WHAT IS CLAIMED IS:

1. A vertebrate cell or cell line comprising a nucleotide sequence as set forth in SEQ ID NO: 87 or SEQ ID NO: 88.

2. The cell of claim 1, wherein the nucleotide sequence encodes a tRNA molecule that has an anticodon recognition sequence that is specific for a selector codon.

3. The cell of claim 2, wherein the selector codon is selected from the group consisting of: amber codon, ochre codon, opal codon, or four or more base codons.

4. The cell of claim 2, wherein the nucleotide sequence encodes a tRNA molecule that is capable of being aminoacylated with at least one non-natural amino acid.

5. The cell of claim 1, wherein the nucleotide sequence encodes a tRNA molecule that is an orthogonal tRNA (O-tRNA).

6. The cell of claim 5, wherein the O-tRNA comprises an amino acid sequence as set forth in SEQ ID NO.: 87, SEQ ID NO: 88, or a conservative variation thereof.

7. The cell of claim 5, wherein the O-tRNA is capable of aminoacylation with a natural amino acid or a non-natural amino acid.

8. The cell of claim 5, wherein the O-tRNA is capable of aminoacylation with a natural amino acid and a non-natural amino acid.

9. The cell of claim 5, wherein the O-tRNA is capable of aminoacylation with a non-natural amino acid.

10. The cell of claim 1, wherein the nucleotide sequence is derived from a non-vertebrate organism or more than one non-vertebrate organism.

11. The cell of claim 1, wherein the nucleotide sequence is derived from a vertebrate organism or more than one vertebrate organisms.

12. The cell of claim 1, wherein the nucleotide sequence is derived from vertebrate and non-vertebrate organisms.

13. The cell of claim 1, wherein the nucleotide sequence is wild type, mutated, or modified from the wild type.

14. The cell of claim 5, wherein the nucleotide sequence is derived from *Escherichia coli,* or *Bacillus stearothermophilus.*

15. The cell of claim 1, wherein the vertebrate cell is a mammalian cell.

16. The cell of claim 15, wherein the vertebrate cell is CHO-K1.

17. The cell of claim 15, wherein the vertebrate cell is CHO DG-44.

18. The cell of claim 15, wherein the vertebrate cell is a human cell line.

19. The cell of claim 9, wherein the non-natural amino acid is selected from the group consisting of: a *p*-acetyl-L-phenylalanine, a *p*-iodo-L-phenylalanine, an O-methyl-L-tyrosine, a *p*-propargyloxyphenylalanine, an L-3-(2-naphthyl)alanine, a 3-methyl-phenylalanine, an O-4-allyl-L-tyrosine, a 4-propyl-L-tyrosine, a tri-O-acetyl-GlcNAcβ-serine, an L-Dopa, a fluorinated phenylalanine, an isopropyl-L-phenylalanine, a *p*-azido-L-phenylalanine, a *p*-acyl-L-phenylalanine, a *p*-benzoyl-L-phenylalanine, an L-phosphoserine, a phosphonoserine, a phosphonotyrosine, a *p*-bromophenylalanine, a *p*-amino-L-phenylalanine, an isopropyl-L-phenylalanine, an unnatural analogue of a tyrosine amino acid; an unnatural analogue of a glutamine amino acid; an unnatural analogue of a phenylalanine amino acid; an unnatural analogue of a serine amino acid; an unnatural analogue of a threonine amino acid; an alkyl, aryl, acyl, azido, cyano, halo, hydrazine, hydrazide, hydroxyl, alkenyl, alkynl, ether, thiol, sulfonyl, seleno, ester, thioacid, borate, boronate, phospho, phosphono, phosphine, heterocyclic, enone, imine, aldehyde, hydroxylamine, keto, or amino substituted amino acid, or any combination thereof; an amino acid with a photoactivatable cross-linker; a spin-labeled amino acid; a fluorescent amino acid; a metal binding amino acid; a metal-containing amino acid; a radioactive amino acid; a photocaged and/or photoisomerizable amino acid; a biotin or biotin-analogue containing amino acid; a keto containing amino acid; an amino acid comprising polyethylene glycol or polyether; a heavy atom substituted amino acid; a chemically cleavable or photocleavable amino acid; an amino acid with an elongated side chain; an amino acid containing a toxic group; a sugar substituted amino acid; a carbon-linked sugar-containing amino acid; a redox-active amino acid; an α-hydroxy containing acid; an amino thio acid; an

α,α disubstituted amino acid; a β-amino acid; a cyclic amino acid other than proline or histidine, and an aromatic amino acid other than phenylalanine, tyrosine or tryptophan.

20. The cell of claim 15, further comprising an orthogonal tRNA synthetase (O-RS), wherein the O-RS recognizes the tRNA, and the tRNA is preferentially aminoacylated with a non-natural amino acid by the O-RS.

21. The cell of claim 20, wherein the O-RS is derived from a non-vertebrate organism.

22. The cell of claim 20, wherein the O-RS comprises the nucleotide sequence of SEQ ID NO: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 86, or conservative variants thereof.

23. The cell of claim 21, wherein the non-vertebrate organism is *Escherichia coli,* or *Bacillus stearothermophilus.*

24. The cell of claim 20, further comprising a nucleic acid that comprises a polynucleotide that encodes a polypeptide of interest, wherein the polynucleotide comprises a selector codon that is recognized by the O-tRNA.

25. The cell of claim 24, wherein the polypeptide of interest is a therapeutic protein, a diagnostic protein, an industrial enzyme, or portion thereof.

26. A vertebrate cell comprising an orthogonal aminoacyl-tRNA synthetase (O-RS), a tRNA encoded by SEQ ID NO: 87 or SEQ ID NO: 88, an non-natural amino acid, and a nucleic acid that comprises a polynucleotide that encodes a polypeptide of interest, wherein the polynucleotide comprises a selector codon that is recognized by the tRNA, wherein the O-RS preferentially aminoacylates the tRNA with the non-natural amino acid in the vertebrate cell, and wherein the cell produces the polypeptide of interest in the presence of the non-natural amino acid.

27. The nucleotide sequence of claim 1, wherein the nucleotide sequence comprises an A box and a B box.

28. The cell line of claim 1, wherein the cell line has been stably transfected.

29. The cell line of claim 1, wherein the cell line has been transiently transfected.

30. A method of producing in a vertebrate cell at least one protein comprising at least one non-natural amino acid, the method comprising:

growing, in an appropriate medium, a vertebrate cell that comprises a nucleic acid that comprises at least one selector codon and encodes the protein; wherein the medium comprises an unnatural amino acid and the vertebrate cell comprises:

a tRNA having a nucleotide sequence set forth in SEQ ID NO: 87 or SEQ ID NO: 88 that functions in the cell and recognizes the selector codon; and

an orthogonal aminoacyl tRNA synthetase (O-RS) that preferentially aminoacylates the O-tRNA with the unnatural amino acid.

31. The method of claim 30, wherein the cell has been stably transfected to comprise the O-tRNA and O-RS.

32. The method of claim 30, wherein the cell has been transiently transfected to comprise the O-tRNA and O-RS.

33. The method of claim 30, wherein the cell has been stably transfected to comprise the O-tRNA or O-RS and transiently transfected to comprise the O-tRNA or O-RS, such that the cell still comprises both a t-RNA and an O-RS.

34. The method of claim 30 wherein the unnatural amino acid is selected from the group consisting of: a *p*-acetyl-L-phenylalanine, a *p*-iodo-L-phenylalanine, an O-methyl-L-tyrosine, a *p*-propargyloxyphenylalanine, an L-3-(2-naphthyl)alanine, a 3-methyl-phenylalanine, an O-4-allyl-L-tyrosine, a 4-propyl-L-tyrosine, a tri-O-acetyl-GlcNAcβ-serine, an L-Dopa, a fluorinated phenylalanine, an isopropyl-L-phenylalanine, a *p*-azido-L-phenylalanine, a *p*-acyl-L-phenylalanine, a *p*-benzoyl-L-phenylalanine, an L-phosphoserine, a phosphonoserine, a phosphonotyrosine, a *p*-bromophenylalanine, a *p*-amino-L-phenylalanine, an isopropyl-L-phenylalanine, an unnatural analogue of a tyrosine amino acid; an unnatural analogue of a glutamine amino acid; an unnatural analogue of a phenylalanine amino acid; an unnatural analogue of a serine amino acid; an unnatural analogue of a threonine amino acid; an alkyl, aryl, acyl, azido, cyano, halo, hydrazine, hydrazide, hydroxyl, alkenyl, alkynl, ether, thiol, sulfonyl, seleno, ester, thioacid, borate, boronate, phospho, phosphono, phosphine, heterocyclic, enone, imine, aldehyde, hydroxylamine, keto, or amino substituted amino acid, or any combination thereof; an amino acid with a photoactivatable cross-linker; a spin-labeled

amino acid; a fluorescent amino acid; a metal binding amino acid; a metal-containing amino acid; a radioactive amino acid; a photocaged and/or photoisomerizable amino acid; a biotin or biotin-analogue containing amino acid; a keto containing amino acid; an amino acid comprising polyethylene glycol or polyether; a heavy atom substituted amino acid; a chemically cleavable or photocleavable amino acid; an amino acid with an elongated side chain; an amino acid containing a toxic group; a sugar substituted amino acid; a carbon-linked sugar-containing amino acid; a redox-active amino acid; an α-hydroxy containing acid; an amino thio acid; an α,α disubstituted amino acid; a β-amino acid; a cyclic amino acid other than proline or histidine, and an aromatic amino acid other than phenylalanine, tyrosine or tryptophan.

35. The method of claim 31, wherein the protein comprises a therapeutic protein, a diagnostic protein, an industrial enzyme, or portion thereof.

36. The method of claim 31, wherein the protein comprises a protein or a portion of a protein selected from the group consisting of: a cytokine, a growth factor, a growth factor receptor, an interferon, an interleukin, an inflammatory molecule, an oncogene product, a peptide hormone, a signal transduction molecule, a steroid hormone receptor, erythropoietin (EPO), insulin, human growth hormone, an Alpha-1 antitrypsin, an Angiostatin, an Antihemolytic factor, an antibody, an Apolipoprotein, an Apoprotein, an Atrial natriuretic factor, an Atrial natriuretic polypeptide, an Atrial peptide, a C-X-C chemokine, T39765, NAP-2, ENA-78, a Gro-a, a Gro-b, a Gro-c, an IP-10, a GCP-2, an NAP-4, an SDF-1, a PF4, a MIG, a Calcitonin, a c-kit ligand, a CC chemokine, a Monocyte chemoattractant protein-1, a Monocyte chemoattractant protein-2, a Monocyte chemoattractant protein-3, a Monocyte inflammatory protein-1 alpha, a Monocyte inflammatory protein-1 beta, RANTES, I309, R83915, R91733, HCC1, T58847, D31065, T64262, a CD40, a CD40 ligand, a Collagen, a Colony stimulating factor (CSF), a Complement factor 5a, a Complement inhibitor, a Complement receptor 1, DHFR, an epithelial Neutrophil Activating Peptide-78, a GROα/MGSA, a GROβ, a GROγ a MIP-1α, a MIP-1δ, a MCP-1, an Epidermal Growth Factor (EGF), an epithelial Neutrophil Activating Peptide, an Erythropoietin (EPO), an Exfoliating toxin, a Factor IX, a Factor VII, a Factor VIII, a Factor X, a Fibroblast Growth Factor (FGF), a Fibrinogen, a Fibronectin, a G-CSF, a GM-CSF, a Glucocerebrosidase, a Gonadotropin, a Hedgehog protein, a Hemoglobin, a Hepatocyte Growth Factor (HGF), a Hirudin, a Human

serum albumin, an ICAM-1, an ICAM-1 receptor, an LFA-1, an LFA-1 receptor, an Insulin, an Insulin-like Growth Factor (IGF), an IGF-I, an IGF-II, an IFN-α, an IFN-β, an IFN-γ, an IL-1, an IL-2, an IL-3, an IL-4, an IL-5, an IL-6, an IL-7, an IL-8, an IL-9, an IL-10, an IL-11, an IL-12, a Keratinocyte Growth Factor (KGF), a Lactoferrin, a leukemia inhibitory factor, a Luciferase, a Neurturin, a Neutrophil inhibitory factor (NIF), an oncostatin M, an Osteogenic protein, a Parathyroid hormone, a PD-ECSF, a PDGF, a Pleiotropin, a Protein A, a Protein G, a Pyrogenic exotoxins A, B, or C, a Relaxin, a Renin, an SCF, a Soluble complement receptor I, a Soluble I-CAM 1, a Soluble interleukin receptor, a Soluble TNF receptor, a Somatomedin, a Somatostatin, a Somatotropin, a Streptokinase, a Superantigen, a Staphylococcal enterotoxins, an SEA, an SEB, an SEC1, an SEC2, an SEC3, an SED, an SEE, a steroid hormone receptor, a Superoxide dismutase (SOD), a Toxic shock syndrome toxin, a Thymosin alpha 1, a Tissue plasminogen activator, a tumor growth factor (TGF), a TGF-α, a TGF-β, a Tumor Necrosis Factor, a Tumor Necrosis Factor alpha, a Tumor necrosis factor beta, a Tumor necrosis factor receptor (TNFR), a VLA-4 protein, a VCAM-1 protein, a Vascular Endothelial Growth Factor (VEGEF), a Urokinase, a Mos, a Ras, a Raf, a Met; a p53, a Tat, a Fos, a Myc, a Jun, a Myb, a Rel, an estrogen receptor, a progesterone receptor, a testosterone receptor, an aldosterone receptor, an LDL receptor, a SCF/c-Kit, a CD40L/CD40, a VLA-4/VCAM-1, an ICAM-1/LFA-1, a hyalurin/CD44, and a corticosterone.

37. A kit for producing a protein that comprises at least one unnatural amino acid, the kit comprising: a container containing a polynucleotide sequence set forth in SEQ ID NO: 87 or SEQ ID NO: 88.

38. The kit of claim 37, wherein the kit further comprises at least one unnatural amino acid.

39. The kit of claim 37, wherein the kit further comprises instructional materials for producing the protein.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An isolated or recombinant vertebrate cell or cell line comprising tRNA that comprises a nucleotide sequence as set forth in SEQ ID NO: 87 , or an isolated or recombinant vertebrate cell or cell line comprising DNA that comprises a nucleotide sequence set forth in SEQ ID NO: 88.

2. The isolated or recombinant vertebrate cell or cell line of claim 1, wherein the tRNA is an orthogonal tRNA (O-tRNA).

3. The isolated or recombinant vertebrate cell or cell line of claim 1 or 2, wherein the cell comprises tRNA or O-tRNA comprising the nucleotide sequence set forth in SEQ ID NO.: 87.

4. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 3, wherein the tRNA or O-tRNA comprises non-vertebrate nucleic acid or is a hybrid molecule comprising nucleic acid from vertebrate and non-veterbrate organisms.

5. The isolated or recombinant vertebrate cell or cell line of claim 4, wherein the tRNA or O-tRNA comprises nucleic acid from *Escherichia coli* and/or *Bacillus stearothermophilus.*

6. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 5, wherein the tRNA or O-tRNA has an anticodon recognition sequence that is specific for a selector codon.

7. The isolated or recombinant vertebrate cell or cell line of claim 6, wherein the selector codon is selected from the group consisting of: amber codon, ochre codon, opal codon, and a codon having four or more bases.

8. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 7, wherein the tRNA or O-tRNA is capable of being aminoacylated with at least one natural amino acid or at least one non-natural amino acid.

9. The isolated or recombinant vertebrate cell or cell line according to claim 8, wherein the tRNA or O-tRNA is capable of being aminoacylated with a plurality of amino acids.

10. The isolated or recombinant vertebrate cell or cell line according to claim 8 or 9, wherein a non-natural amino acid is selected from the group consisting of: a *p*-acetyl-L-

phenylalanine, a *p*-iodo-L-phenylalanine, an O-methyl-L-tyrosine, a *p*-propargyloxyphenylalanine, an L-3-(2-naphthyl)alanine, a 3-methyl-phenylalanine, an O-4-allyl-L-tyrosine, a 4-propyl-L-tyrosine, a tri-O-acetyl-GlcNAcβ-serine, an L-Dopa, a fluorinated phenylalanine, an isopropyl-L-phenylalanine, a *p*-azido-L-phenylalanine, a *p*-acyl-L-phenylalanine, a *p*-benzoyl-L-phenylalanine, an L-phosphoserine, a phosphonoserine, a phosphonotyrosine, a *p*-bromophenylalanine, a *p*-amino-L-phenylalanine, an isopropyl-L-phenylalanine, an unnatural analogue of a tyrosine amino acid; an unnatural analogue of a glutamine amino acid; an unnatural analogue of a phenylalanine amino acid; an unnatural analogue of a serine amino acid; an unnatural analogue of a threonine amino acid; an alkyl, aryl, acyl, azido, cyano, halo, hydrazine, hydrazide, hydroxyl, alkenyl, alkynl, ether, thiol, sulfonyl, seleno, ester, thioacid, borate, boronate, phospho, phosphono, phosphine, heterocyclic, enone, imine, aldehyde, hydroxylamine, keto, or amino substituted amino acid, or any combination thereof; an amino acid with a photoactivatable cross-linker; a spin-labeled amino acid; a fluorescent amino acid; a metal binding amino acid; a metal-containing amino acid; a radioactive amino acid; a photocaged and/or photoisomerizable amino acid; a biotin or biotin-analogue containing amino acid; a keto containing amino acid; an amino acid comprising polyethylene glycol or polyether; a heavy atom substituted amino acid; a chemically cleavable or photocleavable amino acid; an amino acid with an elongated side chain; an amino acid containing a toxic group; a sugar substituted amino acid; a carbon-linked sugar-containing amino acid; a redox-active amino acid; an α-hydroxy containing acid; an amino thio acid; an α,α disubstituted amino acid; a β-amino acid; a cyclic amino acid other than proline or histidine, and an aromatic amino acid other than phenylalanine, tyrosine or tryptophan.

11. The isolated or recombinant vertebrate cell or cell line according to claim 10, wherein the non-natural amino acid is *p*-acetyl-phenylalanine (*p*AF).

12. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 11, wherein the vertebrate cell is a mammalian cell or the vertebrate cell line comprises mammalian cells.

13. The isolated or recombinant vertebrate cell or cell line of claim 12, wherein the mammalian cell(s) are CHO-K1 cell(s), CHO DG-44 cell(s) or human cell(s).

14. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 12, wherein said cell or cell line further comprises an orthogonal tRNA synthetase (O-RS) that is capable of charging the tRNA or O-tRNA with a non-natural amino acid.

15. The isolated or recombinant vertebrate cell or cell line of claim 14, wherein the O-RS is from a non-vertebrate organism.

16. The isolated or recombinant vertebrate cell or cell line of claim 15, wherein the non-vertebrate organism is *Escherichia coli* or *Bacillus stearothermophilus.*

17. The isolated or recombinant vertebrate cell or cell line of claim 15 or 16, wherein the O-RS comprises a nucleotide sequence set forth in any one of SEQ ID NOs: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, or 86, or a conservative variant of any one of said SEQ ID NOs.

18. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 17, wherein said cell or cell line, further comprising nucleic acid that comprises a nucleotide sequence encoding a polypeptide, wherein the nucleotide sequence comprises a selector codon that is recognized by the tRNA or O-tRNA.

19. The isolated or recombinant vertebrate cell or cell line of claim 18, wherein the polypeptide is a therapeutic protein, a diagnostic protein, an industrial enzyme, or a functional portion thereof.

20. The isolated or recombinant vertebrate cell or cell line of claim 18 or 19, wherein the protein is selected from the group consisting of: a cytokine, a growth factor, a growth factor receptor, an interferon, an interleukin, an inflammatory molecule, an oncogene product, a peptide hormone, a signal transduction molecule, a steroid hormone receptor, erythropoietin (EPO), insulin, human growth hormone, an Alpha-1 antitrypsin, an Angiostatin, an Antihemolytic factor, an antibody, an Apolipoprotein, an Apoprotein, an Atrial natriuretic factor, an Atrial natriuretic polypeptide, an Atrial peptide, a C-X-C chemokine, T39765, NAP-2, ENA-78, a Gro-a, a Gro-b, a Gro-c, an IP-10, a GCP-2, an NAP-4, an SDF-1, a PF4, a MIG, a Calcitonin, a c-kit ligand, a CC chemokine, a Monocyte chemoattractant protein-1, a Monocyte chemoattractant protein-2, a Monocyte chemoattractant protein-3, a Monocyte

inflammatory protein-1 alpha, a Monocyte inflammatory protein-1 beta, RANTES, I309, R83915, R91733, HCC1, T58847, D31065, T64262, a CD40, a CD40 ligand, a Collagen, a Colony stimulating factor (CSF), a Complement factor 5a, a Complement inhibitor, a Complement receptor 1, DHFR, an epithelial Neutrophil Activating Peptide-78, a GROα/MGSA, a GROβ, a GROγ a MIP-1α, a MIP-1δ, a MCP-1, an Epidermal Growth Factor (EGF), an epithelial Neutrophil Activating Peptide, an Erythropoietin (EPO), an Exfoliating toxin, a Factor IX, a Factor VII, a Factor VIII, a Factor X, a Fibroblast Growth Factor (FGF), a Fibrinogen, a Fibronectin, a G-CSF, a GM-CSF, a Glucocerebrosidase, a Gonadotropin, a Hedgehog protein, a Hemoglobin, a Hepatocyte Growth Factor (HGF), a Hirudin, a Human serum albumin, an ICAM-1, an ICAM-1 receptor, an LFA-1, an LFA-1 receptor, an Insulin-like Growth Factor (IGF), an IGF-I, an IGF-II, an IFN-α, an IFN-β, an IFN-γ, an IL-1, an IL-2, an IL-3, an IL-4, an IL-5, an IL-6, an IL-7, an IL-8, an IL-9, an IL-10, an IL-11, an IL-12, a Keratinocyte Growth Factor (KGF), a Lactoferrin, a leukemia inhibitory factor, a Luciferase, a Neurturin, a Neutrophil inhibitory factor (NIF), an oncostatin M, an Osteogenic protein, a Parathyroid hormone, a PD-ECSF, a PDGF, a Pleiotropin, a Protein A, a Protein G, a Pyrogenic exotoxins A, B, or C, a Relaxin, a Renin, an SCF, a Soluble complement receptor I, a Soluble I-CAM 1, a Soluble interleukin receptor, a Soluble TNF receptor, a Somatomedin, a Somatostatin, a Somatotropin, a Streptokinase, a Superantigen, a Staphylococcal enterotoxins, an SEA, an SEB, an SEC1, an SEC2, an SEC3, an SED, an SEE, a steroid hormone receptor, a Superoxide dismutase (SOD), a Toxic shock syndrome toxin, a Thymosin alpha 1, a Tissue plasminogen activator, a tumor growth factor (TGF), a TGF-α, a TGF-β, a Tumor Necrosis Factor, a Tumor Necrosis Factor alpha, a Tumor necrosis factor beta, a Tumor necrosis factor receptor (TNFR), a VLA-4 protein, a VCAM-1 protein, a Vascular Endothelial Growth Factor (VEGEF), a Urokinase, a Mos, a Ras, a Raf, a Met; a p53, a Tat, a Fos, a Myc, a Jun, a Myb, a Rel, an estrogen receptor, a progesterone receptor, a testosterone receptor, an aldosterone receptor, an LDL receptor, a SCF/c-Kit, a CD40L/CD40, a VLA-4/VCAM-1, an ICAM-1/LFA-1, a hyalurin/CD44, and a corticosterone.

21. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 20, further comprising a non-natural amino acid capable of aminoacylating the tRNA or O-tRNA.

22. The isolated or recombinant vertebrate cell or cell line according to any one of claims 1 to 21, wherein the vertebrate cell or cell line has been stably transfected or transiently transfected.

23. The isolated vertebrate cell or cell line according to any one of claims 1 to 22 when used to aminoacylate the tRNA molecule therein with a non-natural amino acid.

24. The isolated vertebrate cell or cell line according to any one of claims 1 to 22 when used in the production of a polypeptide comprising a non-natural amino acid.

25. A method of producing a polypeptide that comprises an unnatural amino acid, said method comprising growing an isolated or recombinant vertebrate cell or cell line comprising O-tRNA according to any one of claims 18 to 20 as appended to any one of claims 14 to 17 in medium comprising an unnatural amino acid that aminoacylates the O-tRNA.

26. The method of claim 25, further comprising producing the isolated vertebrate cell or cell line by a process comprising transfecting an isolated vertebrate cell or cell line to comprise the O-tRNA and/or nucleic acid encoding an O-RS and/or nucleic acid encoding the polypeptide.

27. A kit when used to produce a polypeptide that comprises at least one unnatural amino acid, said kit comprising a container comprising an isolated vertebrate cell or cell line according to any one of claims 1 to 22.