

CLAIMS

1. Use of a *Photorhabdus* Virulence Cassettes (PVC) effector leader sequence, for packaging a payload into a PVC Needle Complex;
5 wherein the payload is one or more selected from a polypeptide, a nucleic acid, or a combination thereof; and
 wherein the leader sequence and the payload form an effector fusion that is distinct from a wild-type PVC effector protein.
- 10 2. The use according to claim 1, wherein the leader sequence comprises amino acid residues 1-50 of a PVC effector.
3. The use according to claim 1 or claim 2, wherein the leader sequence comprises an amino acid sequence having at least 60% sequence identity to one or more sequence
15 selected sequence from SEQ ID NO.: 47 - SEQ ID NO.: 92.
4. The use according to any one of the preceding claims, wherein the PVC effector comprises an amino acid sequence of one or more sequence selected from SEQ ID NO.:
20 1 - SEQ ID NO.: 46.
5. The use according to any one of the preceding claims, wherein the PVC effector comprises a sequence selected from SEQ ID NO: 4, SEQ ID NO: 22, SEQ ID NO: 25,
 SEQ ID NO: 30, SEQ ID NO: 32 and SEQ ID NO: 46.
- 25 6. The use according to any one of the preceding claims, wherein the leader sequence is covalently fused to the payload, preferably at an N-terminus of the payload.
7. A method for manufacturing a PVC Needle Complex comprising a payload, the method comprising:
30 a. contacting a PVC Needle Complex with an effector fusion comprising a PVC effector leader sequence fused to a payload;
 b. wherein said payload is one or more selected from a polypeptide, a nucleic acid or a combination thereof; and
 c. wherein the effector fusion is distinct from a wild-type PVC effector protein.
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8. The method according to claim 7, wherein said contacting occurs within a cell, in a cell lysate, or in a purified cell lysate.
- 40 9. An *in vitro* and/or *ex vivo* method for delivering a payload into a cell, the method comprising:
 a. contacting a cell with a PVC Needle Complex comprising an effector fusion;
 b. wherein the effector fusion comprises a PVC effector leader sequence fused to a payload;
 c. wherein said payload is one or more selected from a polypeptide, a nucleic acid
45 or a combination thereof; and
 d. wherein the effector fusion is distinct from a wild-type PVC effector protein.

10. A method for suppressing a pest, the method comprising:
- a. contacting a pest, or a target area comprising a pest, with a PVC Needle Complex comprising an effector fusion;
 - b. wherein the effector fusion comprises a PVC effector leader sequence fused to a payload;
 - c. wherein said payload is one or more selected from a polypeptide, a nucleic acid or a combination thereof; and
 - d. wherein the effector fusion is distinct from a wild-type PVC effector protein.
11. A PVC Needle Complex, for use in a method of treatment;
- a. wherein the PVC Needle Complex comprises an effector fusion which comprises a PVC effector leader sequence fused to a payload;
 - b. wherein said payload is one or more selected from a polypeptide, a nucleic acid, or a combination thereof; and
 - c. wherein the effector fusion is distinct from a wild-type PVC effector protein.
12. A PVC Needle Complex comprising an effector fusion;
- a. wherein said effector fusion comprises a PVC effector leader sequence fused to a payload;
 - b. wherein said payload is one or more selected from a polypeptide, a nucleic acid or a combination thereof; and
 - c. wherein the effector fusion is distinct from a wild-type PVC effector protein.
13. An effector fusion, comprising a PVC effector leader sequence fused to a payload;
- a. wherein said payload is one or more selected from a polypeptide, a nucleic acid or a combination thereof; and
 - b. wherein the effector fusion is distinct from a wild-type PVC effector protein.
14. An isolated PVC effector leader sequence.
15. The method, PVC Needle Complex for use, PVC Needle Complex, effector fusion, or isolated PVC effector leader sequence according to any one of claims 7-14, wherein the leader sequence comprises amino acid residues 1-50 of a PVC effector.
16. The method, PVC Needle Complex for use, PVC Needle Complex, effector fusion or isolated PVC effector leader sequence according to any one of claims 7-15, wherein the leader sequence comprises an amino acid sequence having at least 60% sequence identity to one or more sequence selected from SEQ ID NO.: 47 - SEQ ID NO.: 92.
17. The method, PVC Needle Complex for use, PVC Needle Complex, effector fusion or isolated PVC effector leader sequence according any one of claims 7-16, wherein the PVC effector comprises an amino acid sequence of one or more sequence selected from SEQ ID NO.: 1 - SEQ ID NO.: 46.
18. The method, PVC Needle Complex for use, PVC Needle Complex, effector fusion or isolated PVC effector leader sequence according any one of claims 7-17, wherein the

PVC effector comprises a sequence selected from SEQ ID NO: 4, SEQ ID NO: 22, SEQ ID NO: 25, SEQ ID NO: 30, SEQ ID NO: 32 and SEQ ID NO: 46.

19. The method, PVC Needle Complex for use, PVC Needle Complex, effector fusion or
5 isolated PVC effector leader sequence according to any one of claims 7-18, wherein the leader sequence is covalently fused to a payload.
20. An isolated nucleic acid comprising a nucleotide sequence which encodes the isolated PVC effector leader sequence of any one of claims 14-19.
- 10 21. An expression vector comprising an isolated nucleic acid molecule of claim 20.
22. A host cell comprising an isolated nucleic acid molecule of claim 20, or an expression vector of claim 21.
- 15 23. The host cell of claim 22, wherein said host cell is one or more a selected from a mammalian cell, an insect cell, a yeast cell, a bacterial cell, and/or a plant cell; preferably wherein said bacterial cell is an *E. coli* cell.
- 20 24. The host cell of claim 22, wherein said host cell is a *Photorhabdus* cell.
25. The host cell of claim 24, wherein said *Photorhabdus* cell comprises a *Photorhabdus* PVC operon operably linked to an inducible promoter.