Appendices

Appendix IV: Feature Keys and Qualifiers – a brief explanation of what they are and a sample of the ones we use.

1 – **Feature Keys**: They describe features with DNA coordinates and once marked, they all appear in the Artemis main window. The ones we use are:

CDS: Marks the extent of the coding sequence.

RBS: Ribosomal binding site

misc feature: Miscellaneous feature in the DNA

rRNA: Ribosomal RNA

repeat_region repeat_unit stem_loop

tRNA: Transfer RNA

2 – Qualifiers: They describe features in relation to their coordinates. Once marked they appear in the lower part of the Artemis window. They describe the feature whose coordinates appear in the 'location' part of the editing window. The ones we commonly use for annotation at the Sanger Institute are:

/class: Classification scheme we use "in-house" developed from Monica Riley's MultiFun assignments (see Appendix VI).

/colour: Also used in-house in order to differentiate between different types of genes and other features.

/gene: Descriptive gene a name, eg. ilvE, argA etc.

/label: Allows you to label a gene/feature in the main view panel.

/note: This qualifier allows for the inclusion of free text. This could be a description of the evidence supporting the functional prediction or other notable features/information which cannot be described using other qualifiers.

/product: The assigned possible function for the protein goes here.

/**pseudo**: Matches in different frames to consecutive segments of the same protein in the databases can be linked or joined as one and edited in one window. They are marked as pseudogenes. They are normally not functional and are considered to have been mutated.

/locus tag: Systematic gene number, eg SAS1670, Sty2412 etc.

The list of keys and qualifiers accepted by EMBL in sequence/annotation submission files are list at the following web page:

http://www3.ebi.ac.uk/Services/WebFeat/

Appendix VI: Prokaryotic Protein Classification Scheme used within the PSU

This scheme was adapted for in-house use from the Monica Riley's protein classification (http://genprotec.mbl.edu/files/Multifun.html).

More classes can be added depending on the microorganism that is being annotated (e.g secondary metabolites, sigma factors (ECF or non-ECF), etc).

- 0.0.0 Unknown function, no known homologs
- 0.0.1 Conserved in Escherichia coli
- 0.0.2 Conserved in organism other than Escherichia coli
- 1.0.0 Cell processes
 - 1.1.1 Chemotaxis and mobility
 - 1.2.1 Chromosome replication
 - 1.3.1 Chaperones
- 1.4.0 Protection responses
 - 1.4.1 Cell killing
 - 1.4.2 Detoxification
 - 1.4.3 Drug/analog sensitivity
 - 1.4.4 Radiation sensitivity
- 1.5.0 Transport/binding proteins
 - 1.5.1 Amino acids and amines
 - 1.5.2 Cations
 - 1.5.3 Carbohydrates, organic acids and alcohols
 - 1.5.4 Anions
 - 1.5.5 Other
- 1.6.0 Adaptation
 - 1.6.1 Adaptations, atypical conditions
 - 1.6.2 Osmotic adaptation
 - 1.6.3 Fe storage
- 1.7.1 Cell division
- 2.0.0 Macromolecule metabolism
- 2.1.0 Macromolecule degradation
 - 2.1.1 Degradation of DNA

- 2.1.3 Degradation of polysaccharides
- 2.1.2 Degradation of RNA 2.1.4 Degradation of proteins, peptides, glycoproteins
- 2.2.0 Macromolecule synthesis, modification
 - 2.2.01 Amino acyl tRNA synthesis; tRNA modification 2.2.07 Phospholipids
 - 2.2.02 Basic proteins synthesis, modification 2.2.08 Polysaccharides - (cytoplasmic)
 - 2.2.03 DNA replication, repair, restriction./modification 2.2.09 Protein modification
 - 2.2.04 Glycoprotein 2.2.10 Proteins - translation and modification
 - 2.2.05 Lipopolysaccharide 2.2.11 RNA synthesis, modif., DNA transcrip.
 - 2.2.06 Lipoprotein 2.2.12 tRNA
- 3.0.0 Metabolism of small molecules
- 3.1.0 Amino acid biosynthesis

3.1.01 Alanine	3.1.08 Glutamine	3.1.15 Phenylalanine
3.1.02 Arginine	3.1.09 Glycine	3.1.16 Proline
3.1.03 Asparagine	3.1.10 Histidine	3.1.17 Serine
3 1 0/1 A chartate	3 1 11 Icoloucine 3 1 18 Threonine	

3.1.04 Aspartate 3.1.11 Isoleucine 3.1.18 Threonine

3.1.19 Tryptophan 3.1.05 Chorismate 3.1.12 Leucine 3.1.06 Cysteine 3.1.13 Lysine 3.1.20 Tyrosine 3.1.07 Glutamate 3.1.21 Valine 3.1.14 Methionine

Appendix VI (cont):

3.2.01 Acyl carrier protein (ACP) 3.2.02 Biotin 3.2.03 Elotin 3.2.03 Elotin 3.2.04 Enterochelin 3.2.04 Enterochelin 3.2.05 Folic acid 3.2.05 Folic acid 3.2.06 Manaquinone, ubiquinone 3.2.13 Ribotlavin 3.2.14 Thiamin 3.2.07 Lipoate 3.2.16 Manaquinone, ubiquinone 3.2.18 Thioredoxin, glutardoxin, glutathione 3.2.08 Manaquinone, ubiquinone 3.2.19 Elotoxyribonucleotide metabolism 3.3.01 2*Deoxyribonucleotide metabolism 3.3.01 2*Deoxyribonucleotide metabolism 3.3.02 Amino sugars 3.3.03 Entmer-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.19 Folomyribonucleotide metabolism 3.3.08 Misc. glucose metabolism 3.3.09 Non-oxidative branch pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.10 Seadenosyl methionine 3.3.10 Seadenosyl methionine 3.3.10 Panagorial methionine 3.3.11 Salian Seadenosyl methionine 3.3.12 Other 3.11 Aumines 3.12 Amino acids 3.13 Sugar-nucleotide biosynthesis, conversions 3.3.10 Energy metabolism 3.3.10 Amino acids 3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.1 Aerobic respiration 3.5.2 Aeraerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 A Fermentation 3.5.6 Oxidative branch, pentose pathway 3.5.7 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide functions 4.1.1 Ribosomal and stable RNAs 4.1.2 Mirosomal proteins 4.1.3 Outer membrane 4.1.4 Surface polysaccharides & antigens 4.1.5 Surface structures 4.2.1 Ribosomal proteins synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 6.1.1 Global regulatory functions 6.1.0 Not classifie	3.2.0 Biosynthesis of cofactors, carriers				
3.2.02 Biotin 3.2.03 Cobalamin 3.2.04 Enterochelin 3.2.05 Folic acid 3.2.05 Folic acid 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.2.06 Central intermediary metabolism 3.3.01 Central intermediary metabolism 3.3.02 Amino sugars 3.3.01 Cantral intermediary metabolism 3.3.02 Amino sugars 3.3.03 Mino sugars 3.3.04 Gluconeogenesis 3.3.05 Folic acid 3.3.05 Foregy metabolism 3.3.06 Incorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.10 Aurines 3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.4.3 Carbon compounds 3.5.1 Fersy metabolism, carbon 3.5.1 Aerobic respiration 3.5.3 Fersy metabolism, carbon 3.5.1 Party acid and phosphatidic acid biosynthesis 3.6.1 Farty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Rementation 4.1.1 Miner membrane 4.1.2 Mirer meaculus, peptidoglycan 4.1.2 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.1 Cloicin-related functions 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.1 Cloicin-related functions 6.1.1 Clobal regulatory functions		3 2 09 Molyhdonterin			
3.2.03 Cobalamin 3.2.04 Enterochelin 3.2.05 Folic acid 3.2.05 Folic acid 3.2.06 Heme, porphyrin 3.2.06 Heme, porphyrin 3.2.07 Lipocat 3.2.08 Menaquinone, ubiquinone 3.2.16 biotin carboxyl carrier protein (BCCP) 3.3.0 Central intermediary metabolism 3.3.01 2'-Deoxyribonucleotide metabolism 3.3.01 2'-Deoxyribonucleotide metabolism 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Incorporation metal ions 3.3.07 Silvas emetabolism 3.3.07 Silvas emetabolism 3.3.08 Misc, glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.10 ther 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.5.1 Aerobic respiration 3.5.1 Aerobic respiration 3.5.2 Forengy metabolism, carbon 3.5.3 Electron transport 3.5.4 Fermentation 3.5.7 Pyruvate dehydrogenase 3.5.1 Purine ribonucleotide biosynthesis 3.6.1 Fatty acid biosynthesis 3.7.1 Nucleotide biosynthesis 3.7.1 Nucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Surface polysaccharides & antigens 4.1.2 Murein sacculus, peptidoglycan 4.1.3 Surface structures 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.2 Phago-erlated functions 5.1.3 Plasmid-related functions 5.1.1 Colicin-related functions 6.1.1 Global regulatory functions 6.1.1 Global regulatory functions		· ·			
3.2.04 Enterochelin 3.2.05 Folic acid 3.2.05 Folic acid 3.2.07 Lipoate 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.3.01 Central intermediary metabolism 3.3.02 Central intermediary metabolism 3.3.02 Phoxyribonucleotide metabolism 3.3.03 Entner-Douderoff 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.15 Pool, multipurpose conversions of intermed. metab. 3.3.06 Incorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.1 Aerobic respiration 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.7 Pyruvate dehydrogenase 3.5.1 Permentation 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Foolymithesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Nucleotide biosynthesis 3.7.1 Nucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.2 Surface structures 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.1 Phage-related functions 5.1.3 Plasmid-related functions 5.1.1 Phage-related functions 5.1.3 Plasmid-related functions 5.1.1 Cloicin-related functions 6.1.1 Global regulatory functions					
3.2.05 Folic acid 3.2.06 Heme, porphyrin 3.2.07 Lipoate 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.3.00 Central intermediary metabolism 3.3.01 2*-Deoxyribonucleotide metabolism 3.3.01 2*-Deoxyribonucleotide metabolism 3.3.02 Amino sugars 3.3.03 Britner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Silvosylate bypass 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.4.1 Amines 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.3 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.3 Electron transport 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Herrentation 3.5.7 Purvate dehydrogenase 3.5.7 Purvate dehydrogenase 3.5.7 Purvate dehydrogenase 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Repripasmic/exported/lipoproteins 4.1.2 Murein sacculus, peptidoglycan 4.1.2 Surface structures 4.2.1 Ribosomal and stable RNAs 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal and stable RNAs 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions of tinctions 6.1.1 Global regulatory functions					
3.2.06 Heme, porphyrin 3.2.07 Lipoate 3.2.08 Menaquinone, ubiquinone 3.2.08 Menaquinone, ubiquinone 3.2.16 biotin carboxyl carrier protein (BCCP) 3.3.0 Central intermediary metabolism 3.3.01 2*Deoxyribonucleotide metabolism 3.3.02 Amino sugars 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Incorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.07 Misc. glucose metabolism 3.3.08 Sissess and nucleotides 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.21 Ohigan-nucleotide biosynthesis, conversions 3.3.20 Amino acids 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Farty acid and phosphatidic acid biosynthesis 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Areport ransport 3.5.6 Patty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.3 Outer membrane constituents 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.3 Surface structures 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.1.1 Global regulatory functions					
3.2.07 Lipoate 3.2.15 Thioredoxin, glutardoxin, glutathione 3.2.16 biotin carboxyl carrier protein (BCCP) 3.3.08 Menaquinone, ubiquinone 3.2.16 biotin carboxyl carrier protein (BCCP) 3.3.01 2 "Deoxyribonucleotide metabolism 3.3.11 Nucleotide interconversions 3.3.12 Oligosaccharides 3.3.12 Oligosaccharides 3.3.13 Phosphorus compounds 3.3.14 Polyamine biosynthesis 3.3.05 Glyoxylate bypas 3.3.15 Pool, multipurpose conversions of intermed. metab. 3.3.07 Misc. glucose metabolism 3.3.16 S-adenosyl methionine 3.3.16 S-adenosyl methionine 3.3.18 Sugar-nucleotide biosynthesis 3.3.10 Nucleotide hydrolysis 3.3.19 Sulfur metabolism 3.3.19 Nucleotide hydrolysis 3.3.19 Sulfur metabolism 3.3.19 Sulfur metabolism 3.3.19 Sulfur metabolism 3.3.10 Amino acids 3.4.1 Amines 3.4.4 Fatty acids 3.4.2 Amino acids 3.4.5 Other 3.4.1 Arboic respiration 3.5.1 Aerobic respiration 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.7 Pyruvate dehydrogenase 3.5.9 Electron transport 3.5.7 Pyruvate dehydrogenase 3.5.1 Patty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.1.2 Ribosomal proteins - synthesis, modification 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.4 Transposon-related functions 5.1.5 Pathogenicity island-related functions 5.1.4 Transposon-related functions 5.1.5 Pathogenicity island-related functions 5.1.4 Transposon-related functions 5.1.1 Global regulatory functions					
3.2.08 Menaquinone, ubiquinone 3.3.01 2-Deoxyribonucleotide metabolism 3.3.01 2-Deoxyribonucleotide metabolism 3.3.02 Amino sugars 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Rocorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide biosynthesis 3.3.21 other 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.3 Lectron transport 3.5.1 Rerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Fermentation 3.5.4 Fermentation 3.5.5 Fermentation 3.5.6 Tatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.6.1 Patty acid biosynthesis 3.6.1 Patty acid biosynthesis 3.6.1 Patty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosomal and stable RNAs 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal and stable RNAs 4.2.3 Ribosomal and stable RNAs 4.2.3 Ribosomal and stable RNAs 4.2.3 Ribosomal proteins - synthesis, modification 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 5.1.5 Pathogenicity island-related functions 6.1.1 Global regulatory functions					
3.3.0 Central intermediary metabolism 3.3.01 2-Deoxyribonucleotide metabolism 3.3.02 Amino sugars 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Incorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.10 Nucleotide hydrolysis 3.3.11 Mushould be sufficiently a sufficiently assistance of the sufficie					
3.3.01 2'-Deoxyribonucleotide metabolism 3.3.02 Amino sugars 3.3.02 Amino sugars 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.15 Pool, multipurpose conversions of intermed. metab. 3.3.07 Misc, glucose metabolism 3.3.08 Misc, glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.5.1 Aerobic respiration 3.5.3 Electron transport 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.6 Fatty acid and phosphatidic acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.2 Ribosomal proteins - synthesis, modification 4.2.2 Ribosomal and stable RNAs 4.2.3 Ribosomes - maturation and modification 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.0 Clictin-related functions 5.1.3 Plasmid-related functions 5.1.5 Pathogenicity island-related functions 6.1.1 Global regulatory functions		5.2.10 blothi carboxyl carrier protein (Beel)			
3.3.02 Amino sugars 3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Incorporation metal ions 3.3.06 Misc. glycerol metabolism 3.3.07 Misc. glucose metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.1 Aerobic respiration 3.5.3 Electron transport 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.4 Fermentation 3.5.6 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.10 Nucleotide biosynthesis 3.7.10 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosoma land stable RNAs 4.2.2 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.0 Laterally acquired elements 5.1.2 Phage-related functions 5.1.3 Plasmid-related function 6.0.0 Global functions 6.1.1 Global regulatory functions	•	3 3 11 Nucleotide interconversions			
3.3.03 Entner-Douderoff 3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.06 Incorporation metal ions 3.3.07 Misc, glucose metabolism 3.3.07 Misc, glucose metabolism 3.3.08 Misc, glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.1 Aerobic respiration 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Arety acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.2 Murein sacculus, peptidoglycan 4.1.2 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.3.04 Gluconeogenesis 3.3.05 Glyoxylate bypass 3.3.05 Glyoxylate bypass 3.3.16 Pool, multipurpose conversions of intermed, metab. 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.1 Obegradation of small molecules 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Fermentation 3.5.6 Ferty acid and phosphatidic acid biosynthesis 3.7.1 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions 5.1.3 Plasmid-related functions 6.1.1 Global regulatory functions		_			
3.3.05 Glyoxylate bypass 3.3.06 Incorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.20 other 3.4.1 Amines 3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.1 Aerobic respiration 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal proteins - synthesis, modification 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions and prophages 5.1.5 Pathogenicity islanding the first productions 6.1.1 Global fregulatory functions					
3.3.06 Incorporation metal ions 3.3.07 Misc. glucose metabolism 3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.08 Misc. glycerol metabolism 3.3.10 Nucleotide branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.10 Nucleotide hydrolysis 3.3.20 Amino acids 3.3.21 other 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.4.5 Other 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Glycolysis 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.5.1 Fatty acid and phosphatidic acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Calicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions	•				
3.3.07 Misc. glucose metabolism 3.3.08 Misc. glycerol metabolism 3.3.08 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.1 Aerobic respiration 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.6 Oxidative branch, pentose pathway 3.5.1 Patty acid and phosphatidic acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.3.08 Misc. glycerol metabolism 3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.3 Electron transport 3.5.4 Fermentation 3.5.6 Fatty acid biosynthesis 3.6.1 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 6.1.1 Global regulatory functions 3.3.18 Sugar-nucleotide biosynthesis 3.3.20 Amino acids 3.4.2 Fatty acids 3.4.2 Fother 3.4.2 Fitty acids 3.4.2 Fitty acids 3.4.3 Carbon compounds 3.4.4 Fatty acids 3.4.2 Fitty acids 3.4.5 Other 3.4.2 Fitty acids 3.5.5 Glycolysis 3.5.5 Glycolysis 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.5.8 TCA cycle 3.5.8 TCA cycle 3.5.9 Typy acid acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.3 Outer membrane constituents 4.1.4 Surface polysaccharides & antigens 4.1.5 Surface structures 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomes - maturation and modification 4.2.2 Ribosomal proteins - synthesis, modification 5.1.4 Transposon-related functions 5.1.4 Transposon-related functions 6.1.1 Global regulatory functions					
3.3.09 Non-oxidative branch, pentose pathway 3.3.10 Nucleotide hydrolysis 3.3.20 Amino acids 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.5 Other 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.3.10 Nucleotide hydrolysis 3.3.21 other 3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Folyolysis 3.5.5 Folyolysis 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.1.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions	= -	· · · · · · · · · · · · · · · · · · ·			
3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Frementation 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.1 Ribosomal and stable RNAs 4.2.1 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions	7.1				
3.4.0 Degradation of small molecules 3.4.1 Amines 3.4.2 Amino acids 3.4.2 Amino acids 3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Fyruvate dehydrogenase 3.5.6 Patty acid and phosphatidic acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosomal proteins - synthesis, modification 4.2.1 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.5 Pathogenicity island-related functions 6.1.1 Global regulatory functions	The state of the s	5.5.20 Allillio delus			
3.4.1 Amines 3.4.2 Amino acids 3.4.3 Carbon compounds 3.4.0 ATP-proton motive force 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Glycolysis 3.5.5 Glycolysis 3.5.5 Pyruvate dehydrogenase 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.6.1 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.3 Ribosomes - maturation and modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.4.2 Amino acids 3.4.3 Carbon compounds 3.4.0 ATP-proton motive force 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.5 Fermentation 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface polysaccharides & antigens 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.3 Ribosomes - maturation and modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions	_	3 A A Fatty acids			
3.4.3 Carbon compounds 3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.4 Fermentation 3.5.6 Oxidative branch, pentose pathway 3.5.7 Pyruvate dehydrogenase 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.3 Ribosomes - maturation and modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.5.0 Energy metabolism, carbon 3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.2 Anaerobic respiration 3.5.6 Oxidative branch, pentose pathway 3.5.3 Electron transport 3.5.4 Fermentation 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.4 Surface polysaccharides & antigens 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.1 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.5.1 Aerobic respiration 3.5.2 Anaerobic respiration 3.5.2 Anaerobic respiration 3.5.3 Electron transport 3.5.3 Electron transport 3.5.4 Fermentation 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.4 Surface polysaccharides & antigens 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		5.4.0 ATT proton motive force			
3.5.2 Anaerobic respiration 3.5.6 Oxidative branch, pentose pathway 3.5.3 Electron transport 3.5.7 Pyruvate dehydrogenase 3.5.4 Fermentation 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.4 Surface polysaccharides & antigens 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		3.5.5 Glycolysis			
3.5.3 Electron transport 3.5.4 Fermentation 3.5.8 TCA cycle 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface polysaccharides & antigens 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomes - maturation and modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.5.4 Fermentation 3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.4 Surface polysaccharides & antigens 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.6.0 Fatty acid biosynthesis 3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.4 Surface polysaccharides & antigens 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.3 Ribosomes - maturation and modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.4 Transposon-related functions 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.6.1 Fatty acid and phosphatidic acid biosynthesis 3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 3.7.2 Pyrimidine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface polysaccharides & antigens 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.3 Ribosomes - maturation and modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		5.5.0 Ten cycle			
3.7.0 Nucleotide biosynthesis 3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.1 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
3.7.1 Purine ribonucleotide biosynthesis 4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface polysaccharides & antigens 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
4.0.0 Cell envelop 4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface polysaccharides & antigens 4.1.6 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.1 Ribosomal proteins - synthesis, modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		3.7.2 Pyrimidine ribonucleotide biosynthesis			
4.1.0 Periplasmic/exported/lipoproteins 4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface polysaccharides & antigens 4.1.6 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		5.7.2 1 yrimidile Hoondeleotide biosynthesis			
4.1.1 Inner membrane 4.1.2 Murein sacculus, peptidoglycan 4.1.5 Surface structures 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions	•	4.1.3 Outer membrane constituents			
4.1.2 Murein sacculus, peptidoglycan 4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
4.2.0 Ribosome constituents 4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
4.2.1 Ribosomal and stable RNAs 4.2.2 Ribosomes - maturation and modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		4.1.3 Surface structures			
4.2.2 Ribosomal proteins - synthesis, modification 5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.4 Transposon-related functions 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		4.2.3 Ribosomes - maturation and modification			
5.0.0 Extrachromosomal 5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
5.1.0 Laterally acquired elements 5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		Oii			
5.1.1 Colicin-related functions 5.1.3 Plasmid-related functions 5.1.2 Phage-related functions and prophages 5.1.4 Transposon-related functions 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
5.1.2 Phage-related functions and prophages 5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions		ated functions			
5.1.5 Pathogenicity island-related function 6.0.0 Global functions 6.1.1 Global regulatory functions					
6.0.0 Global functions 6.1.1 Global regulatory functions		2 Transposon related rangellons			
6.1.1 Global regulatory functions					
7.0.0 110t classified (included patative assignments)					

Appendix VII: List of colour codes

- 0 (white) Pathogenicity/Adaptation/Chaperones
- 1 (dark grey) energy metabolism (glycolysis, electron transport etc.)
- **2** (red) Information transfer (transcription/translation + DNA/RNA modification)
- 3 (dark green) Surface (IM, OM, secreted, surface structures
- 4 (dark blue) Stable RNA
- 5 (Sky blue) Degradation of large molecules
- 6 (dark pink) Degradation of small molecules
- 7 (yellow) Central/intermediary/miscellaneous metabolism
- 8 (light green) Unknown
- 9 (light blue) Regulators
- 10 (orange) Conserved hypo
- 11 (brown) Pseudogenes and partial genes (remnants)
- 12 (light pink) Phage/IS elements
- 13 (light grey) Some misc. information e.g. Prosite, but no function

Appendix VIII: List of degenerate nucleotide value/IUB Base Codes.

R = A or G

S = G or C

B = C, G or T

Y = C or T

W = A or T

D = A, G or T

K = G or T

N = A, C, G or T

H = A, C or T

M = A or C

V = A, C or G