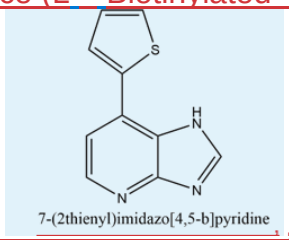
CLAIMS

1. An DNA aptamer for dengue virus (DENV), the aptamer comprising at least one unnatural base, wherein the aptamer comprises a sequence set out in the table below:

SEQ ID NO.	Sequence (L = Biotinylated-T,  7-(2thienyl)imidazo[4,5-b]pyridine, x = Ds, D = Diol1-Pa, y = Diol1-Px)
11	CCCCAGACGGACTGGTGTxCTCGGxATGGCCGTCTGGGGCGCGLAGCG
12	GGCTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGC GACAAGCGGACCAGCCCGCGLAGCG
13	CCGCTTGTCATCTAxCCTGGCCxTGTGGTACTGTAACGGCTGACAAGCG GCGCGLAGCG
14	CGGCGGAGACGTAACGCxTATCAAATCxAAACAGCTTAGGGTCCGCCGC GCGLAGCG
15	Biotin-TTTCGCACTCCATGATATGGTCTACTGAGCGAGACGATGCTGCTA AAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTAGTTAGACCGTGA AA
16	GCACTCCATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGC CGTGGTxACGAAGACAGACAAGCGGAGTGTCGCGLAGCG
17	LGATATGGTCTACTGTGTGAxGTCCTACAATGGACTGGTGTxCTCGGxAT GGCCATTGACAAGCGGAGTAGTTAGACC
18	CAGACGGACTGGTGTxCTCGGxATGGCCGTCTGCGCGLAGCG
19	LTTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGC GGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCAAA
20	Biotin-TTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGx GGCGGGAGGGAyGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGT CAAA
21	LTTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGC GGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAG
22	LCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdG GGTGTGGGTGCGACAAGCGGAGTAG
23	GACGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGT GGGTGCGACAAGCGGAGTAGTTAGACCGTCCGCGLAGCG
24	GGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGG TGCGACAAGCGGAGTAGACCCGCGLAGCG
25	GGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAA GCGGCGCGLAGCG

26	LGATATGGTCTACTGAAGTGTTGTCATCTAxCCTGGCCxTGTGGTACTGTAACGGCTGACAAGCGGAGTAGTTAGACC
27	LGATATGGTCTACTGTGGCGCGAGGGAATCxACGCxTATCAAATAxAAACAGCTAATGACAAGCGGAGTAGTTAGACC
28	LGATATGGTCTACTGAGGAGCGCATGTCGAGATACCAACCxCCATCCAATCxTTCTTGACAAGCGGAGTAGTTAGACC
29	LTGATATGGTCTACTGACGCCGGGGCCCGTAxTCAGACGTATACxCATCAGGGCACATACAAGCGGAGTAGTTAGACC
30	CGAGGCCCGTAxTCAGACGTATACxCATCAGGGCCTCGCGCGLAGCG
31	GGCAGCGCGTCGATTGxCCAATCTTAGCCAACCCAAAATTACAAGCGCTGCCCGCGLAGCG
32	GCTGCCTxGTACCAACCCCCTCCAATCxATTAGGCAGCCGCGLAGCG
33	CGTGCGACGAxGTCCAACCAGTCCCAATCxACAAGTCGCACGCGCGLAGCG
34	GCGGTCCGTGCxGTCGCCAATCCGTGdTCCAACCCCGACAAGCGGACCGCCGCGLAGCG
35	GCCCGCTTTCGxCCAACCCGTGdTCCAATCCCAGAAAGCGGGCCGCGLAGCG
36	CGCCCGTCAAGGxCTCCAATCCGTGdTCCAACCAGTTTTGACGGGCGCGCGLAGCG
37	GCCCGCGTGCTCAACCTTACCAATCTGxCACGCGGGCCGCGLAGCG
38	GCCCTGCGxGCTCAACCTTACCAATCTGxCACGCAGGGCCGCGLAGCG
39	LACTCCATGATATGGTCTACTGATAGTACTCCxGTTTAACTCTGAxACTTGACGTCCATTCATAGACAAGCGGAGTAGTTAGACC
40	LGATATGGTCTACTGGGGCTTGGTCTTGCGTxTGCAGATTAACTTGCGTGCCAGTAAGACAAGCGGAGTAGTTAGACC
41	LGATATGGTCTACTGTCTCAACGGTTGTCAAACGGxTATCACGGCxACACACCTGCGGACAAGCGGAGTAGTTAGACC
42	CTCCGCTGTCAAACGGxTATCACGGCxACACACCTGCGGACAGCGGAGCGCGLAGCG
43	LGATATGGTCTACTGTCACAxATCGCCGTAAAGxCGAAGAGCTGCGGAATCTAAGGTGACAAGCGGAGTAGTTAGACC
44	LGATATGGTCTACTGTATAATCCGCxTTCGTCATGTGGxTTGGATCTGGGTCTGGCAGACAAGCGGAGTAGTTAGACC
45	LGATATGGTCTACTGCCCAAxCTTGTCTGTAAGGGxTTGGxTAGGGCTGGCAAAAAAGACAAGCGGAGTAGTTAGACC

~~2. The aptamer according to claim 1, wherein the at least one unnatural base resides in a loop structure and/or a bulge of the aptamer.~~

~~3. The aptamer according to claim 1, wherein the at least one unnatural base is selected from the group consisting of:~~

~~7-(2thienyl)imidazo[4,5-b]pyridine (Ds);~~

~~7-(2,2′-bithien-5-yl)imidazo[4,5-b]pyridin-3-yl group (Dss);~~

pyrrole2-carbaldehyde (Pa);

2-nitro-4-propynylpyrrole (Px);

7-(2,2′,5′,2″-terthien-5-yl)imidazo[4,5-b]pyridin-3-yl group (Dsss);

2-amino-6-(2-thienyl)purin-9-yl group (s);

2-amino-6-(2,2′-bithien-5-yl)purin-9-yl group (ss);

2-amino-6-(2,2′,5′,2″-terthien-5-yl)purin-9-yl group (sss);

4-(2-thienyl)-pyrrolo[2,3-b]pyridin-1-yl group (dDsa);

4-(2,2′-bithien-5-yl)-pyrrolo[2,3-b]pyridin-1-yl group (Dsas);

4-[2-(2-thiazolyl)thien-5-yl]pyrrolo[2,3-b]pyridin-1-yl group (Dsav);

4-(2-thiazolyl)-pyrrolo[2,3-b]pyridin-1-yl group (dDva);

4-[5-(2-thienyl)thiazol-2-yl]pyrrolo[2,3-b]pyridin-1-yl group (Dvas);

4-(2-imidazolyl)-pyrrolo[2,3-b]pyridin-1-yl group (dDia);

derivatives thereof; and

combinations thereof.

4. The aptamer according to any one of the preceding claims, wherein the aptamer comprises a DNA-based aptamer.

5.2. The aptamer according to any one of the preceding claims, wherein the dissociation constant of the aptamer for DENV is no more than 200 pM.

6.3. The aptamer according to any one of the preceding claims, wherein the aptamer is capable of binding to the NS1 protein of DENV.

7.4. The aptamer according to any one of the preceding claims, wherein the aptamer is capable of binding specifically to a single serotype of DENV selected from the group consisting of serotype 1, serotype 2, serotype 3 and serotype 4.

8. The aptamer according to any one of the preceding claims, wherein the aptamer comprises a sequence set out in the table below:

SEQ ID NO.	Sequence (L=Biotin-dT, x= dDs, d=Diol1-dPa, y=Diol1-dPx, w=Diol1-dPa or Diol1-dPx)
11	CCCCAGACGGACTGGTGTxCTCGGxATGGCCGTCTGGGGCGCGLAGCG
12	GGCTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGC GACAAGCGGACCAGCCCGCGLAGCG

13	CCGCTTGTCATCTAxCCTGGCCxTGTGGTACTGTAACGGCTGACAAGCGGCGCGLAGCG
14	CGGCGGAGACGTAACGCxTATCAAATCxAAACAGCTTAGGGTCCGCCGCGCGLAGCG
15	Biotin-TTTCGCACTCCATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTAGTTAGACCGTGAAA
16	GCACTCCATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTGTCGCGLAGCG
17	LGATATGGTCTACTGTGTGAxGTCCTACAATGGACTGGTGTxCTCGGxATGGCCATTGACAAGCGGAGTAGTTAGACC
18	CAGACGGACTGGTGTxCTCGGxATGGCCGTCTGCGCGLAGCG
19	LTTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCAAA
20	Biotin-TTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAyGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCAAA
21	LTTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAG
22	LCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAG
23	GACGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCCGCGLAGCG
24	GGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGACCCGCGLAGCG
25	GGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGCGCGLAGCG
26	LGATATGGTCTACTGAAGTGTTGTCATCTAxCCTGGCCxTGTGGTACTGTAACGGCTGACAAGCGGAGTAGTTAGACC
27	LGATATGGTCTACTGTGGCGCGAGGGAATCxACGCxTATCAAATAxAAACAGCTAATGACAAGCGGAGTAGTTAGACC
28	LGATATGGTCTACTGAGGAGCGCATGTCGAGATACCAACCxCCATCCAATCxTTCTTGACAAGCGGAGTAGTTAGACC
29	LTGATATGGTCTACTGACGCCGGGGCCCGTAxTCAGACGTATACxCATCAGGGCACATACAAGCGGAGTAGTTAGACC
30	CGAGGCCCGTAxTCAGACGTATACxCATCAGGGCCTCGCGCGLAGCG
31	GGCAGCGCGTCGATTGxCCAATCTTAGCCAACCCAAAATTACAAGCGCTGCCCGCGLAGCG
32	GCTGCCTxGTACCAACCCCCTCCAATCxATTAGGCAGCCGCGLAGCG
33	CGTGCGACGAxGTCCAACCAGTCCCAATCxACAAGTCGCACGCGCGLAGCG
34	GCGGTCCGTGCxGTCGCCAATCCGTGdTCCAACCCCGACAAGCGGACCGCCGCGLAGCG
35	GCCCGCTTTCGxCCAACCCGTGdTCCAATCCCAGAAAGCGGGCCGCGLAGCG

36	CGCCCGTCAAGGxCTCCAATCCGTGdTCCAACCAGTTTTGACGGGCGCGCGLAGCG
37	GCCCGCGTGCTCAACCTTACCAATCTGxCACGCGGGCCGCGLAGCG
38	GCCCTGCGxGCTCAACCTTACCAATCTGxCACGCAGGGCCGCGLAGCG
39	LACTCCATGATATGGTCTACTGATAGTACTCCxGTTTAACTCTGAxACTTGACGTCCATTCATAGACAAGCGGAGTAGTTAGACC
40	LGATATGGTCTACTGGGGCTTGGTCTTGCGTxTGCAGATTAACTTGCGTGCCAGTAAGACAAGCGGAGTAGTTAGACC
41	LGATATGGTCTACTGTCTCAACGGTTGTCAAACGGxTATCACGGCxACACACCTGCGGACAAGCGGAGTAGTTAGACC
42	CTCCGCTGTCAAACGGxTATCACGGCxACACACCTGCGGACAGCGGAGCGCGLAGCG
43	LGATATGGTCTACTGTCACAxATCGCCGTAAAGxCGAAGAGCTGCGGAATCTAAGGTGACAAGCGGAGTAGTTAGACC
44	LGATATGGTCTACTGTATAATCCGCxTTCGTCATGTGGxTTGGATCTGGGTCTGGCAGACAAGCGGAGTAGTTAGACC
45	LGATATGGTCTACTGCCCAAxCTTGTCTGTAAGGGxTTGGxTAGGGCTGGCAAAAAAGACAAGCGGAGTAGTTAGACC
46	CGGCCGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTAGTTAGACCGGCCGCGCGLAGCG
47	GCGCCAAAxTACGCCGTGGTxCGAAGACAGACAAGCGGAGTAGTTGGCGCCGCGLAGCG
48	GCACTCCGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACGGAGTGTCGCGLAGCG
49	GCACTCCGCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGCGGAGTGTCGCGLAGCG
50	GGCTGGTCCGACTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGACCAGCCCGCGLAGCG
51	ACTGGTGTxCTCGGxATGG
52	TGGGAACAAGxGGCGGGAGGGAwGGGTGTGGGTGCGACAAG
53	TCTAxCCTGGCCxTGTGGTACTGTAACGGC
54	GACGTAACGCxTATCAAATCxAAACAGCT
55	ATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGC
56	GAGGGAATCxACGCxTATCAAATAxAAACAGCT
57	AAACGGxTATCACGGCxACACACCTGCG

or;

a sequence sharing at least 75% sequence identity thereto; or

a sequence differing by one, two, three, four, five, six, seven, eight, nine or ten bases thereto; or

portions thereof.

~~9.~~5. A mixture of aptamers that are specific to different serotypes, the mixture comprising at least two, at least three or at least four of the aptamers according to any one of the preceding claims.

~~10.~~6. A method of identifying a DENV infection in a subject, the method comprising:

contacting a sample of the subject with the aptamer according to any one of claims 1-~~4~~8 or the mixture of aptamers according to claim ~~5~~9; and

detecting a binding event at the aptamer(s).

~~11.~~7. The method according to claim ~~6~~10, wherein the method is a method of identifying a current DENV infection in the subject, and a binding event at any of the aptamer(s) is indicative of a current DENV infection in the subject,

optionally wherein the bound aptamer is specific to single DENV serotype and the binding event is indicative of a current DENV infection of said serotype in the subject.

~~12.~~8. The method according to claim ~~7~~11, wherein where the subject is indicated for a current DENV infection, further

contacting a sample of the subject with the aptamer according to any one of claims 1-~~4~~8 or the mixture of aptamers according to claim ~~5~~9 in the presence of a DENV protein; and

detecting a binding event at the aptamer(s)

wherein an absence of a binding event at any of the aptamer(s) is indicative that the current DENV infection is a secondary or further DENV infection,

optionally wherein the unbound aptamer(s) is specific to a DENV serotype and the absence of the binding event(s) is indicative of a past DENV infection of said serotype(s) in the subject.

~~13.~~9. The method according to claim ~~6~~10, wherein the method is a method of identifying a past DENV infection in the subject, the contacting step is performed in the presence of a DENV protein, and an absence of a binding event at any of the aptamer(s) is indicative of a past DENV infection in the subject,

optionally wherein the unbound aptamer(s) is specific to a DENV serotype and the absence of the binding event(s) is indicative of a past DENV infection of said serotype(s) in the subject.

~~14.~~10. The method according to claim ~~8~~12 or claim ~~9~~13, wherein the method comprises a competitive binding assay method.

~~15.~~11. The method according to any one of claims ~~6~~10-~~10~~14, wherein the method is carried out within one week following fever onset in the subject.

~~16. The method according to any one of claims 10-15, the method further comprising administering a DENV treatment regimen to the subject if the subject is indicated for a current DENV infection.~~

~~17.~~12. A method of evaluating a subject's suitability for a DENV vaccine, the method comprising:

contacting a sample of the subject with an aptamer according to any one of claims 1-~~4~~8 or the mixture of aptamers according to claim ~~5~~9 in the presence of a DENV protein;

detecting a binding event at the aptamer(s);

determining an immune history of the subject based on the binding event at the aptamer(s), wherein an absence of a binding event at any of the aptamer(s) is indicative of a past DENV infection in the subject;

concluding the suitability of the subject for the DENV vaccine based on the immune history.

~~18.~~13. A kit for identifying a DENV infection in a subject, the kit comprising an aptamer according to any one of claims 1-~~4~~8 or the mixture of aptamers according to claim ~~5~~9.

~~19.~~14. The kit according to claim ~~13~~18, the kit further comprising a DENV protein.

~~20. A nucleic acid molecule comprising a sequence set out in the table below:~~

~~SEQ ID NO.~~	~~Sequence (L=Biotin-dT, x= dDs, d= Diol1-dPa, y= Diol1-dPx, w=Diol1-dPa or Diol1-dPx)~~
~~11~~	~~CCCCAGACGGACTGGTGTxCTCGGxATGGCCGTCTGGGGCGCGLAGCG~~
~~12~~	~~GGCTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGC GACAAGCGGACCAGCCCGCGLAGCG~~

13	CCGCTTGTCATCTAxCCTGGCCxTGTGGTACTGTAACGGCTGACAAGCGGCGCGLAGCG
14	CGGCGGAGACGTAACGCxTATCAAATCxAAACAGCTTAGGGTCCGCCGCGCGLAGCG
15	Biotin-TTTCGCACTCCATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTAGTTAGACCGTGAAA
16	GCACTCCATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTGTCGCGLAGCG
17	LGATATGGTCTACTGTGTGAxGTCCTACAATGGACTGGTGTxCTCGGxATGGCCATTGACAAGCGGAGTAGTTAGACC
18	CAGACGGACTGGTGTxCTCGGxATGGCCGTCTGCGCGLAGCG
19	LTTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCAAA
20	Biotin-TTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAyGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCAAA
21	LTTTCGCACTCCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAG
22	LCATGATATGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAG
23	GACGGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGTTAGACCGTCCGCGLAGCG
24	GGTCTACTGGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGAGTAGACCCGCGLAGCG
25	GGTCCGxCTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGCGCGLAGCG
26	LGATATGGTCTACTGAAGTGTTGTCATCTAxCCTGGCCxTGTGGTACTGTAACGGCTGACAAGCGGAGTAGTTAGACC
27	LGATATGGTCTACTGTGGCGCGAGGGAATCxACGCxTATCAAATAxAAACAGCTAATGACAAGCGGAGTAGTTAGACC
28	LGATATGGTCTACTGAGGAGCGCATGTCGAGATACCAACCxCCATCCAATCxTTCTTGACAAGCGGAGTAGTTAGACC
29	LTGATATGGTCTACTGACGCCGGGGCCCGTAxTCAGACGTATACxCATCAGGGCACATACAAGCGGAGTAGTTAGACC
30	CGAGGCCCGTAxTCAGACGTATACxCATCAGGGCCTCGCGCGLAGCG
31	GGCAGCGGCGTCGATTGxCCAATCTTAGCCAACCCAAAATTACAAGCGCTGCCCGCGLAGCG
32	GCTGCCTxGTACCAACCCCCTCCAATCxATTAGGCAGCCGCGLAGCG
33	CGTGCGACGAxGTCCAACCAGTCCCAATCxACAAGTCGCACGCGCGLAGCG
34	GCGGTCCGTGCxGTCGCCAATCCGTGdTCCAACCCCGACAAGCGGACCGCCGCGLAGCG
35	GCCCGCTTTCGxCCAACCCGTGdTCCAATCCCAGAAAGCGGGCCGCGLAGCG

36	CGCCCGTCAAGGxCTCCAATCCGTGdTCCAACCAGTTTTGACGGGCGCGCGLAGCG
37	GCCCGCGTGCTCAACCTTACCAATCTGxCACGCGGGCCGCGLAGCG
38	GCCCTGCGxGCTCAACCTTACCAATCTGxCACGCAGGGCCGCGLAGCG
39	LACTCCATGATATGGTCTACTGATAGTACTCCxGTTTAACTCTGAxACTTGACGTCCATTCATAGACAAGCGGAGTAGTTAGACC
40	LGATATGGTCTACTGGGGCTTGGTCTTGCGTxTGCAGATTAACTTGCGTGCCAGTAAGACAAGCGGAGTAGTTAGACC
41	LGATATGGTCTACTGTCTCAACGGTTGTCAAACGGxTATCACGGCxACACACCTGCGGACAAGCGGAGTAGTTAGACC
42	CTCCGCTGTCAAACGGxTATCACGGCxACACACCTGCGGACAGCGGAGCGCGLAGCG
43	LGATATGGTCTACTGTCACAxATCGCCGTAAAGxCGAAGAGCTGCGGAATCTAAGGTGACAAGCGGAGTAGTTAGACC
44	LGATATGGTCTACTGTATAATCCGCxTTCGTCATGTGGxTTGGATCTGGGTCTGGCAGACAAGCGGAGTAGTTAGACC
45	LGATATGGTCTACTGCCCAAxCTTGTCTGTAAGGGxTTGGxTAGGGCTGGCAAAAAAGACAAGCGGAGTAGTTAGACC
46	CGGCCGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGCGGAGTAGTTAGACCGGCCGCGCGLAGCG
47	GCGCCAAAxTACGCCGTGGTxCGAAGACAGACAAGCGGAGTAGTTGGCGCCGCGLAGCG
48	GCACTCCGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACGGAGTGTCGCGLAGCG
49	GCACTCCGCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGCGGAGTGTCGCGLAGCG
50	GGCTGGTCCGACTGGGAACAAGxGGCGGGAGGGAdGGGTGTGGGTGCGACAAGCGGACCAGCCCGCGLAGCG
51	ACTGGTGTxCTCGGxATGG
52	TGGGAACAAGxGGCGGGAGGGAwGGGTGTGGGTGCGACAAG
53	TCTAxCCTGGCCxTGTGGTACTGTAACGGC
54	GACGTAACGCxTATCAAATCxAAACAGCT
55	ATGATATGGTCTACTGAGCGAGACGATGCTGCTAAAxTACGCCGTGGTxACGAAGACAGACAAGC
56	GAGGGAATCxACGCxTATCAAATAxAAACAGCT
57	AAACGGxTATCACGGCxACACACCTGCG

or;

a sequence sharing at least 75% sequence identity thereto; or

a sequence differing by one, two, three, four, five, six, seven, eight, nine or ten bases thereto; or

portions thereof.