Claims

1. A nucleic acid molecule comprising a first nucleotide sequence, wherein said nucleotide sequence has at least ~~80~~85% sequence identity with SEQ ID NO: 12~~,~~

~~2. A nucleic acid molecule according to claim 1,~~ wherein said first nucleotide sequence encodes a cell wall-binding domain binding the peptidoglycan cell wall of *Staphylococcus* genera, wherein said nucleic acid molecule has at least 85% sequence identity with SEQ ID NO: 1, or wherein said nucleic acid molecule further comprises a heterologous nucleotide sequence encoding a lytic domain.

~~3~~2. A nucleic acid molecule according to claim 1 ~~and/or 2~~, wherein said first nucleotide sequence originates from *S. aureus* bacteriophage Φ2638a endolysin.

~~4. A nucleic acid molecule according to any of the claims 1 to 3, wherein said nucleic acid molecule has at least 80% sequence identity with SEQ ID NO: 1, or wherein said nucleic acid molecule further comprises a heterologous nucleotide sequence encoding a lytic domain.~~

~~5~~3. A nucleic acid molecule according to any of the claims 1 ~~or 3~~ 2, wherein said nucleic acid molecule further comprises a heterologous nucleotide sequence encoding a lytic domain, wherein said lytic domain is a second and third nucleotide sequences, and wherein said second nucleotide sequence encodes an M23 endopeptidase domain and said third nucleotide sequences encodes an amidase domain.

~~6~~4. A nucleic acid molecule according to claim ~~5~~3, wherein said second and third nucleotide sequences originate from a gene encoding for an enzyme selected from the group consisting of *S. aureus* bacteriophage Φ2638a endolysin, *S. aureus* bacteriophage Φ11 endolysin, *S. aureus* bacteriophage ΦTwort endolysin and *S. Simulans* lysostaphin.

~~7~~5. A nucleic acid molecule according to claim ~~6~~4, wherein said second nucleotide sequence has at least ~~80~~85% sequence identity with SEQ ID:14 or 15 and said third nucleotide sequences has at least ~~80~~85% sequence identity with SEQ ID NO: 16 or 17.

~~8~~6. A nucleic acid molecule according to claims ~~7~~5, wherein said nucleotide molecule has at least ~~80~~85% sequence identity with SEQ ID NO: 9.

~~9~~7. A nucleic acid molecule according to any one of the claims ~~4~~1 - ~~8~~6, further comprising a fourth nucleotide sequence encoding a CHAP (cysteine, histidine-dependent amidohydrolases/peptidases) domain.

~~10~~8. A nucleic acid molecule according to claim ~~9~~7, wherein said fourth nucleotide sequences originates from *S. aureus* bacteriophage Φ11 or *S. aureus* bacteriophage ΦTwort endolysin.

~~11~~9. A nucleic acid molecule according to claim ~~10~~8, wherein said fourth nucleotide sequences has at least ~~80~~85% sequence identity with SEQ ID NO: 18 or SEQ ID NO: 19.

~~12~~10. A nucleic acid molecule according to any one of the claims ~~4~~1 – ~~11~~9 encoding a polypeptide which has the same or an increased lytic activity and/or the same or a decreased pH optimum as compared to *S. aureus* bacteriophage Φ2638a endolysin encoded by SEQ ID NO: 1.

~~13~~11. A polypeptide encoded by a nucleic acid molecule as identified in any one of claims 1 - ~~12~~10.

~~14~~12. A nucleic acid construct comprising a nucleic acid molecule as identified in any of the claims 1 - ~~12~~10.

~~15~~13. An expression vector comprising a nucleic acid construct as defined in claim ~~14~~12 operably linked to one or more control sequences, which direct the production or expression of the encoded polypeptide in a cell, a subject, or a cell-free expression system.

~~16~~14. A cell comprising the nucleic acid construct as identified in claim ~~4~~12 or the expression vector as identified in claim 1513, said cell being a microbial, prokaryotic or eukaryotic cell.

~~17~~15. A method for producing, optionally purifying and optionally freeze-drying a polypeptide as defined in claim ~~13~~11, said method comprising the steps of:

i) producing said polypeptide in a cell as identified in claim ~~16~~14 comprising a nucleic acid construct as defined in claim ~~14~~12, optionally

ii) purifying said polypeptide, and optionally

iii) freeze-drying said purified polypeptide.

~~18~~16. A method for producing a polypeptide with an enhanced lytic activity by treating a polypeptide as identified in claim ~~13~~11 and/or a polypeptide as obtainable by the method of ~~17~~15, wherein said method comprises the steps of:

i) dialyzing said polypeptide against a buffer comprising a chelating compound,

ii) dialyzing said polypeptide against a divalent metal ion-containing buffer, preferably said divalent metal ion being selected form the group consisting of Co^{2+}, Cu^{2+}, Mn^{2+} and Zn^{2+}.

~~19~~17. A composition comprising a nucleic acid molecule as identified in any one of the claims 1 – ~~12~~10, a polypeptide as identified in claim ~~13~~11 and/or as obtainable by a method as identified in claim ~~17~~15 and/or ~~18~~16, and/or a nucleic acid construct as identified in claim ~~14~~13 and/or a vector as indentified in claim ~~15~~13 and/or a cell as identified in claim ~~16~~14.

~~20~~18. A composition according to claim ~~19~~17, comprising one or more additional active ingredients, preferably selected from the group consisting of a bacteriophage and an antibiotic.

~~21~~19. A composition according to claim ~~19~~17 and/or ~~20~~18 for use as a medicament.

~~22~~20. Use of a composition according to claim ~~21~~19 in the preparation of a medicament for the treatment of an infectious disease.

~~23~~21. Use of a nucleic acid molecule according to any of the claims 1 - ~~12~~10, a polypeptide according to claim ~~13~~11, and/or as obtainable by a method as identified in claim ~~17~~15 and/or ~~18~~16, a nucleic acid construct according to claim ~~14~~12, a vector as indentified in claim ~~15~~13, a

cell as identified in claim ~~16~~14 and/or a composition according to claim ~~19~~17 and/or ~~20~~ 18 for use in the manufacture of as an antimicrobial, preferably as a food additive or a disinfectant.

~~24~~22. Use of a nucleic acid molecule according to any of the claims 1 ~~–3~~ or 2, a polypeptide encoded by such nucleic acid molecule, a nucleic acid construct and/or vector and/or cell comprising such nucleic acid construct or a composition comprising any of such polypeptide, nucleic acid molecule, nucleic acid, vector and/or cell for detecting a *Staphylococcus*~~,~~ in food or on a surface, preferably in a diagnostic application.