ECLA EUROPEAN CLASSIFICATION

C12N MICRO-ORGANISMS OR ENZYMES; COMPOSITIONS THEREOF

(biocides, pest repellants or attractants, or plant growth regulators, containing micro-organisms, viruses, microbial fungi, enzymes, fermentates or substances produced by or extracted from micro-organisms or animal material A01N63/00; food compositions A21, A23; medicinal preparations A61K; chemical aspects of, or use of materials for, bandages, dressings, absorbent pads or surgical articles A61L; fertilisers C05);
PROPAGATING, PRESERVING OR MAINTAINING MICRO-ORGANISMS (preservation of living parts of humans or animals A01N1/02);
MUTATION OR GENETIC ENGINEERING; CULTURE MEDIA (micro-biological testing media C12Q)

[N: **Note**
[C2011.08]

1. Documents relating to the use of vectors or hosts for the preparation of specific peptides, e.g. enzymes, are classified in subclass C07K or in group C12N9/00 according to the peptides, with the appropriate indexing codes.

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[N: **WARNING**
[C2010.05]

1. The following IPC groups are not used in the internal ECLA classification cheme. Subject matter covered by these groups is classified in the following ECLA groups:

C12N1/11	covered by	C12N15/79
C12N1/13	covered by	C12N15/79
C12N1/15	covered by	C12N15/80
C12N1/19	covered by	C12N15/81
C12N1/21	covered by	C12N15/74
C12N5/02	covered by	C12N5/00, C12N5/04 to C12N5/16H
C12N5/07-C12N5/095	covered by	C12N5/06 and subgroups
C12N5/18-C12N5/28	covered by	C12N5/16 and subgroups
C12N5/08	covered by	C12N5/06 to C12N5/06R
C12N5/18	covered by	C12N5/16
C12N5/20	covered by	C12N5/16B
C12N5/22	covered by	C12N5/16
C12N5/24	covered by	C12N5/16B
C12N5/26	covered by	C12N5/16H
C12N5/28	covered by	C12N5/16H
C12N7/01	covered by	C12N7/00
C12N9/70	covered by	C07K14/315A
C12N15/05	covered by	C12N5/14
C12N15/06	covered by	C12N5/16
C12N15/07	covered by	C12N5/16
C12N15/08	covered by	C12N5/16H
C12N15/12	covered by	C07K14/435
C12N15/13	covered by	C07K16/00
C12N15/14	covered by	C07K14/765
C12N15/15	covered by	C07K14/81
C12N15/16	covered by	C07K14/575
C12N15/17	covered by	C07K14/62
C12N15/18	covered by	C07K14/61
C12N15/19	covered by	C07K14/52
C12N15/20	covered by	C07K14/555
C12N15/21	covered by	C07K14/56
C12N15/22	covered by	C07K14/565

C12N15/23 covered by C07K14/57
C12N15/24 covered by C07K14/54
C12N15/25 covered by C07K14/545
C12N15/26 covered by C07K14/55
C12N15/27 covered by C07K14/53
C12N15/28 covered by C07K14/525
C12N15/29 covered by C07K14/415
C12N15/30 covered by C07K14/44
C12N15/31 covered by C07K14/195, C07K14/005
C12N15/32 covered by C07K14/325
C12N15/33 covered by C07K14/005
C12N15/34 covered by C07K14/01
C12N15/35 covered by C07K14/015
C12N15/36 covered by C07K14/02
C12N15/37 covered by C07K14/025
C12N15/38 covered by C07K14/03
C12N15/39 covered by C07K14/065
C12N15/40 covered by C07K14/08
C12N15/41 covered by C07K14/085
C12N15/42 covered by C07K14/09
C12N15/43 covered by C07K14/105
C12N15/44 covered by C07K14/11
C12N15/45 covered by C07K14/115
C12N15/46 covered by C07K14/14
C12N15/47 covered by C07K14/145
C12N15/48 covered by C07K14/15
C12N15/49 covered by C07K14/155
C12N15/50 covered by C07K14/165
C12N15/51 covered by C07K14/02, C07K14/10, C07K14/18
C12N15/53 covered by C12N9/02
C12N15/54 covered by C12N9/10
C12N15/55 covered by C12N9/14
C12N15/56 covered by C12N9/24
C12N15/57 covered by C12N9/48
C12N15/58 covered by C12N9/72B
C12N15/59 covered by C12N9/64A
C12N15/60 covered by C12N9/88
C12N15/61 covered by C12N9/90
C12N15/83 covered by C12N15/82
C12N15/84 covered by C12N15/82

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Notes
[C0408]

1. Attention is drawn to Notes (1) to (3) following the title of Class C12.

2. When classifying in this group, classification is also made in group B01D15/08 insofar as subject matter of general interest relating to chromatography is concerned.

C12N1/00 **Micro-organisms, e.g. protozoa; Compositions thereof** (medicinal preparations containing material from micro-organisms A61K35/66; preparing medicinal bacterial antigen or antibody compositions, e.g. bacterial vaccines A61K39/00)**; Processes of propagating, maintaining or preserving micro-organisms or compositions thereof; Processes of preparing or isolating a composition containing a micro-organism; Culture media therefor**

C12N1/00B . [N: after treatment of microbial biomass not covered byC12N1/02 to C12N1/08]

C12N1/02 . Separating micro-organisms from their culture media

C12N1/04 . Preserving or maintaining viable micro-organisms (immobilised micro-organisms C12N11/00)

C12N1/06 . Lysis of micro-organisms

C12N1/06B . . [N: of yeast]

C12N1/06C . . [N: by physical methods]

C12N1/08 . Reducing the nucleic acid content

C12N1/10 . Protozoa; Culture media therefor

C12N1/12 . Unicellular algae; Culture media therefor (culture of multi-cellular plants A01G; as new plants A01H13/00)

C12N1/14 . Fungi (culture of mushrooms A01G1/04; as new plants per se A01H15/00; [N: fungi per se C12R1/645 to C12R1/885]) Culture media therefor [C9805]

C12N1/16 . . Yeasts; Culture media therefor

C12N1/18 . . . Baker`s yeast; Brewer`s yeast

C12N1/20 . Bacteria [N: (bacteria per se C12R1/01 to C12R1/64)]; Culture media therefor [C9805]

C12N1/22 . Processes using, or culture media containing, cellulose or hydrolysates thereof

C12N1/24 . Processes using, or culture media containing, waste sulfite liquor

C12N1/26 . Processes using, or culture media containing, hydrocarbons (refining of hydrocarbon oils by using micro-organisms C10G32/00)

C12N1/28 . . aliphatic

C12N1/30 . . . having five or less carbon atoms

C12N1/32 . Processes using, or culture media containing, lower alkanols, i.e. C1 to C6

C12N1/34 . Processes using foam culture

C12N1/36 . Adaptation or attenuation of cells

C12N1/38 . Chemical stimulation of growth or activity by addition of chemical compounds which are not essential growth factors; Stimulation of growth by removal of a chemical compound (C12N1/34 takes precedence)

C12N3/00 **Spore forming or isolating processes**

C12N5/00 **Undifferentiated human, animal or plant cells, e.g. cell lines; Tissues; Cultivation or maintenance thereof; Culture media therefor;** (plant reproduction by tissue culture techniques A01H4/00) [C1207]

[N: **Notes**

[N1207] In this group, the following words are used with the meanings indicated: - a "totipotent" cell can differentiate into all somatic lineages (ectoderm, mesoderm, endoderm), the germ line and extra-embryonic tissues such as the placenta; - a "pluripotent" cell is a somatic stem cell which can differentiate into cells of at least two of the three somatic lineages (ectoderm, mesoderm, endoderm); - a "multipotent" cell is restricted to one lineage; - "progenitor" and "precursor" cells are further restricted within the lineage. If not explicitly forseen, totipotent cells are classified with pluripotent cells. Multipotent cells should not be classified with pluripotent cells. Unless provided for otherwise, committed progenitors are classified with their progeny.
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C12N5/00B . [N: Modification of the membrane of cells, e.g. cell decoration] [N0406]

C12N5/00C . [N: Cell encapsulation] [N0501]

C12N5/00M . [N: Culture media for cell or tissue culture (media for specific animal cell type C12N5/06)] [C0501]

C12N5/00M1 . . [N: Culture media for plant cell or plant tissue culture]

C12N5/00M2 . . [N: Serum-free culture media]

[N: **WARNING**
[N1207]This group is no longer used for the classification of new documents as from January 1, 2012. The backlog of this group is being continuously reclassified to C12N5/00M90 to C12N5/00M98
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C12N5/00M90 . . [N: Serum-free medium, which may still contain naturally-sourced components] [N1204]

C12N5/00M92 . . [N: Medium free of human- or animal-derived components] [N1204]

C12N5/00M95 . . [N: Protein-free medium] [N1204]

C12N5/00M98 . . [N: Xeno-free medium] [N1204]

C12N5/00R . [N: General methods for three-dimensional culture] [N0501]

C12N5/00S . [N: General culture methods using substrates (for specific animal cell type C12N5/06)] [C1207]

C12N5/00S1 . . [N: using microcarriers] [C1207]

C12N5/00Z . [N: Purging biological preparations of unwanted cells] [N1108] [M1207]

C12N5/00Z1 . . [N: Purging against subsets of blood cells, e.g. purging alloreactive T cells] [N1108]

C12N5/00Z3 . . [N: Purging against cancer cells] [N1108]

C12N5/04 . Plant cells or tissues [N: (culture media C12N5/00M1)]

C12N5/06 . Animal cells or tissues; [N: Human cells or tissues (preservation of living cells or tissues A01N1/02); Not used, see subgroups] [C0408]

[N: **Note**
In this group, the following words are used with the meanings indicated:

- a "totipotent" cell can differentiate into all somatic lineages (ectoderm, mesoderm,

endoderm), the germ line and extra-embryonic tissues such as the placenta;
- a "pluripotent" cell is a somatic stem cell which can differentiate into cells of at least two of the three somatic lineages (ectoderm, mesoderm, endoderm);
- a "multipotent" cell is restricted to one lineage.
"Progenitor" and "precursor" cells are further restricted within the lineage. If not explicitely forseen, totipotent cells are classified with pluripotent cells. Multipotent cells should not be classified with pluripotent cells
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C12N5/06A . . [N: Invertebrate cells or tissues, e.g. insect cells; Culture media therefor]

C12N5/06B . . [N: Vertebrate cells] [N9703]

[N: **Note**
Three-dimensional culture, tissue culture or organ culture are classified with the corresponding cells, if not specially provided for
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C12N5/06B2 . . . [N: Embryonic cells (production of embryos, nuclear transfer A01K67/027); Embryoid bodies] [N9703] [C0209]

C12N5/06B2E . . . . [N: Whole embryos; Culture medium therefor] [N0209]

C12N5/06B2L . . . . [N: Cells from extra-embryonic tissues, e.g. placenta, amnion, yolk sac, Wharton's jelly] [N0209] [C1207]

C12N5/06B2P . . . . [N: Pluripotent embryonic cells, e.g. embryonic stem cells (ES) (embryonic germ cells C12N5/06B4P, induced pluripotent stem cells C12N5/06B45)] [N0209] [C1207]

C12N5/06B3 . . . [N: Non-embryonic pluripotent stem cells, e.g. MASC (induced pluripotent stem cells C12N5/06B45) [N0209] [C1207]

C12N5/06B4 . . . [N: Germ cells (production of embryos, nuclear transfer A01K67/027); Not used, see subgroups] [N9703] [C1207]

C12N5/06B4F . . . . [N: Oocytes, oogonia (fertilised oocytes C12N5/06B2E)] [N0209] [C1207]

C12N5/06B4M . . . . [N: Sperm cells, spermatogonia] [N0209] [C1207]

C12N5/06B4P . . . . [N: Primordial germ cells, e.g. embryonic germ cells (EG)] [N0209]

C12N5/06B4Z . . . . [N: sorting of gametes, e.g. according to sex or motility] [N1108]

C12N5/06B7 . . . [N: Cells from endocrine organs (pancreas C12N5/06B22, gonads C12N5/06B24)] [N0305]

C12N5/06B7A . . . . [N: Adrenal gland] [N0305]

C12N5/06B7E . . . . [N: Pineal gland] [N0305]

C12N5/06B7H . . . . [N: Pituitary gland] [N0305]

C12N5/06B7T . . . . [N: Thyroid and parathyroid glands] [N0305]

C12N5/06B8 . . . [N: Cells of the nervous system] [N9703]

C12N5/06B8A . . . . [N: Neurons] [N9703]

C12N5/06B8B . . . . [N: Sensory transducers, e.g. photoreceptors; Sensory neurons, e.g. for hearing, taste, smell, pH, touch, temperature, pain] [N9703]

C12N5/06B8C . . . . [N: Eye cells, e.g. cornea, iris pigmented cells (photoreceptors C12N5/06B8B)] [N0302] [C0608]

C12N5/06B8G . . . . [N: Glial cells, e.g. astrocytes, oligodendrocytes; Schwann cells] [N9703]

C12N5/06B8P . . . . [N: Stem cells] [N9703] [C1207]

C12N5/06B9 . . . [N: Epidermal cells, skin cells; Cells of the oral mucosa] [N1204]
C12N5/06B9C . . . . [N: Melanocytes] [N1204]
C12N5/06B9H . . . . [N: Hair cells] [N1204]
C12N5/06B9H9 . . . . . [N: Hair stem cells; Hair progenitors (mesenchymal stem cells from hair follicles C12N5/06B13P4)] [N1204]
C12N5/06B9K . . . . [N: Keratinocytes; Whole skin] [N1204]
C12N5/06B9K9 . . . . . [N: Kereatinocyte stem cells; Keratinocyte progenitors] [N1204]
C12N5/06B9M . . . . [N: Mammary cells] [N1204]
C12N5/06B9R . . . . [N: Cells of the oral mucosa] [N1204]
C12N5/06B9S . . . . [N: Cells of secretory glands, e.g. parotid gland, salivary glands, sweat glands, lacrymal glands] [N1204]
C12N5/06B11 . . . [N: Cells from the blood or the immune system] [N0305]

[N: **Note**
Commited progenitors are classified with their progeny
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C12N5/06B11B . . . . [N: B lymphocytes] [N0305]
C12N5/06B11C . . . . [N: T lymphocytes] [N0305] [C1207]
C12N5/06B11C2 . . . . . [N: Immunosuppressive T lymphocytes, e.g. regulatory T cells (Treg)] [N1204]
C12N5/06B11C5 . . . . . [N: Cytotoxic T lymphocytes (CTL), lymphokine activated killer cells (LAK)] [N1204]
C12N5/06B11D . . . . [N: Dendritic cells, e.g. Langherhans cells in the epidermis] [N0305]
C12N5/06B11D2 . . . . . [N: Immunosuppressive dendritic cells] [N1204]
C12N5/06B11E . . . . [N: Erythrocytes] [N0305]
C12N5/06B11G . . . . [N: Granulocytes, e.g. basopils, eosinophils, neutrophils, mast cells] [N0305]
C12N5/06B11K . . . . [N: Osteoclasts] [N0305]
C12N5/06B11L . . . . [N: Platelets; Megakaryocytes] [N0305]
C12N5/06B11M . . . . [N: Macrophages, e.g. Kuepfer cells in the liver; Monocytes] [N0305]
C12N5/06B11N . . . . [N: Natural killers cells (NK), NKT cells] [N0305]
C12N5/06B11P . . . . [N: Haematopoietic stem cells; Uncommited or multipotent progenitors] [N0305]
C12N5/06B11S . . . . [N: Splenocytes] [N0307]
C12N5/06B11T . . . . [N: Thymocytes] [N0305]
C12N5/06B11Y . . . . [N: Lymph nodes] [N0307]
C12N5/06B13 . . . [N: Cells of skeletal and connective tissues; Mesenchyme] [N1204]
C12N5/06B13A . . . . [N: Adipocytes; Adipose tissue] [N1204]
C12N5/06B13B . . . . [N: Osteocytes, Osteoblasts, Odontocytes; Bones, Teeth] [N1204]
C12N5/06B13C . . . . [N: Chondrocytes; Cartilage] [N1204]
C12N5/06B13F . . . . [N: Adult fibroblasts] [N1204]
C12N5/06B13H . . . . [N: Cardiomyocytes; Heart cells] [N1204]
C12N5/06B13K . . . . [N: Skeletal muscle cells, e.g. myocytes, myotubes, myoblasts] [N1204]
C12N5/06B13K9 . . . . . [N: Satellite cells] [N1204]
C12N5/06B13L . . . . [N: Tenocytes; Tendons, Ligaments] [N1204]
C12N5/06B13M . . . . [N: Smooth muscle cells] [N1204]

C12N5/06B13P . . . . [N: Stem cells] [N1204]
C12N5/06B13P1 . . . . . [N: Bone marrow mesenchymal stem cells (BM-MSC)] [N1204]
C12N5/06B13P2 . . . . . [N: Dental pulp stem cells, Dental follicle stem cells] [N1204]
C12N5/06B13P3 . . . . . [N: Blood-borne mesenchymal stem cells, e.g. from umbilical cord blood] [N1204]
C12N5/06B13P4 . . . . . [N: Mesenchymal stem cells from hair follicles] [N1204]
C12N5/06B13P6 . . . . . [N: Adipose-derived stem cells (ADSC); Adipose stromal stem cells] [N1204]
C12N5/06B13P9 . . . . . [N: Mesenchymal stem cells from other natural sources] [N1204]
C12N5/06B13S . . . . [N: Bone marrow stromal cells; Whole bone marrow (isolated stem cells from bone marrow C12N5/06B11P, C12N5/06B13P1)] [N1204]
C12N5/06B14 . . . [N: Hepatocytes] [N9703]
C12N5/06B14A . . . . [N: Three-dimensional culture, tissue culture or organ culture; Encapsulated cells] [N9703] [C0406]
C12N5/06B14P . . . . [N: Stem cells; Progenitor cells; Precursor cells; Oval cells] [N0205]
C12N5/06B21 . . . [N: Cells from bone marrow stroma] [N0305]
C12N5/06B21P . . . . [N: Mesenchymal stem cells] [N0305]
C12N5/06B22 . . . [N: Pancreatic cells] [N9703] [C0205]
C12N5/06B22A . . . . [N: Three-dimensional culture, tissue culture or organ culture; Encapsulated cells] [N0205] [C0406]
C12N5/06B22P . . . . [N: Stem cells; Progenitor cells; Precursor cells] [N0205]
C12N5/06B23 . . . [N: Cells of the gastro-intestinal tract] [N1204]
C12N5/06B23P . . . . [N: Stem cells; Progenitors] [N1204]
C12N5/06B24 . . . [N: Cells of the genital tract; Non-germinal cells from gonads; Not used, see subgroups] [N9703] [C1207]
C12N5/06B24F . . . . [N: Cells of the female genital tract, e.g. endometrium; Non-germinal cells from ovaries, e.g. ovarian follicle cells (oocytes C12N5/06B4F)] [N1204]
C12N5/06B24M . . . . [N: Cells of the male genital tract, e.g. prostate, epididymis; Non-germinal cells from testis, e.g. Leydig cells, Sertoli cells (spermatogonia C12N5/06B4M)] [N1204]
C12N5/06B25 . . . [N: Cells of the urinary tract or kidneys] [N1204]
C12N5/06B25B . . . . [N: Bladder epithelial cells] [N1204]
C12N5/06B25K . . . . [N: Kidney cells] [N1204]
C12N5/06B25P . . . . [N: Renal stem cells; Renal progenitors] [N1204]
C12N5/06B27 . . . [N: Cells from the lungs or the respiratory tract] [N1204]
C12N5/06B27P . . . . [N: Stem cells; Progenitors] [N1204]
C12N5/06B28 . . . [N: Vascular Endothelial cells] [N9703] [C1207]
C12N5/06B28A . . . . [N: Vascular smooth muscle cells; 3D culture thereof, e.g. models of blood vessels] [N0209]
C12N5/06B28P . . . . [N: Stem cells; Progenitor cells; Precursor cells] [N0209]
C12N5/06B30 . . . [N: Tumour cells; Cancer cells] [N9703] [C0205]
C12N5/06B30A . . . . [N: Cells of blood, e.g. leukemia cells, myeloma cells] [N9703]
C12N5/06B30P . . . . [N: Stem cells; Progenitor cells; Precursor cells] [N0608]
C12N5/06B45 . . . [N: Artificially induced pluripotent stem cells, e.g. iPS] [N1204]

C12N5/06T . . [N: Artificial constructs associating cells of different lineages, e.g. tissue equivalents (blood vessels C12N5/06B28A)] [N0209] [C1207]

C12N5/06T2 . . . [N: Skin equivalents] [N0209]

C12N5/10 . Cells modified by introduction of foreign genetic material [N: Not used, see subgroups] [C0408]

C12N5/12 . . Fused cells, e.g. hybridomas

C12N5/14 . . . Plant cells

C12N5/16 . . . Animal cells

C12N5/16B . . . . [N: one of the fusion partners being a B or a T lymphocyte] [N0207] [C0305]

C12N5/16H . . . . [N: resulting from interspecies fusion] [N0207]

C12N7/00 **Viruses; Bacteriophages; Compositions thereof; Preparation or purification thereof** (preparing medicinal viral antigen or antibody composition, e.g. virus vaccines, A61K39/00) [C0904]

[N: **WARNING** [M1207]
From March 15, 2012 groups C12N7/02-C12N7/08 and subgroups thereof are no longer used for the classification of new documents. The documents in these (sub)groups are being reclassified to the corresponding codes in the range M12N710-M12N795.
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C12N7/02 . Recovery or purification

C12N7/02C . . [N: Packaging cell lines, e.g. transcomplementing cell lines, for production of virus] [N0904]

C12N7/04 . Inactivation or attenuation; Producing viral sub-units

C12N7/04A . . [N: Pseudoviral particles; Non infectious pseudovirions, e.g. genetically engineered] [N9701]

C12N7/06 . . [N: Inactivation or attenuation] by chemical treatment [C9701]

C12N7/08 . . [N: Inactivation or attenuation] by serial passage of virus [C9701]

C12N9/00 **Enzymes; Proenzymes; Compositions thereof** (preparations containing enzymes for cleaning teeth A61K8/66, A61Q11/00; medicinal preparations containing enzymes or pro-enzymes A61K38/43; enzyme containing detergent compositions C11D; [N: enzymes with nucleic acid structure, e.g. ribozymes, C12N15/113])**; Processes for preparing, activating, inhibiting, separating or purifying enzymes** (preparation of malt C12C1/00) [C1012]

Note
Enzymes are generally categorized below according to the "Nomenclature and Classification of Enzymes" of the International Commission on Enzymes. Where appropriate, this designation appears in the groups below in parenthesis.

C12N9/00B . [N: Antibodies with enzymatic activity; e.g. abzymes]

C12N9/00P . [N: Oxidoreductases (1.)] [N1205]

C12N9/00P2 . .]N: acting on CH-OH groups as donors (1.1)] [N1205]

C12N9/00P4 . . [N: acting on the aldehyde or oxo group of donors (1.2)] [N1205]

C12N9/00P6 . . [N: acting on the CH-CH group of donors (1.3)] [N1205]

C12N9/00P8 . . [N: acting on nitrogen containing compounds as donors (1.4, 1.5, 1.6, 1.7)] [N1205]
C12N9/00P8B . . . [N: acting on the CH-NH2 group of donors (1.4)] [N1205]
C12N9/00P8B1 . . . . [N: with NAD or NADP as acceptor (1.4.1)] [N1205]
C12N9/00P8B1M . . . . . [N: Phenylalanine dehydrogenase (1.4.1.20)] [N1205]
C12N9/00P8B2 . . . . [N: with a cytochrome as acceptor (1.4.2)] [N1205]
C12N9/00P8B3 . . . . [N: with oxygen as acceptor (1.4.3)] [N1205]
C12N9/00P8B3C . . . . . [N: D-Amino acid oxidase (1.4.3.3)] [N1205]
C12N9/00P8D . . . [N: acting on CH-NH groups of donors (1.5)] [N1205]
C12N9/00P8D1 . . . . [N: with NAD or NADP as acceptor (1.5.1)] [N1205]
C12N9/00P8D1C . . . . . [N: Dihydrofolate reductase (DHFR) (1.5.1.3)] [N1205]
C12N9/00P8D3 . . . . [N: with oxygen as acceptor (1.5.3)] [N1205]
C12N9/00P8D3A . . . . . [N: Sarcosine oxidase (1.5.3.1)] [N1205]
C12N9/00P8F . . . [N: acting on NADH or NADPH (1.6)] [N1205]
C12N9/00P8F2 . . . . [N: with a heme protein as acceptor (1.6.2)] [N1205]
C12N9/00P8F2B . . . . . [N: Cytochrome-b5 reductase (1.6.2.2)] [N1205]
C12N9/00P8F2D . . . . . [N: NADPH-cytochrome P450 reductase (1.6.2.4)] [N1205]
C12N9/00P8H . . . [N: acting on other nitrogen compounds as donors (1.7)] [N1205]
C12N9/00P8H3 . . . . [N: with oxygen as acceptor (1.7.3) [N1205]
C12N9/00P8H3C . . . . . [N: Uricase (1.7.3.3)] [N1205]
C12N9/00P18 . . [N: acting on a sulfur group of donors (1.8)] [N1205]
C12N9/00P20 . . [N: acting on a heme group of donors (1.9)] [N1205]
C12N9/00P22 . . [N: acting on diphenols and related substances as donors (1.10)] [N1205]
C12N9/00P22C . . . [N: with oxygen as acceptor (1.10.3)] [N1205]
C12N9/00P22C1 . . . . [N: Catechol oxidase (1.10.3.1), i.e. tyrosinase] [N1205]
C12N9/00P22C2 . . . . [N: Laccase (1.10.3.2)] [N1205]
C12N9/00P22C3 . . . . [N: Ascorbate oxidase (1.10.3.3)] [N1205]
C12N9/00P24 . . [N: acting on hydrogen peroxide as acceptor (1.11)] [N1205]
C12N9/00P26 . . [N: acting on hydrogen as donor (1.12)] [N1205]
C12N9/00P28 . . [N: acting on single donors with incorporation of molecular oxygen, i.e. oxygenases (1.13)] [N1205]
C12N9/00P30 . . [N: acting on paired donors with incorporation of molecular oxygen (1.14)] [N1205]
C12N9/00P30C . . . [N: with NADH or NADPH as one donor, and incorporation of one atom of oxygen 1.14.13] [N1205]
C12N9/00P30C39 . . . . [N: Nitric-oxide synthase (1.14.13.39)] [N1205]
C12N9/00P30E . . . [N: with a reduced iron-sulfur protein as one donor (1.14.15)] [N1205]
C12N9/00P30E4 . . . . [N: Steroid 11 beta monooxygenase (P-450 protein) (1.14.15.4)] [N1205]
C12N9/00P30E6 . . . . [N: Cholesterol monooxygenase (cytochrome P 450scc) (1.14.15.6)] [N1205]
C12N9/00P30Z . . . [N: Miscellaneous (1.14.99)] [N1205]
C12N9/00P30Z9 . . . . [N: Steroid 17 alpha-monooxygenase (1.14.99.9)] [N1205]
C12N9/00P30Z10 . . . . [N: Steroid 21-monooxygenase (1.14.99.10)] [N1205]
C12N9/00P32 . . [N: acting on superoxide as acceptor (1.15)] [N1205]
C12N9/00P34 . . [N: oxidizing metal ions (1.16)] [N1205]
C12N9/00P36 . . [N: acting on CH or CH2 groups (1.17)] [N1205]

C12N9/00P38 . . [N: acting on iron-sulfur proteins as donor (1.18)] [N1205]
C12N9/00P40 . . [N: acting on reduced flavodoxin as donor (1.19)] [N1205]

C12N9/10 . Transferases (2.) (ribonucleases 9/22)
C12N9/10A . . [N: transferring one-carbon groups (2.1)] [N9412]
C12N9/10A1 . . . [N: Methyltransferases (general) (2.1.1.)] [N9412]
C12N9/10A1E . . . . [N: Catechol O-methyltransferase (2.1.1.6)] [N1205]
C12N9/10A2 . . . [N: Hydroxymethyl-, formyl-transferases (2.1.2)] [N9412]
C12N9/10A3 . . . [N: Carboxy- and carbamoyl transferases (2.1.3)] [N9412] [M1205]
C12N9/10B . . [N: transferring aldehyde or ketonic groups (2.2)] [N9412] [M1205]
C12N9/10C . . [N: Acyltransferases (2.3)] [N9412]
C12N9/10C1 . . . [N: transferring groups other than amino-acyl groups (2.3.1)] [N9412] [M1205]
C12N9/10C1H . . . . [N: Chloramphenicol O-acetyltransferase (2.3.1.28)] [N1205]
C12N9/10C1P . . . . [N: Naringenin-chalcone synthase (2.3.1.74), i.e. chalcone synthase] [N1205]
C12N9/10C2 . . . [N: Aminoacyltransferases (2.3.2)] [N1205]
C12N9/10C2H . . . . [N: Protein-glutamine gamma-glutamyltransferase (2.3.2.13), i.e. transglutaminase or factor XIII] [N1205]
C12N9/10D . . [N: Glycosyltransferases (2.4)] [N9412]
C12N9/10D1 . . . [N: Hexosyltransferases (2.4.1)] [N1205]
C12N9/10D1E . . . . [N: Levansucrase (2.4.1.10)] [N1205]
C12N9/10D1G . . . . [N: Cellulose synthases (2.4.1.12; 2.4.1.29)] [N1205]
C12N9/10D1H . . . . [N: Sucrose synthase (2.4.1.13)] [N1205]
C12N9/10D1J . . . . [N: Sucrose phosphate synthase (2.4.1.14)] [N1205]
C12N9/10D1L . . . . [N: 1,4-Alpha-glucan branching enzyme (2.4.1.18)] [N1205]
C12N9/10D1M . . . . [N: Cyclomaltodextrin glucanotransferase (2.4.1.19)] [N1205]
C12N9/10D2 . . . [N: Pentosyltransferases (2.4.2)] [N9412]
C12N9/10D9 . . . [N: transferring other glycosyl groups (2.4.99)] [N9412]
C12N9/10E . . [N: transferring alkyl or aryl groups other than methyl groups (2.5)] [N9412]
C12N9/10E18 . . . [N: Glutathione transferase (2.5.1.18)] [N1205]
C12N9/10E19 . . . [N: 3-Phosphoshikimate 1-carboxyvinyltransferase (2.5.1.19), i.e. 5-enolpyruvylshikimate-3-phosphate synthase] [N1205]
C12N9/10F . . [N: transferring nitrogenous groups (2.6)] [N9412]
C12N9/12 . . transferring phosphorus containing groups, e.g. kinases (2.7)
C12N9/12C . . . [N: Phosphotransferases with an alcohol group as acceptor (2.7.1), e.g. protein kinases [N1205]
C12N9/12C21 . . . . [N: Thymidine kinase (2.7.1.21)] [N1205]
C12N9/12D . . . [N: Phosphotransferases with a carboxyl group as acceptor (2.7.2)] [N1205]
C12N9/12E . . . [N: Phosphotransferases with a nitrogenous group as acceptor (2.7.3)] [N1205]
C12N9/12F . . . [N: Phosphotransferases with a phosphate group as acceptor (2.7.4)] [N1205]
C12N9/12H . . . [N: Diphosphotransferases (2.7.6)] [N1205]
C12N9/12J . . . [N: Nucleotidyltransferases (2.7.7)] [N1205]
C12N9/12J6 . . . . [N: DNA-directed RNA polymerase (2.7.7.6)] [N1205]
C12N9/12J7 . . . . [N: DNA-directed DNA polymerase (2.7.7.7), i.e. DNA replicase] [N1205]

C12N9/12J8 . . . . [N: Polyribonucleotide nucleotidyltransferase (2.7.7.8), i.e. polynucleotide phosphorylase] [N1205]

C12N9/12J31 . . . . [N: DNA nucleotidylexotransferase (2.7.7.31), i.e. terminal nucleotidyl transferase] [N1205]

C12N9/12J48 . . . . [N: RNA-directed RNA polymerase (2.7.7.48), i.e RNA replicase] [N1205]

C12N9/12J49 . . . . [N: RNA-directed DNA polymerase (2.7.7.49), i.e. reverse transcriptase or telomerase] [N1205]

C12N9/12J52 . . . . [N: RNA uridylyltransferase (2.7.7.52)] [N1205]

C12N9/12K . . . [N: Transferases for other substituted phosphate groups (2.7.8)] [N1205]

C12N9/12L . . . [N: Phosphotransferases with paired acceptors (2.7.9)] [N1205]

C12N9/13 . . [N: transferring sulfur containing groups (2.8)] [N1205]

C12N9/14 . Hydrolases (3)

C12N9/16 . . acting on ester bonds (3.1)

C12N9/18 . . . Carboxylic ester hydrolases [N: (3.1.1)] [C9709]

C12N9/20 . . . . Triglyceride splitting, e.g. by means of lipase

C12N9/22 . . . Ribonucleases [N: RNAses, DNAses (catalytic nucleic acids C12N15/11B)] [C0406]

C12N9/24 . . acting on glycosyl compounds (3.2)

C12N9/24A . . . [N: hydrolysing O- and S- glycosyl compounds (3.2.1)] [N1205]

C12N9/24A2 . . . . [N: Glucanases] [N1205]

C12N9/24A2B . . . . . [N: acting on alpha -1,4-glucosidic bonds] [N1205]

C12N9/24A2B1 . . . . . [N: Amylases] [N1205]

C12N9/24A2B1A . . . . . {7 dots} [N: Alpha-amylase (3.2.1.1.)] [N1205]

C12N9/24A2B1A2 . . . . . {8 dots} [N: from microbiological source] [N1205]

C12N9/24A2B1A2B . . . . . {9 dots} [N: Fungal source] [N1205]

C12N9/24A2B1A4 . . . . . {8 dots} [N: from plant source] [N1205]

C12N9/24A2B1B . . . . . {7 dots} [N: Beta-amylase (3.2.1.2)] [N1205]

C12N9/24A2B1C . . . . . {7 dots} [N: Glucan 1,4-alpha-glucosidase (3.2.1.3), i.e. glucoamylase] [N1205]

C12N9/24A2B26 . . . . . [N: Beta-fructofuranosidase (3.2.1.26), i.e. invertase] [N1205]

C12N9/24A2D . . . . . [N: acting on beta-1,4-glucosidic bonds] [N1205]

C12N9/24A2D4 . . . . . [N: Cellulases (3.2.1.4; 3.2.1.74; 3.2.1.91; 3.2.1.150)] [N1205]

C12N9/24A2D6 . . . . . [N: Endo-1,3(4)-beta-glucanase (3.2.1.6)] [N1205]

C12N9/24A2D14 . . . . . [N: Chitinase (3.2.1.14)] [N1205]

C12N9/24A2D21 . . . . . [N: Beta-glucosidase (3.2.1.21)] [N1205]

C12N9/24A2D73 . . . . . [N: Licheninase (3.2.1.73)] [N1205]

C12N9/24A2F . . . . . [N: acting on alpha-1,6-glucosidic bonds] [N1205]

C12N9/24A2F11 . . . . . [N: Dextranase (3.2.1.11)] [N1205]

C12N9/24A2F41 . . . . . [N: Pullulanase (3.2.1.41)] [N1205]

C12N9/24A2F68 . . . . . [N: Isoamylase (3.2.1.68)] [N1205]

C12N9/24A4 . . . . [N: Lysozyme (3.2.1.17)] [N1205]

C12N9/24A6 . . . . [N: acting on alpha-galactose-glycoside bonds, e.g. alpha-galactosidase (3.2.1.22)] [N1205]

C12N9/24A8 . . . . [N: acting on beta-galactose-glycoside bonds, e.g. carrageenases (3.2.1.83; 3.2.1.157); beta-agarase (3.2.1.81)] [N1205]

C12N9/24A8B . . . . . [N: Beta-galactosidase (3.2.1.23), i.e. exo-(1-->4)-beta-D-galactanase] [N1205]

C12N9/24A10 . . . . [N: Hyaluronoglucosaminidase (3.2.1.35), i.e hyaluronidase] [N1205]

C12N9/24A12 . . . . [N: Hemicellulases not provided in a preceding group] [N1205]

C12N9/24A12B . . . . . [N: Xylanases] [N1205]

C12N9/24A12B8 . . . . . [N: Endo-1,4-beta-xylanase (3.2.1.8)] [N1205]

C12N9/24A12B32 . . . . . [N: Xylan endo-1,3-beta-xylosidase (3.2.1.32), i.e. endo-1,3-beta-xylanase] [N1205]

C12N9/24A12D . . . . . [N: Mannanases] [N1205]

C12N9/24A12D25 . . . . . [N: Beta-mannosidase (3.2.1.25), i.e. mannanase] [N1205]

C12N9/24A12D78 . . . . . [N: Mannan endo-1,4-beta-mannosidase (3.2.1.78), i.e. endo-beta-mannanase] [N1205]

C12N9/24B . . . [N: hydrolysing N- glycosyl compounds (3.2.2)] [N1205]

C12N9/26 . . . acting on alpha -1, 4-glucosidic bonds, e.g. hyaluronidase, invertase, amylase

C12N9/38 . . . acting on beta-galactose-glycoside bonds, e.g. beta-galactosidase

C12N9/42 . . . acting on beta-1, 4-glucosidic bonds, e.g. cellulase

C12N9/44 . . . acting on alpha-1, 6-glucosidic bonds, e.g. isoamylase, pullulanase

C12N9/48 . . acting on peptide bonds (3.4) [N1205]

C12N9/48A . . . [N: Exopeptidases (3.4.11-3.4.19)] [N1205]

C12N9/50 . . . Proteinases [N: Endopeptidases (3.4.21-3.4.25)] [N1205]

C12N9/50A . . . . [N: derived from viruses]

C12N9/50A1 . . . . . [N: derived from RNA viruses]

C12N9/52 . . . . derived from bacteria

C12N9/54 . . . . . bacteria being Bacillus

C12N9/58 . . . . derived from fungi

C12N9/60 . . . . . from yeast

C12N9/62 . . . . . from Aspergillus

C12N9/63 . . . . [N: derived from plants] [N1205]

C12N9/64 . . . . derived from animal tissue [C9605]

C12N9/64E . . . . . [N: from non-mammals] [N9605]

C12N9/64E3 . . . . . [N: not being snakes] [N1205]

C12N9/64E3A . . . . . {7 dots} [N: Serine endopeptidases (3.4.21)] [N1205]

C12N9/64E3B . . . . . {7 dots} [N: Cysteine endopeptidases (3.4.22)] [N1205]

C12N9/64E3C . . . . . {7 dots} [N: Aspartic endopeptidases (3.4.23)] [N1205]

C12N9/64E3D . . . . . {7 dots} [N: Metalloendopeptidases (3.4.24)] [N1205]

C12N9/64E4 . . . . . [N: from snakes] [N9605]

C12N9/64F . . . . . [N: from mammals] [N9605]

C12N9/64F21 . . . . . [N: Serine endopeptidases (3.4.21)] [N1205]

C12N9/64F21A . . . . . {7 dots} [N: Chymotrypsins (3.4.21.1; 3.4.21.2); Trypsin (3.4.21.4)] [N1205]

C12N9/64F21B . . . . . {7 dots} [N: Thrombin (3.4.21.5)] [N1205]

C12N9/64F21C . . . . . {7 dots} [N: Coagulation factor Xa (3.4.21.6)] [N1205]

C12N9/64F21D . . . . . {7 dots} [N: Plasmin (3.4.21.7), i.e. fibrinolysin] [N1205]
C12N9/64F21F . . . . . {7 dots} [N: Coagulation factor VIIa (3.4.21.21)] [N1205]
C12N9/64F21G . . . . . {7 dots} [N: Coagulation factor IXa (3.4.21.22)] [N1205]
C12N9/64F21H . . . . . {7 dots} [N: Coagulation factor XIa (3.4.21.27)] [N1205]
C12N9/64F21K . . . . . {7 dots} [N: Kallikreins (3.4.21.34; 3.4.21.35)] [N1205]
C12N9/64F21L . . . . . {7 dots} [N: Elastases, e.g. pancreatic elastase (3.4.21.36); leukocyte elastase (3.4.31.37)] [N1205]
C12N9/64F21M . . . . . {7 dots} [N: Coagulation factor XIIa (3.4.21.38)] [N1205]
C12N9/64F21P . . . . . {7 dots} [N: Dibasic site splicing serine proteases, e.g. kexin (3.4.21.61); furin (3.4.21.75) and other proprotein convertases] [N1205]
C12N9/64F21Q . . . . . {7 dots} [N: Plasminogen activators] [N1205]
C12N9/64F21Q68 . . . . . {8 dots} [N: t-plasminogen activator (3.4.21.68), i.e. tPA] [N1205]
C12N9/64F21Q73 . . . . . {8 dots} [N: u-Plasminogen activator (3.4.21.73), i.e. urokinase] [N1205]
C12N9/64F21R . . . . . {7 dots} [N: Protein C (3.4.21.69)] [N1205]
C12N9/64F21S . . . . . {7 dots} [N: Granzymes, e.g granzyme A (3.4.21.78); granzyme B (3.4.21.79)] [N1205]
C12N9/64F21Z . . . . . {7 dots} [N: Blood coagulation factors not provided for in a preceding group or according to more than one of the proceeding groups] [N1205]
C12N9/64F22 . . . . . [N: Cysteine endopeptidases (3.4.22)] [N1205]
C12N9/64F22B . . . . . {7 dots} [N: Interleukin 1-beta convertase-like enzymes (3.4.22.10; 3.4.22.36; 3.4.22.63)] [N1205]
C12N9/64F23 . . . . . [N: Aspartic endopeptidases (3.4.23)] [N1205]
C12N9/64F23A . . . . . {7 dots} [N: Pepsins (3.4.23.1; 3.4.23.2; 3.4.23.3)] [N1205]
C12N9/64F23D . . . . . {7 dots} [N: Chymosin (3.4.23.4), i.e. rennin] [N1205]
C12N9/64F23F . . . . . {7 dots} [N: Renin (3.4.23.15)] [N1205]
C12N9/64F24 . . . . . [N: Metalloendopeptidases (3.4.24)] [N1205]
C12N9/64F24C . . . . . {7 dots} [N: Matrix metalloproteases (MMP's), e.g. interstitial collagenase (3.4.24.7); Stromelysins (3.4.24.17; 3.2.1.22); Matrilysin (3.4.24.23)] [N1205]
C12N9/64F24E . . . . . {7 dots} [N:Neprilysin (3.4.24.11), i.e. enkephalinase or neutral-endopeptidase 24.11] [N1205]
C12N9/64F24G . . . . . {7 dots} [N: Endothelin-converting enzyme (3.4.24.71] [N1205]
C12N9/78 . . acting on carbon to nitrogen bonds other than peptide bonds (3.5)
C12N9/80 . . . acting on amide bonds in linear amides [N: (3.5.1)] [N9709]
C12N9/82 . . . . Asparaginase [N: (3.5.1.1)] [C1207]
C12N9/84 . . . . Penicillin amidase [N: (3.5.1.11)] [C1207]
C12N9/86 . . . acting on amide bonds in cyclic amides, e.g. penicillinase [N: (3.5.2)] [C9709]

C12N9/88 . Lyases (4.)

C12N9/90 . Isomerases (5.)
C12N9/92 . . Glucose isomerase [N: (5.3.1.5; 5.3.1.9; 5.3.1.18)] [C1207]

C12N9/93 . [N: Ligases (6)] [N1205]

C12N9/94 . Pancreatin

C12N9/96 . Stabilising an enzyme by forming an adduct or a composition; Forming enzyme conjugates

C12N9/98 . Preparation of granular or free-flowing enzyme compositions (C12N9/96 takes precedence)

C12N9/99 . Enzyme inactivation by chemical treatment

C12N11/00 **Carrier-bound or immobilised enzymes; Carrier-bound or immobilised microbial cells; Preparation thereof**

C12N11/02 . Enzymes or microbial cells being immobilised on or in an organic carrier

C12N11/04 . . entrapped within the carrier, e.g. gel, hollow fibre

C12N11/06 . . attached to the carrier via a bridging agent

C12N11/08 . . carrier being a synthetic polymer

C12N11/10 . . carrier being a carbohydrate

C12N11/12 . . . Cellulose or derivative thereof

C12N11/14 . Enzymes or microbial cells being immobilised on or in an inorganic carrier

C12N11/16 . Enzymes or microbial cells being immobilised on or in a biological cell

C12N11/18 . Multi-enzyme systems

C12N13/00 **Treatment of micro-organisms or enzymes with electrical or wave energy, e.g. magnetism, sonic waves**

C12N15/00 **Mutation or genetic engineering; DNA or RNA concerning genetic engineering, vectors, e.g. plasmids, or their isolation, preparation or purification; Use of hosts therefor** (mutants or genetically engineered micro-organisms, per se C12N1/00, C12N5/00, C12N7/00; new plants per se A01H; plant reproduction by tissue culture techniques A01H4/00; new animals per se A01K67/00; use of medicinal preparations containing genetic material which is inserted into cells of the living body to treat genetic diseases, gene therapy A61K48/00)

C12N15/01 . Preparation of mutants without inserting foreign genetic material therein; Screening processes therefor

C12N15/02 . Preparation of hybrid cells by fusion of two or more cells, e.g. protoplast fusion [N: (monoclonal antibodies C07K16/00; apparatus for cell fusion C12M)] [C0207]

C12N15/03 . . Bacteria

C12N15/04 . . Fungi

C12N15/09 . Recombinant DNA-technology

C12N15/10 . . Processes for the isolation, preparation or purification of DNA or RNA (chemical

eparation of DNA or RNA C07H21/00; preparation of non-structural polynucleotides from micro-organisms or with enzymes C12P19/34) [C0703]

[N: **Notes**
After the symbol C12N15/10 to C12N15/10D, and separated therefrom by a + sign, it is desirable to add the indexing codes selected from groups M12Q500/00 to M12Q599/00, relating to relevant technical features of the invention. When more than one indexing code is selected, the different codes are separated by a + sign. Example : C12N15/10C1 + 537/125 + 521/537
]

C12N15/10A . . . [N: Extracting or separating nucleic acids from biological samples, e.g. pure separation or isolation methods; Conditions, buffers or apparatuses therefor] [N9706]

C12N15/10A2 . . . . [N: by means of a solid support carrier, e.g. particles, polymers] [N9910]

C12N15/10A2B . . . . . [N: by chromatography, e.g. electrophoresis, ion-exchange, reverse phase] [N9910]

C12N15/10A2D . . . . . [N: by using magnetic beads] [N9910]

C12N15/10A3 . . . . [N: by filtration, e.g. using filters, frits, membranes] [N9910]

C12N15/10B . . . [N: Mutagenizing nucleic acids] [N9706]

C12N15/10B1 . . . . [N: In vivo mutagenesis using high mutation rate "mutator" host strains by inserting genetic material, e.g. encoding an error prone polymerase, disrupting a gene for mismatch repair] [N0608]

C12N15/10B2 . . . . [N: by DNA shuffling, e.g. RSR, STEP, RPR] [N0110]

C12N15/10B4 . . . . [N: mutagenesis by gene assembly, e.g. assembly by oligonucleotide extension PCR] [N1006]

C12N15/10C . . . [N: Isolating an individual clone by screening libraries] [N9706]

C12N15/10C1 . . . . [N: Screening libraries presented on the surface of microorganisms, e.g. phage display, E. coli display] [N9706]

C12N15/10C2 . . . . [N: Ribosome/Polysome display, e.g. SPERT, ARM] [N0110]

C12N15/10C3 . . . . [N: Preparation or screening of libraries displayed on scaffold proteins] [N0603]s

C12N15/10C4 . . . . [N: SELEX] [N0110]

C12N15/10C5 . . . . [N: Gene trapping, e.g. exon-, intron-, IRES-, signal sequence-trap cloning, trap vectors] [N0603]

C12N15/10C6 . . . . [N: Protein x Protein interaction, e.g. two hybrid selection] [N0110]

C12N15/10C7 . . . . [N: Directional evolution of libraries, e.g. evolution of libraries is achieved by mutagenesis and screening or selection of mixed population of organisms] [N0603]

C12N15/10C8 . . . . [N: mRNA-Display, e.g. polypeptide and encoding template are connected covalently] [N0110] [C0504]

C12N15/10C9 . . . . [N: Preparation or screening of tagged libraries, e.g. tagged microorganisms by STM-mutagenesis, tagged polynucleotides, gene tags] [N0603]

C12N15/10C10 . . . . [N: Template (nucleic acid) mediated chemical library synthesis, e.g. chemical and enzymatical DNA-templated organic molecule synthesis, libraries prepared by non ribosomal polypeptide synthesis (NRPS), DNA/RNA-polymerase mediated polypeptide synthesis] [N0504]

C12N15/10C11 . . . . [N: Differential gene expression library synthesis, e.g. subtracted libraries, differential screening] [N0603]

C12N15/10C12 . . . . [N: by coupling phenotype to genotype, not provided for in other groups of this subclass][N0504]

C12N15/10C13 . . . . [N: Screening libraries by altering the phenotype or phenotypic trait of the host (reporter assays C12N15/10C15)] [N0603]

C12N15/10C14 . . . . [N: Preparation or screening gene libraries by chromosomal integration of polynucleotide sequences, HR-, site-specific-recombination, transposons, viral vectors] [N0603]

C12N15/10C15 . . . . [N: Preparation or screening of expression libraries, e.g. reporter assays] [N0603]

C12N15/10C16 . . . . [N: Design, preparation, screening or analysis of libraries using computer algorithms] [N0603]

C12N15/10C100 . . . . [N: General methods of preparing gene libraries, not provided for in other subgroups] [N0603]

C12N15/10D . . . [N: cDNA Synthesis; Subtracted cDNA library construction, e.g. RT, RT-PCR] [N0005]

C12N15/11 . . DNA or RNA fragments; Modified forms thereof (DNA or RNA not used in recombinant technology, C07H21/00); [N: Non-coding nucleic acids having a biological activity] [C1002]

[N: **Note**
[C1002]

1. Documents relating to DNA or its corresponding RNA and their use in recombinant DNA technology or the preparation of specific peptides, e.g. enzymes, are classified in subclass C07K or in group C12N9/00 according to the peptides, with the appropriate indexing codes relating to their use in recombinant technology. Groups C12N15/11 to C12N15/117 cover also the use of non-coding nucleic acids as active ingredients in medicinal preparations. The M12N300/00 ICO scheme has to be applied to these groups. When documents classifiable in one or more subgroups disclose general principles of the technology applicable to the whole field, classification is also made in group C12N15/11M

]

C12N15/11M . . . [N: General methods applicable to biologically active non-coding nucleic acids] [N1002]

C12N15/113 . . . Non-coding nucleic acids modulating the expression of genes, e.g.antisense oligonucleotides; [N: Antisense DNA or RNA; Triplex- forming oligonucleotides; Catalytic nucleic acids, e.g. ribozymes; Nucleic acids used in co-suppression or gene silencing (when used in plants C12N15/82B4)] [N1002]

C12N15/113A . . . . [N: against viruses] [N1002]

C12N15/113A1 . . . . . [N: against retroviridae, e.g. HIV] [N1002]

C12N15/113A3 . . . . . [N: against herpetoviridae, e.g. HSV] [N1002]

C12N15/113B . . . . [N: against oncogenes or tumor suppressor genes] [N1002]

C12N15/113C . . . . [N: against growth factors, growth regulators, cytokines, lymphokines or hormones] [N1002]

C12N15/113D . . . . [N: against enzymes (viral enzymes C12N15/113A; receptors C12N15/113E)] [N1002]

C12N15/113E . . . . [N: against receptors or cell surface proteins] [N1002]

C12N15/115 . . . Aptamers, i.e. nucleic acids binding a target molecule specifically and with high affinity without hybridising therewith; [N: Nucleic acids binding to non-nucleic acids, e.g. aptamers] [N1002]

[N: **Note** [N1002]
Aptamers fused to compounds which are already classified in groups

2N15/11 to C12N15/117, are classified with the corresponding compound]

C12N15/117 . . . Nucleic acids having immunomodulatory properties, e.g. containing CpG-motifs [N1002]

C12N15/52 . . . Genes encoding for enzymes or proenzymes

Note
In this group genes encoding for proenzymes are classified with the corresponding genes encoding enzymes.

C12N15/62 . . . DNA sequences coding for fusion proteins

Note
In this group, the following term is used with the meaning indicated:

- "fusion" means the fusion of two different proteins.

C12N15/62A . . . . [N: containing a sequence coding for a signal sequence]

C12N15/63 . . Introduction of foreign genetic material using vectors; Vectors; Use of hosts therefor; Regulation of expression

C12N15/63A . . . [N: Externally inducible repressor mediated regulation of gene expression, e.g. tetR inducible by tetracyline] [N9904]

C12N15/64 . . . General methods for preparing the vector, for introducing it into the cell or for selecting the vector-containing host

C12N15/65 . . . using markers (enzymes used as markers C12N15/52)

C12N15/66 . . . General methods for inserting a gene into a vector to form a recombinant vector using cleavage and ligation; Use of non-functional linkers or adaptors, e.g. linkers containing the sequence for a restriction endonuclease

Note
In this group, the following expression is used with the meaning indicated:

- "non-functional linkers" means DNA sequences which are used to link DNA sequences
  and which have no known function of structural gene or regulating function.

C12N15/67 . . . General methods for enhancing the expression

C12N15/68 . . . . Stabilisation of the vector

C12N15/69 . . . . Increasing the copy number of the vector

C12N15/70 . . . Vectors or expression systems specially adapted for E. coli

Notes

1. This group covers the use of E. coli as host.

2. Shuttle vectors also replicating in E. coli are classified according to the other host.

C12N15/71 . . . . Expression systems using regulatory sequences derived from the trp-operon

C12N15/72 . . . . Expression systems using regulatory sequences derived from the lac-operon

C12N15/73 . . . . Expression systems using phage (lambda) regulatory sequences

C12N15/74 . . . Vectors or expression systems specially adapted for prokaryotic hosts other than E. coli, e.g. Lactobacillus, Micromonospora

Note
This group covers the use of prokaryotes as hosts.

C12N15/74A . . . . [N: for Agrobacterium; Rhizobium; Bradyrhizobium]

C12N15/74B . . . . [N: for lactic acid bacteria (Streptococcus; Lactococcus; Lactobacillus; Pediococcus; Enterococcus; Leuconostoc; Propionibacterium; Bifidobacterium; Sporolactobacillus)]

C12N15/75 . . . . for Bacillus

C12N15/76 . . . . for Actinomyces; for Streptomyces

C12N15/77 . . . . for Corynebacterium; for Brevibacterium

C12N15/78 . . . . for Pseudomonas

C12N15/79 . . . Vectors or expression systems specially adapted for eukaryotic hosts

Note
This group covers the use of eukaryotes as hosts.

C12N15/80 . . . . for fungi

C12N15/81 . . . . . for yeasts

C12N15/81A . . . . . [N: for yeasts other than Saccharomyces]

C12N15/82 . . . . for plant cells, [N: e.g. plant artificial chromosomes (PACs)] [C0211]

[N: **Note**
Documents are being continuously reclassified into this new classification scheme. See Warning notes below
]

C12N15/82A . . . . . [N: Methods for introducing genetic material into plant cells, e.g. DNA, RNA, stable or transient incorporation, tissue culture methods adapted for transformation] [N9607] [C0211]

C12N15/82A4 . . . . . [N: by biological means, e.g. cell mediated or natural vector] [N9607]

C12N15/82A4A . . . . . {7 dots} [N: Virus mediated transformation] [N9607]

C12N15/82A4B . . . . . {7 dots} [N: Agrobacterium mediated transformation] [N9607]

C12N15/82A6 . . . . . [N: by physical or chemical, i.e. non-biological, means, e.g. electroporation, PEG mediated] [N9607]

C12N15/82A6D . . . . . {7 dots} [N: by mechanical means, e.g. microinjection, particle bombardment, silicon whiskers] [N9607] [C0211]

C12N15/82A8 . . . . . [N: Selection, visualisation of transformants, reporter constructs, e.g. antibiotic resistance markers] [N9607] [C0211]

[N: **Note**
Standard selectable markers such as neomycin phosphotransferase (NPT) are not systematically classified in C12N15/82A8
]

C12N15/82A8D . . . . . {7 dots} [N: Non-antibiotic resistance markers, e.g. morphogenetic, metabolic markers] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82A8
]

C12N15/82A8D20 . . . . . {8 dots} [N: Colour markers, e.g. beta-glucoronidase (GUS), green fluorescent protein (GFP), carotenoid] [N0211]

[N: **WARNING**

Incomplete, see also C12N15/82A8
]

C12N15/82A10 . . . . . [N: Targeted insertion of genes into the plant genome by homologous recombination] [N9607]

C12N15/82A12 . . . . . [N: Plastid transformation] [N9607]

C12N15/82B . . . . . [N: Methods for controlling, regulating or enhancing expression of transgenes in plant cells] [N9607] [C0211]

C12N15/82B2 . . . . . [N: Gene switch] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B
]

C12N15/82B4 . . . . . [N: Antisense, co-suppression, viral induced gene silencing (VIGS), post-transcriptional induced gene silencing (PTGS)] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B
]

C12N15/82B6 . . . . . [N: Reducing position variability, e.g. by the use of scaffold attachment region/matrix attachment region (SAR/MAR); Use of SAR/MAR to regulate gene expression] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B
]

C12N15/82B8 . . . . . [N: Transit peptides] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B
]

C12N15/82B20 . . . . . [N: Developmentally regulated expression systems, tissue, organ specific, temporal or spatial regulation] [N9607] [C0211]

C12N15/82B20A . . . . . {7 dots} [N: Vegetative tissue-specific promoters] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20A2 . . . . . {8 dots} [N: Leaf-specific, e.g. including petioles, stomata] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20A4 . . . . . {8 dots} [N: Stem-specific, e.g. including tubers, beets] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20A6 . . . . . {8 dots} [N: Root-specific] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20A8 . . . . . {8 dots} [N: Meristem-specific, e.g. nodal, apical] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20B . . . . . {7 dots} [N: Reproductive tissue-specific promoters] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20B2 . . . . . {8 dots} [N: Male-specific, e.g. anther, tapetum, pollen] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20B4 . . . . . {8 dots} [N: Female-specific, e.g. pistil, ovule] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20B6 . . . . . {8 dots} [N: Seed-specific, e.g. embryo, endosperm] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B20B8 . . . . . {8 dots} [N: Fruit-specific] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B20
]

C12N15/82B24 . . . . . [N: Externally regulated expression systems] [N9607] [C0211]

C12N15/82B24B . . . . . {7 dots} [N: chemically inducible, e.g. tetracycline] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B24
]

C12N15/82B24D . . . . . {7 dots} [N: pathogen inducible] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82B24
]

C12N15/82C . . . . . [N: Phenotypically and genetically modified plants via recombinant DNA technology] [N9607]

C12N15/82C4 . . . . . [N: with non-agronomic quality (output) traits, e.g. for industrial processing; Value added, non-agronomic traits] [N9607] [C0211]

C12N15/82C4B . . . . . {7 dots} [N: involving biosynthetic or metabolic pathways, i.e. metabolic engineering, e.g. nicotine, caffeine] [N9607] [C0211]

C12N15/82C4B2 . . . . . {8 dots} [N: involving modified carbohydrate or sugar alcohol metabolism, e.g. starch biosynthesis] [N9607]

C12N15/82C4B2A . . . . . {9 dots} [N: Non-starch polysaccharides, e.g. cellulose, fructans, levans] [N0211]

[N: **WARNING**

Incomplete, see also C12N15/82C4B2
]

C12N15/82C4B4 . . . . . {8 dots} [N: involving modified lipid metabolism, e.g. seed oil composition] [N9607]

C12N15/82C4B6 . . . . . {8 dots} [N: involving ethylene biosynthesis, senescence or fruit development, e.g. modified tomato ripening, cut flower shelf-life] [N9607] [C0211]

C12N15/82C4B8 . . . . . {8 dots} [N: involving pigment biosynthesis] [N9607] [C0211]

[N: **Note**
Transgenic plants with altered flower morphology are also classified in this group
]

C12N15/82C4B10 . . . . . {8 dots} [N: Amino acid content, e.g. synthetic storage proteins, altering amino acid biosynthesis] [N9607] [C0211]

C12N15/82C4B10A . . . . . {9 dots} [N: Methionine or cysteine] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C4B10
]

C12N15/82C4B10B . . . . . {9 dots} [N: Tryptophan or lysine] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C4B10
]

C12N15/82C4B12 . . . . . {8 dots} [N: involving lignin biosynthesis] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C4B
]

C12N15/82C4D . . . . . {7 dots} [N: for the production of primary gene products, e.g. pharmaceutical products, interferon] [N9607] [C0211]

C12N15/82C4D2 . . . . . {8 dots} [N: for the production of oral vaccines (antigens) or immunoglobulins] [N9607] [C0211]

C12N15/82C4E . . . . . {7 dots} [N: Phytoremediation] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C4
]

C12N15/82C8 . . . . . [N: with agronomic (input) traits, e.g. crop yield] [N9607] [C0211]

C12N15/82C8A . . . . . {7 dots} [N: involving plant development (not used)] [N0211]

C12N15/82C8A2 . . . . . {8 dots} [N: Ablation; Apoptosis] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8A4 . . . . . {8 dots} [N: Transgene containment, e.g. gene dispersal] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8A6 . . . . . {8 dots} [N: Abscission; Dehiscence; Senescence] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8A8 . . . . . {8 dots} [N: Seed dormancy, germination or sprouting] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8A10 . . . . . {8 dots} [N: Photosynthesis] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8A12 . . . . . {8 dots} [N: Flower development or morphology, e.g. flowering promoting factor (FPF)] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8B . . . . . {7 dots} [N: for stress resistance, e.g. heavy metal resistance] [N9607] [N0211]

C12N15/82C8B2 . . . . . {8 dots} [N: for drought, cold, salt resistance] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8B
]

C12N15/82C8B4 . . . . . {8 dots} [N: for herbicide resistance] [N9607]

C12N15/82C8B4A . . . . . {9 dots} [N: Glyphosate] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8B4
]

C12N15/82C8B4B . . . . . {9 dots} [N: Phosphinotricin] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8B4
]

C12N15/82C8B4C . . . . . {9 dots} [N: Sulfonylurea] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8B4
]

C12N15/82C8B6 . . . . . {8 dots} [N: for biotic stress resistance, pathogen resistance, disease resistance] [N9607] [C0211]

C12N15/82C8B6A . . . . . {9 dots} [N: for bacterial resistance] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8B6
]

C12N15/82C8B6B . . . . . {9 dots} [N: for fungal resistance] [N0211]

[N: **WARNING**

Incomplete, see also C12N15/82C8B6
]

C12N15/82C8B6C . . . . . {9 dots} [N: for virus resistance] [N9607]

C12N15/82C8B6D . . . . . {9 dots} [N: for nematode resistance] [N9607]

C12N15/82C8B6E . . . . . {9 dots} [N: for insect resistance] [N9607]

C12N15/82C8D . . . . . {7 dots} [N: for fertility modification, e.g. apomixis] [N9607] [C0211]

C12N15/82C8D2 . . . . . {8 dots} [N: Male sterility] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8D
]

C12N15/82C8D4 . . . . . {8 dots} [N: Female sterility] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8D
]

C12N15/82C8H . . . . . {7 dots} [N: Hormone-influenced development] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8H2 . . . . . {8 dots} [N: Abscisic acid (ABA)] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8H4 . . . . . {8 dots} [N: Auxins] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8H6 . . . . . {8 dots} [N: Cytokinins] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8H8 . . . . . {8 dots} [N: Gibberellins; GA3] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/82C8H10 . . . . . {8 dots} [N: Brassinosteroids] [N0211]

[N: **WARNING**
Incomplete, see also C12N15/82C8
]

C12N15/85 . . . . for animal cells

C12N15/85A . . . . . [N: for producing genetically modified animals, e.g. transgenic][N0506]

[N: **Notes** [M1207]
The purpose of the modified animal is indicated using the codes under

01K267/00
]

C12N15/86 . . . . . Viral vectors [C0406]

[N: **WARNING** [M1207]
From March 15, 2012 groups C12N15/861-C12N15/869 and subgroups thereof are no longer used for the classification of new documents. The documents in these (sub)groups are being reclassified to the corresponding codes in the range M12N710-M12N795
]

C12N15/861 . . . . . Adenoviral vectors [N0406]
C12N15/861C . . . . . {7 dots} [N: Chimaeric vector systems comprising heterologous sequences for production of another viral vector] [N0406]
C12N15/861T . . . . . {7 dots} [N: Special methods for targeting systems] [N0406]
C12N15/863 . . . . . Poxviral vectors, [N: e.g. entomopoxvirus] [N0406]
C12N15/863A . . . . . {7 dots} [N: Avian poxviral vectors] [N0406]
C12N15/863V . . . . . {7 dots} [N: Vaccina virus vectors] [N0406]
C12N15/864 . . . . . Parvoviral vectors, [N: e.g. parvovirus, densovirus] [N0406]
C12N15/864A . . . . . {7 dots} [N: Adeno-associated virus] [N0406]
C12N15/866 . . . . . Baculoviral vectors[N0406]
C12N15/867 . . . . . Retroviral vectors [N0406]
C12N15/867P . . . . . {7 dots} [N: Special methods for packaging systems] [N0406]
C12N15/867T . . . . . {7 dots} [N: Special methods for targeting systems] [N0406]
C12N15/869 . . . . . Herpesviral vectors [N0406]
C12N15/869H . . . . . {7 dots} [N: Herpes simplex virus-based vectors] [N0406]
C12N15/87 . . Introduction of foreign genetic material using processes not otherwise provided for, e.g. co-transformation
C12N15/873 . . . Techniques for producing new embryos, e.g. nuclear transfer, manipulation of totipotent cells or production of chimeric embryos [N1001]
C12N15/877 . . . . Techniques for producing new mammalian cloned embroys [N1001]
C12N15/877B . . . . . [N: Bovine embryos] [N1001]
C12N15/877C . . . . . [N: Caprine embryos] [N1001]
C12N15/877E . . . . . [N: Ovine embryos] [N1001]
C12N15/877M . . . . . [N: Murine embryos] [N1001]
C12N15/877P . . . . . [N: Primate embryos] [N1001]
C12N15/877R . . . . . [N: Rabbit embryos] [N1001]
C12N15/877S . . . . . [N: Swine embryos] [N1001]
C12N15/88 . . . using micro-encapsulation, e.g. using [N: amphiphile] liposome vesicle [C9707]
C12N15/89 . . . using micro-injection
C12N15/89B . . . . [N: using biolistic methods] [N9706]
C12N15/90 . . . Stable introduction of foreign DNA into chromosome
C12N15/90B . . . . [N: using homologous recombination] [N9706]
C12N15/90B2 . . . . . [N: in geasts] [N9706]
C12N15/90B4 . . . . . [N: in mammalian cells] [N9706]