Patent Claims

1. An expression vector comprising

- an antibody light chain expression cassette,
- an antibody heavy chain expression cassette, and
- a selection marker expression cassette,

wherein the expression cassettes are arranged unidirectional, ~~and~~

wherein the expression cassettes are arranged in the 5' to 3' sequence of antibody heavy chain expression cassette, antibody light chain expression cassette and selection marker expression cassette, and

wherein all three expression cassettes comprise the human elongation factor 1 alpha promoter.

~~2. The expression vector according to claim 1, characterized in that the antibody light chain expression cassette and/or the antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other comprise a promoter selected from the human elongation factor 1 alpha promoter, the human CMV promoter, and the SV40 promoter.~~

~~3. The expression vector according to any one of claims 1 to 2, characterized in that one, two, or all three expression cassettes comprise the human elongation factor 1 alpha promoter.~~

~~4. The expression vector according to any one of claims 1 to 3, characterized in that the antibody light chain expression cassette and/or the antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other the human elongation factor 1 alpha promoter.~~

~~5~~2. The expression vector according to ~~any one of~~ claims ~~1 to 4~~, characterized in that the expression cassettes do not comprise a terminator sequence.

~~6~~3. The expression vector according to claim ~~5~~2, characterized in that the terminator sequence is the human gastrin gene transcription terminator sequence (hGT).

~~7. The expression vector according to any one of claims 1 to 2, characterized in that one, two, or all three expression cassettes comprise the human CMV promoter.~~

~~8. The expression vector according to any one of claims 1, 2 and 7, characterized in that the antibody light chain expression cassette and/or the antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other the human CMV promoter.~~

~~9~~4. The expression vector according to ~~any one of~~ claims 1 ~~to 4 and 7 to 8~~, characterized in that one, two, or three expression cassettes comprise the bovine growth hormone polyA signal sequence.

~~10~~5. The expression vector according to ~~any one of~~ claims 1 ~~to~~ or 4 ~~and 7 to 9~~, characterized in that the antibody light chain expression cassette and/or the antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other the bovine growth hormone polyA signal sequence.

~~11~~6. The expression vector according to any one of claims 1, ~~to~~ 4 or 5~~and 7 to 10~~, characterized in that the antibody light chain expression cassette and/or the antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other a polyA signal sequence selected from the bovine growth hormone polyA signal sequence and the SV40 polyA signal sequence.

~~12~~7. The expression vector according to any one of claims 1 and ~~7~~ 4 to ~~11~~6, characterized in that one, two, or all three expression cassettes comprise the human gastrin terminator sequence after the polyA signal sequence.

~~13~~8. The expression vector according to any one of claims 1 and ~~7~~ 4 to ~~12~~7, characterized in that the antibody light chain expression cassette and/or the antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other the human gastrin terminator sequence after the polyA signal sequence.

~~14~~9. The expression vector according to any one of claims 1 and ~~7~~ 4 to ~~13~~8, characterized in that the antibody light chain expression cassette and/or the

antibody heavy chain expression cassette and/or the selection marker expression cassette comprise independently of each other in 5' to 3' direction the bovine growth hormone polyA signal sequence and the human gastrin terminator sequence.

~~15~~10. The expression vector according to any one of claims 1 to ~~14~~9, characterized in that the promoter of one, two, or all three expression cassettes comprises an Intron A.

~~16~~11. The expression vector according to any one of claims 1 to ~~8~~3 and ~~12~~7 to ~~13~~8, characterized in that one, two, or all three expression cassettes comprise the SV40 polyA signal sequence.

~~17. The expression vector according to claim 16, characterized in that one, two, or all three expression cassettes comprise the SV40 promoter.~~

~~18~~12. The expression vector according to any one of claims 1 to ~~17~~11, characterized in that the nucleic acid encoding the antibody light chain and/or the nucleic acid encoding the antibody heavy chain comprises at least one intron.

~~19~~13. The expression vector according to any one of claims 1 to ~~18~~12, characterized in that the nucleic acid encoding the antibody light chain and/or the nucleic acid encoding the antibody heavy chain is cDNA.

~~20~~14. Use of an expression vector according to any one of claims 1 to ~~19~~13 for the recombinant production of an antibody.

~~21~~15. Use of an expression vector according to any one of claims 1 to ~~19~~13 for the generation of a stable cell line.

~~22~~16. Use of an expression vector according to any one of claims 1 to ~~19~~13 for the generation of a production cell line.

~~23~~17. Use of an expression vector according to any one of claims 1 to ~~19~~13 comprising at least one expression cassette comprising a human elongation factor 1 alpha promoter for the generation of a stable cell line.

~~24~~18. Use of an expression vector according to any one of claims 1 to ~~19~~13 comprising at least one expression cassette comprising a human elongation factor 1 alpha promoter for the generation of a production cell line.

~~25~~19. Use of an expression vector according to any one of claims 1 to ~~19~~ 13 comprising at least one expression cassette comprising a human elongation factor 1 alpha promoter for the recombinant production of an antibody.

~~26. Use of an expression vector according to any one of claims 1 to 19 comprising at least one expression cassette comprising a human CMV promoter for the generation of a production cell line.~~

~~27. Use of an expression vector according to any one of claims 1 to 19 comprising at least one expression cassette comprising a human CMV promoter for the generation of a stable cell line.~~

~~28. Use of an expression vector according to any one of claims 1 to 19 comprising at least one expression cassette comprising a human CMV promoter for the production of an antibody.~~

~~29. A method for the transfection of a eukaryotic cell with an expression vector, characterized in that the expression vector is linearized prior to the transfection by cleavage in the prokaryotic origin of replication.~~

~~30. The method according to claim 29, characterized in that the prokaryotic origin of replication is between an antibody light chain expression cassette and an antibody heavy chain expression cassette.~~

~~31. The method according to any one of claims 29 to 30, characterized in that the expression vector is an expression vector according to any one of claims 1 to 19.~~

~~32. A method for the selection of a eukaryotic cell comprising a nucleic acid encoding an antibody, characterized in that the selection agent is added to the cultivation medium for the first time about 24 hours after transfection.~~

~~33. The method according to claim 32, characterized in that the nucleic acid encoding an antibody is comprised in an expression vector according to any one of claims 1 to 19.~~

~~34. Use of a method according to any one of claims 32 to 33 for the generation of a eukaryotic cell for the recombinant production of an antibody.~~

~~35. Use of a cell selected with a method according to any one of claims 32 to 33 for the recombinant production of an antibody.~~

~~36~~20. A method for the production of an antibody comprising the following steps:

- cultivating a eukaryotic cell that has been transfected with an expression vector according to any one of claims 1 to ~~19~~13, and
- recovering the antibody from the cell or the cultivation medium.

~~37. A method for the production of an antibody comprising the following step:~~

- ~~cultivating a eukaryotic cell, which has been obtained by the transfection with an expression vector encoding an antibody that has been linearized prior to the transfection by cleavage in the prokaryotic origin of replication, and~~
- ~~recovering the antibody from the cell or the cultivation medium.~~

~~38. A method for the production of an antibody comprising the following step:~~

- ~~cultivating a eukaryotic cell that has been transfected with an expression vector encoding an antibody, which has been selected by the addition of a selection agent about 24 hours after transfection to the cultivation, and~~
- ~~recovering the antibody from the cell or the cultivation medium.~~

~~39. A method for the transfection of a eukaryotic cell with an expression vector encoding an antibody whereby the expression vector comprises prokaryotic and eukaryotic nucleic acid sequences, characterized in that the prokaryotic nucleic acid sequences are removed from the expression vector prior to the transfection of the eukaryotic cell with the expression vector.~~

~~40. The method according to any one of claims 37 to 39, characterized in that the expression vector encoding an antibody is an expression vector according to any one of claims 1 to 19.~~

~~41. Use of a linearized expression vector encoding an antibody comprising no prokaryotic nucleic acid sequences for the transfection of a eukaryotic cell.~~

~~42. Use of an expression vector encoding an antibody comprising only eukaryotic nucleic acid sequences for the generation of a eukaryotic cell for the recombinant production of an antibody.~~

~~43. The use according to any one of claims 35, 41, 42, characterized in that the expression vector encoding an antibody is an expression vector according to any one of claims 1 to 19.~~

4421. The expression vector according to any one of claims 1 to ~~19~~13, characterized in that the expression vector is encoding a bispecific antibody.

4522. The expression vector according to claim ~~44~~21, characterized in that the bispecific antibody has a first binding specificity or binding site that specifically binds to a first antigen or a first epitope on a first antigen and the bispecific antibody has a second binding specificity or binding site that specifically binds to a second antigen or second epitope on a second antigen.

4623. The expression vector according to any one of claims 1 to ~~19~~13 and ~~44~~21 to ~~45~~22, characterized in that the expression vector comprises either

- a first expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding a first antibody light chain, a polyA signal sequence, and optionally a terminator sequence,
- a second expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding a second antibody light chain, a polyA signal sequence, and optionally a terminator sequence,
- a third expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding a first antibody heavy chain, a polyA signal sequence, and optionally a terminator sequence,
- a fourth expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding a second antibody heavy chain, a polyA signal sequence, and optionally a terminator sequence,

or

- a first expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding an antibody light chain, a polyA signal sequence, and optionally a terminator sequence,

- a second expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding a first antibody heavy chain, a polyA signal sequence, and optionally a terminator sequence, and

- a third expression cassette comprising in 5' to 3' direction a promoter, a nucleic acid encoding a second antibody heavy chain, a polyA signal sequence, and optionally a terminator sequence,

whereby the antibody light chain is a common light chain for both antibody heavy chains.

~~47~~24. The expression vector according to any one of claims 1 to ~~19~~13 and ~~44~~21 to ~~46~~23, characterized in that the expression vector comprises

- an antibody light chain expression cassette,

- a first antibody heavy chain expression cassette,

- a second antibody heavy chain expression cassette, and

- a selection marker expression cassette,

wherein at least one of the antibody heavy chain expression cassettes and the antibody light chain expression cassette and the selection marker expression cassette are arranged unidirectional, and

wherein the unidirectional expression cassettes are arranged in the 5' to 3' sequence of antibody heavy chain expression cassette, antibody light chain expression cassette and selection marker expression cassette.

~~48~~25. The expression vector according to any one of claims 1 to ~~19~~13 and ~~44~~21 to ~~46~~23, characterized in that the expression vector comprises

- a first antibody light chain expression cassette,

- a second antibody light chain expression cassette,

- a first antibody heavy chain expression cassette,

- a second antibody heavy chain expression cassette, and

- a selection marker expression cassette,

wherein one of the antibody heavy chain expression cassettes and one of the antibody light chain expression cassette and the selection marker expression cassette are arranged unidirectional, and

wherein the unidirectional expression cassettes are arranged in the 5' to 3' sequence of antibody heavy chain expression cassette, antibody light chain expression cassette and selection marker expression cassette.

~~49~~26. The expression vector according to any one of claims ~~44~~–21 to ~~48~~25, characterized in that one of the antibody heavy chain expression cassettes encodes an antibody heavy chain comprising a hole mutation.

~~50~~27. The expression vector according to any one of claims ~~44~~–21 to ~~49~~26, characterized in that one of the antibody heavy chain expression cassettes encodes an antibody heavy chain comprising a knob mutation.

~~51~~28. The expression vector according to any one of claims ~~44~~–21 to ~~50~~27, characterized in that one of the antibody light chain expression cassettes encodes an antibody light chain variant comprising an antibody light chain variable domain and an antibody heavy chain CH1 domain as constant domain and/or one of the antibody light chain expression cassettes encodes an antibody light chain comprising an antibody light chain variable domain and an antibody light chain CL domain as constant domain.

~~52~~29. The expression vector according to any one of claims ~~44~~–21 to ~~51~~28, characterized in that one of the antibody heavy chain expression cassettes encodes an antibody heavy chain variant comprising as first constant domain an antibody light chain constant domain (CL), and/or one of the antibody heavy chain expression cassettes encodes an antibody heavy chain comprising as first constant domain an antibody heavy chain CH1 domain.