CLAIMS

1. An engineered Cas13a polypeptide, wherein the Cas13a polypeptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 18, SEQ ID NO:16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22, or a sequence being at least 80%, 85%, 90%, 91 %, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22.

2. An engineered Cas13a polypeptide according to claim 1, wherein the Cas13a polypeptide is encoded by a nucleic acid molecule selected from by SEQ ID NO: 3, or SEQ ID NO: 1, or SEQ ID NO: 2, or SEQ ID NO: 4, or SEQ ID NO: 5, or SEQ ID NO: 6, or SEQ ID NO: 7, or is encoded by a sequence being at least 80%, 85%, 90%, 91 %, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 3, or SEQ ID NO: 1, or SEQ ID NO: 2, or SEQ ID NO: 4, or SEQ ID NO: 5, or SEQ ID NO: 6, or SEQ ID NO: 7.

3. A composition comprising the engineered Cas13a polypeptide of claim 1 or 2.

4. A vector comprising the nucleic acid molecule described in claim 2.

5. A CRISPR/Cas13a system for targeting RNA molecules, the system comprising a) at least one Cas13a polypeptide wherein the Cas13a polypeptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22, or a sequence being at least 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22; or a nucleic acid molecule comprising a sequence encoding the Cas13a polypeptide; and b) at least one CRISPR RNA (crRNA) or at least one nucleic acid molecule encoding the at least one crRNA, the crRNA comprising one or more spacers and one or more Cas13-specific direct repeats, wherein the crRNA is capable of hybridising with one or more target RNA molecules.

6. A CRISPR/Cas13a system for targeting RNA molecules according to claim 5, the system comprising

a) a nucleic acid molecule comprising a sequence encoding the Cas13a polypeptide; and

b) at least one nucleic acid molecule encoding the at least one crRNA, the crRNA comprising one or more spacers and one or more Cas13-specific direct repeats, wherein the crRNA is capable of hybridising with one or more target RNA molecules.

7. A CRISPR/Cas13a system for targeting RNA molecules according to claim 6, wherein the system further comprises a vector system of one or more vectors comprising:

i) a first regulatory element operably linked to the nucleic acid molecule of element (a); and

ii) a second regulatory element operably linked to the nucleic acid molecule of element (b); wherein components (i) and (ii) are located on the same or different vectors of the system.

8. A CRISPR/Cas13a system according to any one of claims 5 to 7 wherein the nucleic acid molecule encoding the Cas13a polypeptide is selected from the group consisting of SEQ ID NO: 3, or SEQ ID NO: 1, or SEQ ID NO: 2, or SEQ ID NO: 4, or SEQ ID NO: 5, or SEQ ID NO: 6, or SEQ ID NO: 7, or is selected from a sequence being at least 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 3, or SEQ ID NO: 1, or SEQ ID NO: 2, or SEQ ID NO: 4, or SEQ ID NO: 5, or SEQ ID NO: 6, or SEQ ID NO: 7.

9. An in vitro method of modifying a target RNA, the method comprising contacting the target RNA with a ribonucleoprotein (RNP) complex of a CRISPR/Cas13a system, the system comprising:

i) at least one Cas13a polypeptide wherein the Cas13a polypeptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22, or a sequence being at least 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22; and

ii) at least one CRISPR RNA (crRNA), the crRNA comprising one or more spacers and one or more Cas13-specific direct repeats, wherein the crRNA is capable of hybridising with one or more target RNA molecules, wherein the Cas13a polypeptide

and the crRNA form a ribonucleoprotein (RNP) complex, and upon binding of the complex to the target RNA through the one or more spacers, the Cas13a polypeptide modifies the target RNA.

10. The method of modifying a target RNA according to claim 9 wherein prior to contacting the target RNA with the RNP complex, the method comprises:
a) expressing from a vector system at least one Cas13a polypeptide and at least one CRISPR RNA (crRNA), the vector system comprising one or more vectors comprising:
i) a first regulatory element operably linked to a nucleic acid molecule comprising a sequence encoding a Cas13a polypeptide wherein the Cas13a polypeptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22, or a sequence being at least 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22; and
ii) a second regulatory element operably linked to a nucleic acid molecule encoding a CRISPR RNA (crRNA), the crRNA comprising one or more spacers and one or more Cas13-specific direct repeats, wherein the crRNA is capable of hybridising with one or more target RNA molecules; wherein components (i) and (ii) are located on the same or different vectors of the system; and
b) isolating the expression products of step (a); and then
c) contacting the target RNA with the isolated expression products of step (b), wherein the Cas13a polypeptide and the crRNA form an RNP complex, and upon binding of the RNP complex to the target RNA through the one or more spacers, the Cas13a polypeptide modifies the target RNA.

11. The method according to claim 10 wherein the isolated expression products of step (b) are assembled in to the RNP complex prior to contact with the target RNA in step (c).

12. The method according to any one of claims 9 to 11 wherein the nucleic acid molecule encoding the Cas13a polypeptide is selected from the group consisting of SEQ ID NO: 3, or SEQ ID NO: 1, or SEQ ID NO: 2, or SEQ ID NO: 4, or SEQ ID NO: 5, or

SEQ ID NO: 6, or SEQ ID NO: 7, or is selected from a sequence being at least 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 3, or SEQ ID NO: 1, or SEQ ID NO: 2, or SEQ ID NO: 4, or SEQ ID NO: 5, or SEQ ID NO: 6, or SEQ ID NO: 7.

13. A nucleic acid detection system, the system comprising:

i) at least one Cas13a polypeptide wherein the Cas13a polypeptide has an amino acid sequence selected from the group consisting of SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22, or a sequence being at least 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% identical to SEQ ID NO: 18, SEQ ID NO: 16, SEQ ID NO: 17, SEQ ID NO: 19, SEQ ID NO: 20, SEQ ID NO: 21 and SEQ ID NO: 22, or a nucleic acid molecule comprising a sequence encoding the Cas13a polypeptide and

ii) at least one CRISPR RNA (crRNA) or a nucleic acid molecule encoding the crRNA, the crRNA comprising one or more spacers and one or more Cas13-specific direct repeats, and

iii) a detector RNA wherein the crRNA is capable of hybridising with one or more target RNA molecules, and the Cas13a polypeptide has at least trans cleavage activity.