, T. Akamatsu and J. Sekiguchi, *Agric. Biol. Chem.* **46,** 1617–1621 (1982).
3. Host:Vector Systems for Gene Cloning in *Pseudomonas,* M. Bagdasarian and K. N. Timmis, *Curr. Top. Microbiol. Immunol.* **96,** 47–67 (1982).
4. Determination of Rust Resistance in Wheat by DNA/DNA Molecular Hybridization, I. D. Bekhoev, D. A. Solomatin, and E. V. Budnitskaya, *Prikl. Biokhim. Mikrobiol.* **18,** 104–110 (1982).
5. Plasmid-Mediated Nicotine Degradation in *Arthrobacter oxidans,* R. Brandsch, A. E. Hinkkanen, and K. Decker, *Arch. Microbiol.* **132,** 26–30 (1982).
6. Ligation of Restriction Endonuclease-Generated DNA Fragments Using Immobilized T4 DNA Ligase, L. Buelow, and K. Mosbach, *Biochem. Biophys. Res. Comm.* **107,** 458–464 (1982).
7. Identification and Characterization of Plasmids in Hydrogen Uptake Positive and Hydrogen Updake Negative Strains of *Rhizobium japonicum,* M. A. Cantrell, R. E. Hickok, and H. J. Evans, *Arch. Microbiol.* **131,** 102–106 (1982).
8. Target Point Mutation that Creates a Unique EcoRI Site within the Signal Codons of the Beta-lactamase Gene Without Altering Enzyme Secretion of Processing, A. D. Charles, A. E. Gautier, M. D. Edge, and J. R. Knowles, *J. Biol. Chem.* **257,** 7930–7932 (1982).
9. Gene Cloning in *Streptomyces,* K. F. Chater, D. A. Hopwood, T. Kieser, and C. J. Thompson, *Curr. Top. Microbiol. Immunol.* **96,** 69–95 (1982).
10. Naphthalene Plasmids in *Pseudomonas,* M. A. Connors and E. A. Barnsley, *J. Bacteriol.* **149,** 1096–1101 (1982).
11. Uptake of Plasmid DNA by Protoplasts from Synchronized Soybean Cell Suspension Cultures, D. E. Cress, *Z. Pflanzenphysiol.* **105,** 467–470 (1982).
12. Cloning and Analysis of cDNAs Encoding Plant Storage Protein Presursors, R. R. D. Croy, G. W. Lycett, J. A. Gatehouse, J. N. Yarwood, and D. Boulter, *Nature* **295,** 76–79 (1982).
13. Bovine Papillomavirus Vector That Propagates as a Plasmid in Both Mouse and Bacterial Cells, D. DiMaio, R. Treisman, and T. Maniatis, *Proc. Natl. Acad. Sci. USA* **79,** 4030–4034 (1982).
14. Cloning of cDNA Encoding the Sweet-Tasting Plant Protein Thaumatin and Its Expression in *Escherichia coli,* L. Edens, L. Heslinga, R. Klok, A. M. Ledeboer, J. Maat, M. Y. Toonen, C. Visser, and C. Th. Verrips, *Gene* **18,** 1–12 (1982).
15. Use of Plasmids from *Staphylococcus aureus* for Cloning of DNA in *Bacillus subtilis,* S. D. Ehrlich, B. Niaudet, and B. Michel, *Curr. Top. Microbiol. Immunol.* **96,** 19–29 (1982).
16. Genetic Properties of Chromosomally Integrated 2.mu. Plasmid DNA in Yeast, C. S. Falco, Y. Li, J. R. Broach, and D. Botstein, *Cell* **29,** 573–584 (1982).

17. Isolation of a Maltase Structural Gene from *Saccharomyces carlsbergensis*, H. J. Federoff, J. D. Cohen, T. R. Eccleshall, R. R. Needleman, B. A. Buchferer, J. Giacalone, and J. Marmur, *J. Bacteriol* **149,** 1064–1070 (1982).
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