

# Supporting Information

## Multidimensional Data Organization and Random Access in Large-Scale DNA Storage Systems

Xin Song<sup>1,2,3\*</sup>, Shalin Shah<sup>1,3</sup>, John Reif<sup>1,3\*</sup>

<sup>1</sup> Department of Electrical and Computer Engineering

<sup>2</sup> Department of Biomedical Engineering

<sup>3</sup> Department of Computer Science

Duke University, Durham, NC 27708, USA

\* Correspondence to: [xin.song@duke.edu](mailto:xin.song@duke.edu), [reif@cs.duke.edu](mailto:reif@cs.duke.edu)

### Results of In Silico PCR Experiments of Sixteen Random-Access Patterns

#### (1) UFP+URP: all blocks.

Data retrieval target:

All blocks (entry #1, 3, 5, 7, 9, 11, 13, 15, 2, 4, 6, 8, 10, 12, 14, 16)

Input primer list:

>UFP

AAGGCAAGTTGTTACCAGCA

>URP

TGCGACCGTAATCAAACCAA

In silico PCR result:

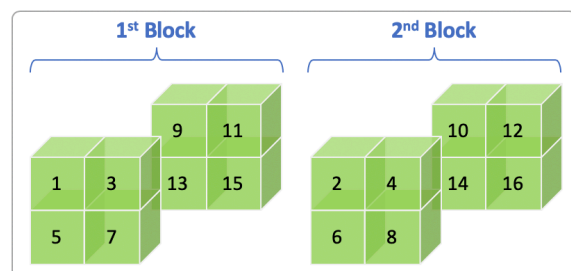
In silico Primer(s) search for: ////seq1:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      106<-125
5'-tgcgaccgtaatcaaacc
```

>1-125 Amplicon size: 125bp Ta=40°C

aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcatttcacaatcggtataaaacaaatcaacgacgaacgaacaaattaggcgacgcaatttggtttgattacggtcgc

In silico Primer(s) search for: ////seq3:



```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      116<-135
5'-tgcgaccgtaatacaaccaa
```

```
>1-135 Amplicon size: 135bp      Ta=40°C
aaggcaagttgttaccagcaagccgacaagtccaacacatggctcattcacaatcggtaaaaaaaaaaaaaaaaaaaaaactcatggctcgtttacaattaggcgacgcgaatttggttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq5:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      126<-145
5'-tgcgaccgtaatacaaccaa
```

```
>1-145 Amplicon size: 145bp      Ta=40°C
aaggcaagttgttaccagcaagccgacaagtccaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaaacaaattaggcgacgcgaatttggttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq7:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      136<-155
5'-tgcgaccgtaatacaaccaa
```

```
>1-155 Amplicon size: 155bp      Ta=41°C
aaggcaagttgttaccagcaagccgacaagtccaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctcgtttacaattaggcgacgcgaatttggttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq9:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      146<-165
5'-tgcgaccgtaatacaaccaa
```

```
>1-165 Amplicon size: 165bp      Ta=41°C
aaggcaagttgttaccagcaagccgacaagtccaacacatggctcattcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgcccctccagtttttggttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq11:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      156<-175
5'-tgcgaccgtaatacaaccaa
```

```
>1-175 Amplicon size: 175bp      Ta=41°C
aaggcaagttgttaccagcaagccgacaagtccaacacatggctcattcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgttttaattgccgctccagtttttggttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq13:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      166<-185
5'-tgcgaccgtaatacaaccaa
```

```
>1-185 Amplicon size: 185bp      Ta=41°C
```

aaggcaagttgttaccagcaagccgacaagttcaaacacaataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaac  
aatcaacgacgaacgaataatttgcgcctccagttttggtttgattacggtcgc

---

In silico Primer(s) search for: ///seq15:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>urp 176<-195  
5'-tgcgaccgtaatcaaaccaa

>1-195 Amplicon size: 195bp Ta=41°C  
aaggcaagttgttaccagcaagccgacaagttcaaacacaataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa  
aaaaaaaaaacaactcatggctcgttttaattgcccctccagttttggtttgattacggtcgc

---

In silico Primer(s) search for: ///seq2:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>urp 111<-130  
5'-tgcgaccgtaatcaaaccaa

>1-130 Amplicon size: 130bp Ta=40°C  
aaggcaagttgttaccagcagttcaaattgctgacattggctcatttcacaatcggttaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcaatttggtttgattacggtcgc

---

In silico Primer(s) search for: ///seq4:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>urp 121<-140  
5'-tgcgaccgtaatcaaaccaa

>1-140 Amplicon size: 140bp Ta=40°C  
aaggcaagttgttaccagcagttcaaattgctgacattggctcatttcacaatcggttaaaaaaaaaaaaaaaaaaacaactcatggctcgtttacaattaggcgacgcaatttggtttgattacggtc  
gc

---

In silico Primer(s) search for: ///seq6:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>urp 131<-150  
5'-tgcgaccgtaatcaaaccaa

>1-150 Amplicon size: 150bp Ta=41°C  
aaggcaagttgttaccagcagttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcaattt  
ggtttgattacggtcgc

---

In silico Primer(s) search for: ///seq8:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>urp 141<-160  
5'-tgcgaccgtaatcaaaccaa

>1-160 Amplicon size: 160bp Ta=41°C  
aaggcaagttgttaccagcagttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcatggctcgtttacaattaggcgac  
cgcaatttggtttgattacggtcgc

---

In silico Primer(s) search for: ///seq10:

>ufp 1->20

```

5'-aaggcaagttgttaccagca
>urp      151<-170
5'-tgcgaccgtaatcaaaccaa

>1-170 Amplicon size: 170bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaat
aatttgcgcctccagtttttggtttgattacggtcgc

```

---

In silico Primer(s) search for: ///seq12:

```

>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      161<-180
5'-tgcgaccgtaatcaaaccaa

>1-180 Amplicon size: 180bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaat
gctcgttttaattgcccctccagtttttggtttgattacggtcgc

```

---

In silico Primer(s) search for: ///seq14:

```

>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      171<-190
5'-tgcgaccgtaatcaaaccaa

>1-190 Amplicon size: 190bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaat
aatttgcgcctccagtttttggtttgattacggtcgc

```

---

In silico Primer(s) search for: ///seq16:

```

>ufp      1->20
5'-aaggcaagttgttaccagca
>urp      181<-200
5'-tgcgaccgtaatcaaaccaa

>1-200 Amplicon size: 200bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaat
aatttgcgcctccagtttttggtttgattacggtcgc

```

## (2) UFP+TP: specific table from all blocks.

Data retrieval target:

The 1<sup>st</sup> table from all blocks (entry #1, 3, 5, 7, 2, 4, 6, 8)

Input primer list:

```

>UFP
AAGGCAAGTTGTTACCAGCA

```

```

>TP1
ATTCGCGTCGCCTAATTGT

```

In silico PCR result:

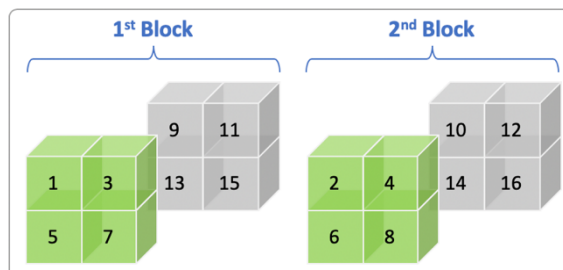
---

In silico Primer(s) search for: ///seq1:

```

>ufp      1->20

```



5'-aaggcaagttgtaccagca  
>tp1 86<-105  
5'-attcgcgtcgcctaatttgt

>1-105 Amplicon size: 105bp Ta=40°C  
aaggcaagttgtaccagcaagccgacaagttcaaacacatggctcattcacaatcggtataaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq3:

>ufp 1->20  
5'-aaggcaagttgtaccagca  
>tp1 96<-115  
5'-attcgcgtcgcctaatttgt

>1-115 Amplicon size: 115bp Ta=40°C  
aaggcaagttgtaccagcaagccgacaagttcaaacacatggctcattcacaatcggtataaaaaaaaaaaaaaaccaatcatggctccgtttacaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq5:

>ufp 1->20  
5'-aaggcaagttgtaccagca  
>tp1 106<-125  
5'-attcgcgtcgcctaatttgt

>1-125 Amplicon size: 125bp Ta=40°C  
aaggcaagttgtaccagcaagccgacaagttcaaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq7:

>ufp 1->20  
5'-aaggcaagttgtaccagca  
>tp1 116<-135  
5'-attcgcgtcgcctaatttgt

>1-135 Amplicon size: 135bp Ta=40°C  
aaggcaagttgtaccagcaagccgacaagttcaaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcatggctccgtttacaattaggcgacgcg  
aa

---

In silico Primer(s) search for: ///seq9:

---

In silico Primer(s) search for: ///seq11:

---

In silico Primer(s) search for: ///seq13:

---

In silico Primer(s) search for: ///seq15:

---

In silico Primer(s) search for: ///seq2:

>ufp 1->20  
5'-aaggcaagttgtaccagca  
>tp1 91<-110  
5'-attcgcgtcgcctaatttgt

>1-110 Amplicon size: 110bp Ta=40°C  
aaggcaagttgtaccagcagttcaaattgcgtgcacattggctcattcacaatcggtataaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq4:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp1      101<-120
5'-attcgcgtcgcctaatttgt

>1-120 Amplicon size: 120bp    Ta=40°C
aaggcaagttgttaccagcagttcaaattgcgtgcgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaactcatggctcggtttacaattaggcgacgcgaa
```

---

In silico Primer(s) search for: ///seq6:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp1      111<-130
5'-attcgcgtcgcctaatttgt

>1-130 Amplicon size: 130bp    Ta=40°C
aaggcaagttgttaccagcagttcaaattgcgtgcgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaa
```

---

In silico Primer(s) search for: ///seq8:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp1      121<-140
5'-attcgcgtcgcctaatttgt

>1-140 Amplicon size: 140bp    Ta=40°C
aaggcaagttgttaccagcagttcaaattgcgtgcgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctcggtttacaattaggcgacgcgaa
```

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

### (3) UFP+CP: specific column from all tables in all blocks.

Data retrieval target:

The 2<sup>nd</sup> column from all tables in all blocks (entry #3, 7, 11, 15, 4, 8, 12, 16)

Input primer list:

```
>UFP
AAGGCAAGTTGTTACCAGCA
```

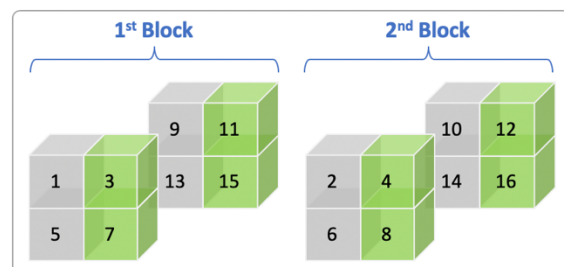
```
>CP2
AAACGGAGCCATGAGTTTGT
```

In silico PCR result:

---

In silico Primer(s) search for: ///seq1:

---



In silico Primer(s) search for: ///seq3:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      76<-95
5'-aaacggagccatgagttgt
```

```
>1-95 Amplicon size: 95bp      Ta=40°C
aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq5:

---

In silico Primer(s) search for: ///seq7:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      96<-115
5'-aaacggagccatgagttgt
```

```
>1-115 Amplicon size: 115bp     Ta=40°C
aaggcaagttgttaccagcaagccgacaagttcaaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq9:

---

In silico Primer(s) search for: ///seq11:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      116<-135
5'-aaacggagccatgagttgt
```

```
>1-135 Amplicon size: 135bp     Ta=40°C
aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq13:

---

In silico Primer(s) search for: ///seq15:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      136<-155
5'-aaacggagccatgagttgt
```

```
>1-155 Amplicon size: 155bp     Ta=41°C
aaggcaagttgttaccagcaagccgacaagttcaaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
aaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq2:

---

In silico Primer(s) search for: ///seq4:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      81<-100
5'-aaacggagccatgagttgt
```

```
>1-100 Amplicon size: 100bp     Ta=40°C
```

aaggcaagttgttaccagcagttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt

---

In silico Primer(s) search for: ///seq6:

---

In silico Primer(s) search for: ///seq8:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      101<-120
5'-aacggagccatgagtttgt
```

```
>1-120 Amplicon size: 120bp    Ta=40°C
aaggcaagttgttaccagcagttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      121<-140
5'-aacggagccatgagtttgt
```

```
>1-140 Amplicon size: 140bp    Ta=40°C
aaggcaagttgttaccagcagttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatg
gctccgtt
```

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>cp2      141<-160
5'-aacggagccatgagtttgt
```

```
>1-160 Amplicon size: 160bp    Ta=41°C
aaggcaagttgttaccagcagttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
aaaaaaaaaaaaaactcatggctccgtt
```

#### (4) RP+URP: specific row from all tables in all blocks.

Data retrieval target:

The 1<sup>st</sup> row from all tables in all blocks (entry #1, 3, 9, 11, 2, 4, 10, 12)

Input primer list:

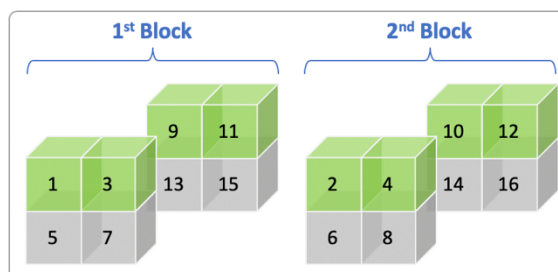
```
>RP1
TGGCTCATTTACAAATCGGT
```

```
>URP
TGCGACCGTAATCAAACCAA
```

In silico PCR result:

---

In silico Primer(s) search for: ///seq1:





>rp1 41->60  
5'-tggctcatttcacaatcggt  
>urp 106<-125  
5'-tgcgaccgtaatcaaacc

>41-125 Amplicon size: 85bp Ta=40°C  
tggctcatttcacaatcggtaaaaaaccaatcaacgacgaacgaacaattaggcgacggaattgggttgattacggtcgc

---

In silico Primer(s) search for: ///seq3:

>rp1 41->60  
5'-tggctcatttcacaatcggt  
>urp 116<-135  
5'-tgcgaccgtaatcaaacc

>41-135 Amplicon size: 95bp Ta=40°C  
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaactcatggctcgtttacaattaggcgacggaattgggttgattacggtcgc

---

In silico Primer(s) search for: ///seq5:

---

In silico Primer(s) search for: ///seq7:

---

In silico Primer(s) search for: ///seq9:

>rp1 41->60  
5'-tggctcatttcacaatcggt  
>urp 146<-165  
5'-tgcgaccgtaatcaaacc

>41-165 Amplicon size: 125bp Ta=40°C  
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgccgcctccagttttgggttgattacggtcgc

---

In silico Primer(s) search for: ///seq11:

>rp1 41->60  
5'-tggctcatttcacaatcggt  
>urp 156<-175  
5'-tgcgaccgtaatcaaacc

>41-175 Amplicon size: 135bp Ta=40°C  
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcatggctcgttttaattgccgcctccagttttgggttgattacggtcgc

---

In silico Primer(s) search for: ///seq13:

---

In silico Primer(s) search for: ///seq15:

---

In silico Primer(s) search for: ///seq2:

>rp1 41->60  
5'-tggctcatttcacaatcggt  
>urp 111<-130  
5'-tgcgaccgtaatcaaacc

>41-130 Amplicon size: 90bp Ta=40°C  
tggctcatttcacaatcggtaaaaaaaaaaccaatcaacgacgaacgaacaattaggcgacggaattgggttgattacggtcgc

In silico Primer(s) search for: ///seq4:

```
>rp1      41->60
5'-tggctcatttcacaatcggt
>urp      121<-140
5'-tgcgaccgtaatcaaacc
```

```
>41-140 Amplicon size: 100bp   Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaaattaggcgacgcgaatttggtttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq6:

---

In silico Primer(s) search for: ///seq8:

---

In silico Primer(s) search for: ///seq10:

```
>rp1      41->60
5'-tggctcatttcacaatcggt
>urp      151<-170
5'-tgcgaccgtaatcaaacc
```

```
>41-170 Amplicon size: 130bp   Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgccgcctccagttttggtttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq12:

```
>rp1      41->60
5'-tggctcatttcacaatcggt
>urp      161<-180
5'-tgcgaccgtaatcaaacc
```

```
>41-180 Amplicon size: 140bp   Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgttttaattgccgcctccagttttggtttgattacggtcgc
```

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

## (5) RP+TP: specific row from specific table in all blocks.

Data retrieval target:

The 2<sup>nd</sup> row from the 1<sup>st</sup> table in all blocks (entry #5, 7, 6, 8)

Input primer list:

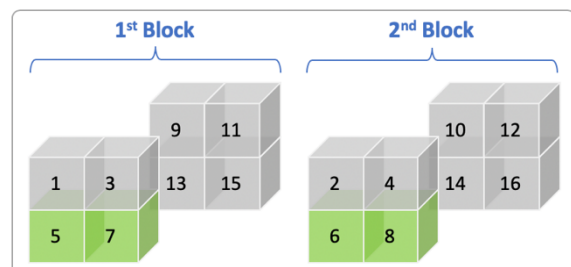
```
>RP2
ATAAATGACCTGCCGTGCAA
```

```
>TP1
ATTCGCGTCGCCTAATTGT
```

In silico PCR result:

---

In silico Primer(s) search for: ///seq1:



---

In silico Primer(s) search for: ////seq3:

---

In silico Primer(s) search for: ////seq5:

>rp2 41->60  
5'-ataaatgacctgccgtgcaa  
>tp1 106<-125  
5'-attcgcgtcgcctaatttgt

>41-125 Amplicon size: 85bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq7:

>rp2 41->60  
5'-ataaatgacctgccgtgcaa  
>tp1 116<-135  
5'-attcgcgtcgcctaatttgt

>41-135 Amplicon size: 95bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq13:

---

In silico Primer(s) search for: ////seq15:

---

In silico Primer(s) search for: ////seq2:

---

In silico Primer(s) search for: ////seq4:

---

In silico Primer(s) search for: ////seq6:

>rp2 41->60  
5'-ataaatgacctgccgtgcaa  
>tp1 111<-130  
5'-attcgcgtcgcctaatttgt

>41-130 Amplicon size: 90bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq8:

>rp2 41->60  
5'-ataaatgacctgccgtgcaa  
>tp1 121<-140  
5'-attcgcgtcgcctaatttgt

>41-140 Amplicon size: 100bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq14:

---

In silico Primer(s) search for: ////seq16:

## (6) UFP+TP then UFP+CP: specific column from specific table in all blocks.

Data retrieval target:

The 1<sup>st</sup> column from the 2<sup>nd</sup> table in all blocks (entry #9, 13, 10, 14)

Input primer list:

>UFP

AAGGCAAGTTGTTACCAGCA

>TP2

AAACTGGAGGCGGCAAATTA

Then,

>UFP

AAGGCAAGTTGTTACCAGCA

>CP1

TTCGTCGTCGTTGATTGGT

In silico PCR result:

>>> 1<sup>st</sup> PCR round >>>

---

In silico Primer(s) search for: ////seq1:

---

In silico Primer(s) search for: ////seq3:

---

In silico Primer(s) search for: ////seq5:

---

In silico Primer(s) search for: ////seq7:

---

In silico Primer(s) search for: ////seq9:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp2 126<-145  
5'-aaactggagcgcaaatta

>1-145 Amplicon size: 145bp Ta=40°C  
aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcattcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataatt  
gccgcctccagtt

---

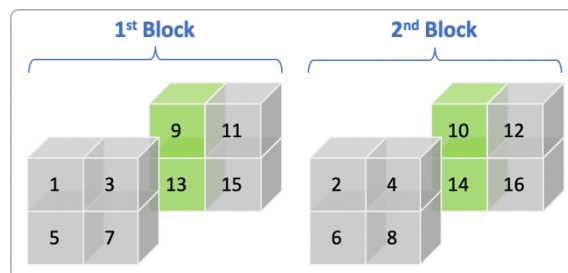
In silico Primer(s) search for: ////seq11:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp2 136<-155  
5'-aaactggagcgcaaatta

>1-155 Amplicon size: 155bp Ta=41°C  
aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcattcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctcc  
gttttaattgccgcctccagtt

---

In silico Primer(s) search for: ////seq13:



```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp2      146<-165
5'-aaactggaggcggcaaatta
```

```
>1-165 Amplicon size: 165bp      Ta=41°C
aaggcaagttgttaccagcaagccgacaagttcaaacacaataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaac
aatcaacgacgaacgaataatttgcgcctccagtt
```

---

In silico Primer(s) search for: ///seq15:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp2      156<-175
5'-aaactggaggcggcaaatta
```

```
>1-175 Amplicon size: 175bp      Ta=41°C
aaggcaagttgttaccagcaagccgacaagttcaaacacaataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaac
aaaaaaaaaaactcatggtccgttttaatttgcgcctccagtt
```

---

In silico Primer(s) search for: ///seq2:

---

In silico Primer(s) search for: ///seq4:

---

In silico Primer(s) search for: ///seq6:

---

In silico Primer(s) search for: ///seq8:

---

In silico Primer(s) search for: ///seq10:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp2      131<-150
5'-aaactggaggcggcaaatta
```

```
>1-150 Amplicon size: 150bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgcgtgcgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaat
aatttgcgcctccagtt
```

---

In silico Primer(s) search for: ///seq12:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp2      141<-160
5'-aaactggaggcggcaaatta
```

```
>1-160 Amplicon size: 160bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgcgtgcgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcatg
gtcctgttttaatttgcgcctccagtt
```

---

In silico Primer(s) search for: ///seq14:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp2      151<-170
5'-aaactggaggcggcaaatta
```

```
>1-170 Amplicon size: 170bp      Ta=41°C
```

aaggcaagttgttaccagcagttcaaattgctgacacataataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa  
aaccaatcaacgacgaacgaataattgccgcctccagtt

---

In silico Primer(s) search for: ///seq16:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp2 161<-180  
5'-aaactggaggcggcaaatta

>1-180 Amplicon size: 180bp Ta=41°C  
aaggcaagttgttaccagcagttcaaattgctgacacataataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa  
aaaaaaaaaaaaaaactcatggctccgttttaatttgcgcctccagtt

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq9:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>cp1 106<-125  
5'-ttcgttcgtcgttgattggt

>1-125 Amplicon size: 125bp Ta=40°C  
aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaatcaacgacgaacga

---

In silico Primer(s) search for: ///seq11:

---

In silico Primer(s) search for: ///seq13:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>cp1 126<-145  
5'-ttcgttcgtcgttgattggt

>1-145 Amplicon size: 145bp Ta=40°C  
aaggcaagttgttaccagcaagccgacaagttcaaacacaataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa  
aatcaacgacgaacga

---

In silico Primer(s) search for: ///seq15:

---

In silico Primer(s) search for: ///seq10:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>cp1 111<-130  
5'-ttcgttcgtcgttgattggt

>1-130 Amplicon size: 130bp Ta=40°C  
aaggcaagttgttaccagcagttcaaattgctgacacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaatcaacgacgaacga

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

>ufp 1->20

```

5'-aaggcaagttgttaccagca
>cp1      131<-150
5'-ttcgttcgtcgttgattggt

>1-150 Amplicon size: 150bp      Ta=41°C
aaggcaagttgttaccagcagttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
aaccaatcaacgacgaacga

```

---

In silico Primer(s) search for: ////seq16:

## (7) RP+CP: specific entry from all tables in all blocks.

Data retrieval target:

Entry at the 1<sup>st</sup> row 2<sup>nd</sup> column from all tables in all blocks (entry #3, 11, 4, 12)

Input primer list:

```

>RP1
TGGCTCATTTCAACAATCGGT

```

```

>CP2
AAACGGAGCCATGAGTTTGT

```

In silico PCR result:

---

In silico Primer(s) search for: ////seq1:

---

In silico Primer(s) search for: ////seq3:

```

>rp1      41->60
5'-tggctcatttcacaatcggt
>cp2      76<-95
5'-aaacggagccatgagtttgt

```

```

>41-95 Amplicon size: 55bp      Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt

```

---

In silico Primer(s) search for: ////seq7:

---

In silico Primer(s) search for: ////seq9:

---

In silico Primer(s) search for: ////seq11:

```

>rp1      41->60
5'-tggctcatttcacaatcggt
>cp2      116<-135
5'-aaacggagccatgagtttgt

```

```

>41-135 Amplicon size: 95bp      Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt

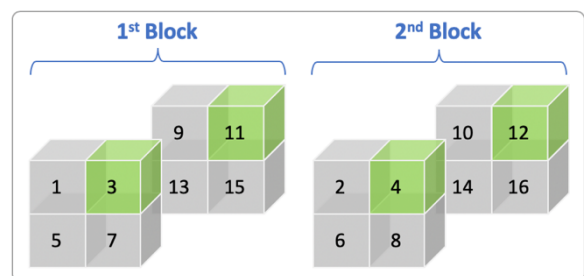
```

---

In silico Primer(s) search for: ////seq15:

---

In silico Primer(s) search for: ////seq2:



---

In silico Primer(s) search for: ///seq4:

```
>rp1      41->60
5'-tggctcatttcacaatcggt
>cp2      81<-100
5'-aacggagccatgagtttgt

>41-100 Amplicon size: 60bp    Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq8:

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

```
>rp1      41->60
5'-tggctcatttcacaatcggt
>cp2      121<-140
5'-aacggagccatgagtttgt

>41-140 Amplicon size: 100bp   Ta=40°C
tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

---

In silico Primer(s) search for: ///seq16:

## (8) UFP+TP then RP+CP: specific entry from specific table in all blocks.

Data retrieval target:

Entry at the 2<sup>nd</sup> row 2<sup>nd</sup> column from the 1<sup>st</sup> table in all blocks (entry #7, 8)

Input primer list:

```
>UFP
AAGGCAAGTTGTTACCAGCA
```

```
>TP1
ATTCGCGTCGCCTAATTTGT
```

Then,

```
>RP2
ATAAATGACCTGCCGTGCAA
```

```
>CP2
AACGGAGCCATGAGTTTGT
```

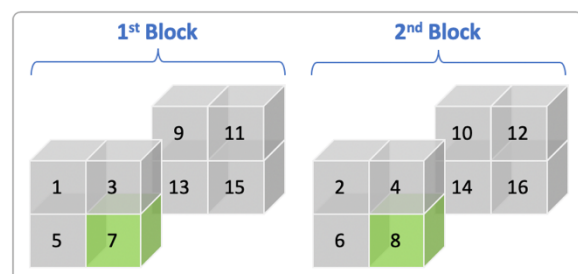
In silico PCR result:

>>> 1<sup>st</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq1:

```
>ufp      1->20
5'-aaggcaagttgttaccagca
>tp1      86<-105
```





5'-attcgcgtcgcctaatttgt

>1-105 Amplicon size: 105bp Ta=40°C

aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcatttcacaatcggtataaaacaaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq3:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp1 96<-115  
5'-attcgcgtcgcctaatttgt

>1-115 Amplicon size: 115bp Ta=40°C

aaggcaagttgttaccagcaagccgacaagttcaaacacatggctcatttcacaatcggtataaaacaaactcatggctccgtttacaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq5:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp1 106<-125  
5'-attcgcgtcgcctaatttgt

>1-125 Amplicon size: 125bp Ta=40°C

aaggcaagttgttaccagcaagccgacaagttcaaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaccatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq7:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp1 116<-135  
5'-attcgcgtcgcctaatttgt

>1-135 Amplicon size: 135bp Ta=40°C

aaggcaagttgttaccagcaagccgacaagttcaaacacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaattaggcgacgcg  
aa

---

In silico Primer(s) search for: ///seq9:

---

In silico Primer(s) search for: ///seq11:

---

In silico Primer(s) search for: ///seq13:

---

In silico Primer(s) search for: ///seq15:

---

In silico Primer(s) search for: ///seq2:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp1 91<-110  
5'-attcgcgtcgcctaatttgt

>1-110 Amplicon size: 110bp Ta=40°C

aaggcaagttgttaccagcagttcaaatgctgcgacattggctcatttcacaatcggtataaaacaaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq4:

>ufp 1->20

5'-aaggcaagttgttaccagca  
>tp1 101<-120  
5'-attcgcgtcgcctaatttgt

>1-120 Amplicon size: 120bp Ta=40°C  
aaggcaagttgttaccagcagttcaaattgcgtgcgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq6:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp1 111<-130  
5'-attcgcgtcgcctaatttgt

>1-130 Amplicon size: 130bp Ta=40°C  
aaggcaagttgttaccagcagttcaaattgcgtgcgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaccatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq8:

>ufp 1->20  
5'-aaggcaagttgttaccagca  
>tp1 121<-140  
5'-attcgcgtcgcctaatttgt

>1-140 Amplicon size: 140bp Ta=40°C  
aaggcaagttgttaccagcagttcaaattgcgtgcgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq3:

---

In silico Primer(s) search for: ///seq5:

---

In silico Primer(s) search for: ///seq7:

>rp2 41->60  
5'-ataaatgacctgccgtgcaa  
>cp2 96<-115  
5'-aacggagccatgagtttgt

>41-115 Amplicon size: 75bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt

---

In silico Primer(s) search for: ///seq4:

---

In silico Primer(s) search for: ////seq6:

---

In silico Primer(s) search for: ////seq8:

```
>rp2      41->60
5'-ataaatgacctgccgtgcaa
>cp2      101<-120
5'-aacggagccatgagttgt

>41-120 Amplicon size: 80bp    Ta=40°C
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtt
```

## (9) BP+URP: specific block.

Data retrieval target:

The 2<sup>nd</sup> block (entry #2, 4, 6, 8, 10, 12, 14, 16)

Input primer list:

```
>BP2
GTTCAAATTGCGTGCGACAT
```

```
>URP
TGCGACCGTAATCAAACCAA
```

In silico PCR result:

---

In silico Primer(s) search for: ////seq1:

---

---

In silico Primer(s) search for: ////seq3:

---

---

In silico Primer(s) search for: ////seq5:

---

---

In silico Primer(s) search for: ////seq7:

---

---

In silico Primer(s) search for: ////seq9:

---

---

In silico Primer(s) search for: ////seq11:

---

---

In silico Primer(s) search for: ////seq13:

---

---

In silico Primer(s) search for: ////seq15:

---

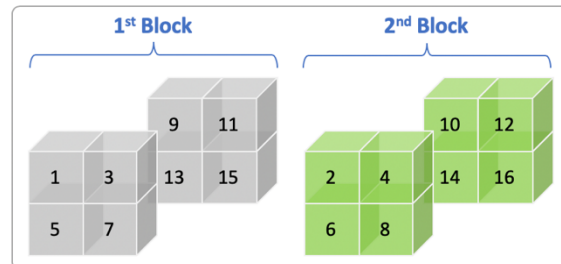
---

In silico Primer(s) search for: ////seq2:

---

```
>bp2      21->40
5'-gttcaaattgctgacat
>urp      111<-130
5'-tgcgaccgtaatcaaaccaa

>21-130 Amplicon size: 110bp    Ta=40°C
gttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaatttggttgattacggtcgc
```



---

In silico Primer(s) search for: ///seq4:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>urp 121<-140  
5'-tgcgaccgtaatcaaaccaa

>21-140 Amplicon size: 120bp Ta=40°C  
gttcaaattgctgctgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaacatcgctcgtttacaattaggcgacgcaatttggttgattacggctgc

---

In silico Primer(s) search for: ///seq6:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>urp 131<-150  
5'-tgcgaccgtaatcaaaccaa

>21-150 Amplicon size: 130bp Ta=40°C  
gttcaaattgctgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcaatttggttgattacggctgc

---

In silico Primer(s) search for: ///seq8:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>urp 141<-160  
5'-tgcgaccgtaatcaaaccaa

>21-160 Amplicon size: 140bp Ta=40°C  
gttcaaattgctgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcgctcgtttacaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq10:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>urp 151<-170  
5'-tgcgaccgtaatcaaaccaa

>21-170 Amplicon size: 150bp Ta=41°C  
gttcaaattgctgctgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgccgcctccagttttggttgattacggctgc

---

In silico Primer(s) search for: ///seq12:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>urp 161<-180  
5'-tgcgaccgtaatcaaaccaa

>21-180 Amplicon size: 160bp Ta=41°C  
gttcaaattgctgctgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcgctcgttttaattgccgcctccagttttggttgattacggctgc

---

In silico Primer(s) search for: ///seq14:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>urp 171<-190  
5'-tgcgaccgtaatcaaaccaa

```
>21-190 Amplicon size: 170bp    Ta=41°C
gttcaaattgctgctgcacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacga
ataattgccgctccagtttttggtttgattacggctgc
```

---

In silico Primer(s) search for: ///seq16:

```
>bp2      21->40
5'-gttcaaattgctgctgcacat
>urp      181<-200
5'-tgcgaccgtaatcaaaccaa
```

```
>21-200 Amplicon size: 180bp    Ta=41°C
gttcaaattgctgctgcacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacga
atggctccgttttaattgccgctccagtttttggtttgattacggctgc
```

## (10) BP+TP: specific table from specific block.

Data retrieval target:

The 1<sup>st</sup> table from the 2<sup>nd</sup> block (entry #2, 4, 6, 8)

Input primer list:

```
>BP2
GTTCAAATTGCGTGCGACAT
```

```
>TP1
ATTCGCGTCGCCTAATTGT
```

In silico PCR result:

---

In silico Primer(s) search for: ///seq1:

---

In silico Primer(s) search for: ///seq3:

---

In silico Primer(s) search for: ///seq5:

---

In silico Primer(s) search for: ///seq7:

---

In silico Primer(s) search for: ///seq2:

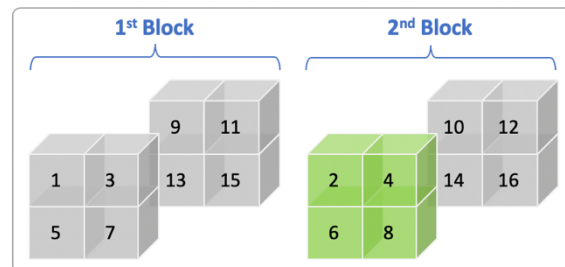
```
>bp2      21->40
5'-gttcaaattgctgctgcacat
>tp1      91<-110
5'-attcgcgtgcctaatttgt
```

```
>21-110 Amplicon size: 90bp    Ta=41°C
gttcaaattgctgctgcacattggctcatttcacaatcggtaaaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcgaa
```

---

In silico Primer(s) search for: ///seq4:

```
>bp2      21->40
5'-gttcaaattgctgctgcacat
>tp1      101<-120
5'-attcgcgtgcctaatttgt
```



>21-120 Amplicon size: 100bp Ta=41°C  
gttcaaattgctgacgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq6:

>bp2 21->40  
5'-gttcaaattgctgacgacat  
>tp1 111<-130  
5'-attcgcgtcgcctaattgt

>21-130 Amplicon size: 110bp Ta=41°C  
gttcaaattgctgacgacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq8:

>bp2 21->40  
5'-gttcaaattgctgacgacat  
>tp1 121<-140  
5'-attcgcgtcgcctaattgt

>21-140 Amplicon size: 120bp Ta=41°C  
gttcaaattgctgacgacataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccatcatggctccgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

## (11) BP+CP: specific column from all tables in specific block.

Data retrieval target:

The 2<sup>nd</sup> column from all tables in the 1<sup>st</sup> block (entry #3, 7, 11, 15)

Input primer list:

>BP1  
AGCCGACAAGTTCAAACACA

>CP2  
AAACGGAGCCATGAGTTTGT

In silico PCR result:

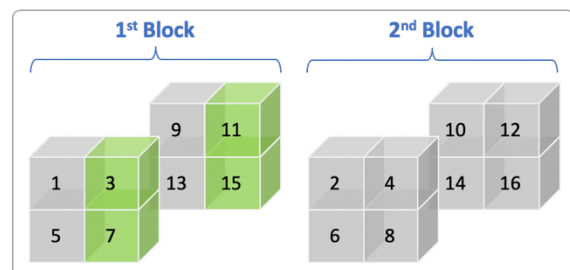
---

In silico Primer(s) search for: ///seq1:

---

In silico Primer(s) search for: ///seq3:

>bp1 21->40  
5'-agccgacaagttcaaacaca  
>cp2 76<-95  
5'-aaacggagccatgagtttgt



>21-95 Amplicon size: 75bp Ta=40°C  
agccgacaagttcaaacacatggctcatttcacaatcggtaaaaaaaaaaaaaaacaactcatggctccgtt

---

In silico Primer(s) search for: ///seq5:

---

In silico Primer(s) search for: ///seq7:

>bp1 21->40  
5'-agccgacaagttcaaacaca  
>cp2 96<-115  
5'-aacggagccatgagtttgt

>21-115 Amplicon size: 95bp Ta=40°C  
agccgacaagttcaaacacaataatgacctgcccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaactcatggctccgtt

---

In silico Primer(s) search for: ///seq9:

---

In silico Primer(s) search for: ///seq11:

>bp1 21->40  
5'-agccgacaagttcaaacaca  
>cp2 116<-135  
5'-aacggagccatgagtttgt

>21-135 Amplicon size: 115bp Ta=40°C  
agccgacaagttcaaacacatggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaactcatggctccgtt

---

In silico Primer(s) search for: ///seq13:

---

In silico Primer(s) search for: ///seq15:

>bp1 21->40  
5'-agccgacaagttcaaacaca  
>cp2 136<-155  
5'-aacggagccatgagtttgt

>21-155 Amplicon size: 135bp Ta=40°C  
agccgacaagttcaaacacaataatgacctgcccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaactcatggc  
tccgtt

---

In silico Primer(s) search for: ///seq4:

---

In silico Primer(s) search for: ///seq8:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq16:

## (12) BP+URP then RP+URP: specific row from all tables in specific block.

Data retrieval target:

The 1<sup>st</sup> row from all tables in the 2<sup>nd</sup> block (entry #2, 4, 10, 12)

Input primer list:

>BP2

GTTCAAATTGCGTGCGACAT

>URP

TGCGACCGTAATCAAACCAA

Then,

>RP1

TGGCTCATTTACAATCGGT

>URP

TGCGACCGTAATCAAACCAA

In silico PCR result:

>>> 1<sup>st</sup> PCR round >>>

---

In silico Primer(s) search for: ////seq1:

---

In silico Primer(s) search for: ////seq3:

---

In silico Primer(s) search for: ////seq5:

---

In silico Primer(s) search for: ////seq7:

---

In silico Primer(s) search for: ////seq9:

---

In silico Primer(s) search for: ////seq11:

---

In silico Primer(s) search for: ////seq13:

---

In silico Primer(s) search for: ////seq15:

---

In silico Primer(s) search for: ////seq2:

>bp2 21->40

5'-gttcaaattgctgacat

>urp 111<-130

5'-tgcgaccgtaatcaaacc

>21-130 Amplicon size: 110bp Ta=40°C

gttcaaattgctgacattggctcatttcacaatcggtataaaaaaaaaaaccaatcaacgacgaacaaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ////seq4:

>bp2 21->40

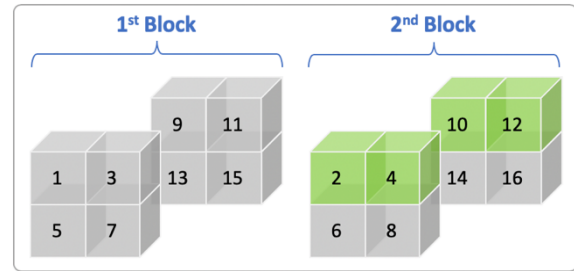
5'-gttcaaattgctgacat

>urp 121<-140

5'-tgcgaccgtaatcaaacc

>21-140 Amplicon size: 120bp Ta=40°C

gttcaaattgctgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaccaatcatggctccgtttacaaattaggcgacgcaatttggttgattacggtcgc





---

In silico Primer(s) search for: ///seq6:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 131<-150  
5'-tgcgaccgtaataaccaa

>21-150 Amplicon size: 130bp Ta=40°C  
gttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacaaattaggcgacgcaatttggttgattacggctgc

---

In silico Primer(s) search for: ///seq8:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 141<-160  
5'-tgcgaccgtaataaccaa

>21-160 Amplicon size: 140bp Ta=40°C  
gttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacactcatggctcgtttacaaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq10:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 151<-170  
5'-tgcgaccgtaataaccaa

>21-170 Amplicon size: 150bp Ta=41°C  
gttcaaattgctgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgccgcctccagttttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq12:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 161<-180  
5'-tgcgaccgtaataaccaa

>21-180 Amplicon size: 160bp Ta=41°C  
gttcaaattgctgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacactcatggctcgttttaattgccgcctccagttttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq14:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 171<-190  
5'-tgcgaccgtaataaccaa

>21-190 Amplicon size: 170bp Ta=41°C  
gttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgccgcctccagttttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq16:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 181<-200

5'-tgcgaccgtaatacaaccaa

>21-200 Amplicon size: 180bp Ta=41°C

gttcaaattgcgtgcgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaactc  
atggctccgttttaatttgcgcctccagtttttggttgattacggtcgc

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq2:

>rp1 21->40  
5'-tggctcatttcacaatcggt  
>urp 91<-109  
5'-tgcgaccgtaatacaaccaa

>21-110 Amplicon size: 90bp Ta=40°C

tggctcatttcacaatcggtaaaaaaaaaaccaatcaacgacgaacgaacaaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq4:

>rp1 21->40  
5'-tggctcatttcacaatcggt  
>urp 101<-119  
5'-tgcgaccgtaatacaaccaa

>21-120 Amplicon size: 100bp Ta=40°C

tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaccaatcggtctcgtttacaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq6:

---

In silico Primer(s) search for: ///seq8:

---

In silico Primer(s) search for: ///seq10:

>rp1 21->40  
5'-tggctcatttcacaatcggt  
>urp 131<-149  
5'-tgcgaccgtaatacaaccaa

>21-150 Amplicon size: 130bp Ta=40°C

tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataatttgcgcctccagtttttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq12:

>rp1 21->40  
5'-tggctcatttcacaatcggt  
>urp 141<-159  
5'-tgcgaccgtaatacaaccaa

>21-160 Amplicon size: 140bp Ta=40°C

tggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcggtctcgttttaatttgcgcctccagtttttggttgattacg  
gtcgc

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

### (13) BP+TP then RP+TP: specific row from specific table in specific block.

Data retrieval target:

The 2<sup>nd</sup> row from the 2<sup>nd</sup> table in the 1<sup>st</sup> block (entry #13, 15)

Input primer list:

>BP1

AGCCGACAAGTTCAAACACA

>TP2

AAACTGGAGGCGGCAAATTA

Then,

>RP2

ATAAATGACCTGCCGTGCAA

>TP2

AAACTGGAGGCGGCAAATTA

In silico PCR result:

>>> 1<sup>st</sup> PCR round >>>

---

In silico Primer(s) search for: ////seq1:

---

In silico Primer(s) search for: ////seq3:

---

In silico Primer(s) search for: ////seq5:

---

In silico Primer(s) search for: ////seq7:

---

In silico Primer(s) search for: ////seq9:

>bp1 21->40

5'-agccgacaagttcaaacaca

>tp2 126<-145

5'-aaactggagcgcaaatta

>21-145 Amplicon size: 125bp Ta=40°C

agccgacaagttcaaacacatggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaatcaacgacgaacgaataatttgccgcctccagtt

---

In silico Primer(s) search for: ////seq11:

>bp1 21->40

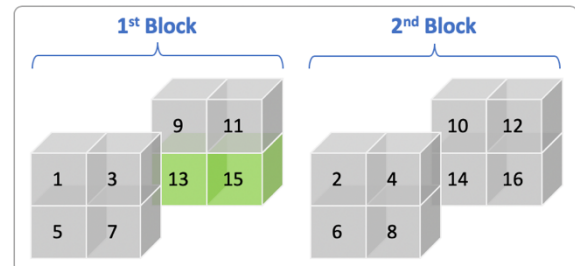
5'-agccgacaagttcaaacaca

>tp2 136<-155

5'-aaactggagcgcaaatta

>21-155 Amplicon size: 135bp Ta=40°C

agccgacaagttcaaacacatggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaactcatggctcggttttaatttgccgcctccagtt



In silico Primer(s) search for: ///seq13:

>bp1 21->40  
5'-agccgacaagttcaaacaca  
>tp2 146<-165  
5'-aaactggaggcggcaaatta

>21-165 Amplicon size: 145bp Ta=40°C  
agccgacaagttcaaacacaataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataa  
ttgccgcctccagtt

---

In silico Primer(s) search for: ///seq15:

>bp1 21->40  
5'-agccgacaagttcaaacaca  
>tp2 156<-175  
5'-aaactggaggcggcaaatta

>21-175 Amplicon size: 155bp Ta=41°C  
agccgacaagttcaaacacaataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggc  
tcggttttaattgccgcctccagtt

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq9:

---

In silico Primer(s) search for: ///seq11:

---

In silico Primer(s) search for: ///seq13:

>rp2 21->40  
5'-ataaatgacctgccgtgcaa  
>tp2 126<-144  
5'-aaactggaggcggcaaatta

>21-145 Amplicon size: 125bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacgaataattgccgcctccagtt

---

In silico Primer(s) search for: ///seq15:

>rp2 21->40  
5'-ataaatgacctgccgtgcaa  
>tp2 136<-154  
5'-aaactggaggcggcaaatta

>21-155 Amplicon size: 135bp Ta=40°C



---

In silico Primer(s) search for: ///seq6:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>tp1 111<-130  
5'-attcgcgtcgcctaatttgt

>21-130 Amplicon size: 110bp Ta=41°C  
gttcaaattgctgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaatcaacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq8:

>bp2 21->40  
5'-gttcaaattgctgctgacat  
>tp1 121<-140  
5'-attcgcgtcgcctaatttgt

>21-140 Amplicon size: 120bp Ta=41°C  
gttcaaattgctgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaactcatggctccgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq2:

>bp2 1->20  
5'-gttcaaattgctgctgacat  
>cp1 51<-70  
5'-ttcgttcgtcgttgatttgt

>1-70 Amplicon size: 70bp Ta=40°C  
gttcaaattgctgctgacattggctcatttcacaaatcggtaaaaaaaaaaaaacaaatcaacgacgaacga

---

In silico Primer(s) search for: ///seq4:

---

In silico Primer(s) search for: ///seq6:

>bp2 1->20  
5'-gttcaaattgctgctgacat  
>cp1 71<-90  
5'-ttcgttcgtcgttgatttgt

>1-90 Amplicon size: 90bp Ta=40°C  
gttcaaattgctgctgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaatcaacgacgaacga

---

In silico Primer(s) search for: ///seq8:

## (15) BP+URP then RP+CP: specific entry from all tables in specific block.

Data retrieval target:

Entry at the 2<sup>nd</sup> row 2<sup>nd</sup> column from all tables in the 2<sup>nd</sup> block (entry #8, 16)

Input primer list:

>BP2

GTTCAAATTGCGTGCGACAT

>URP

TGCGACCGTAATCAAACCAA

Then,

>RP2

ATAAATGACCTGCCGTGCAA

>CP2

AAACGGAGCCATGAGTTTGT

In silico PCR result:

>>> 1<sup>st</sup> PCR round >>>

---

In silico Primer(s) search for: ////seq1:

---

In silico Primer(s) search for: ////seq3:

---

In silico Primer(s) search for: ////seq5:

---

In silico Primer(s) search for: ////seq7:

---

In silico Primer(s) search for: ////seq9:

---

In silico Primer(s) search for: ////seq11:

---

In silico Primer(s) search for: ////seq13:

---

In silico Primer(s) search for: ////seq15:

---

In silico Primer(s) search for: ////seq2:

>bp2 21->40

5'-gttcaaattgctgacat

>urp 111<-130

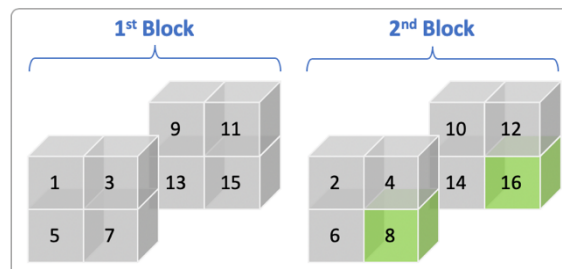
5'-tgcgaccgtaatcaaaccaa

>21-130 Amplicon size: 110bp Ta=40°C

gttcaaattgctgacattggctcatttcacaatcggtataaaaaaaacaaatcaacgacgaacgaacaaattaggcgacgcaatttggtttgattacggtcgc

---

In silico Primer(s) search for: ////seq4:



>bp2 21->40  
5'-gttcaaattgctgctgcgacat  
>urp 121<-140  
5'-tgcgaccgtaatcaaacc

>21-140 Amplicon size: 120bp Ta=40°C  
gttcaaattgctgctgcgacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaactcatggctcgtttacaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq6:

>bp2 21->40  
5'-gttcaaattgctgctgcgacat  
>urp 131<-150  
5'-tgcgaccgtaatcaaacc

>21-150 Amplicon size: 130bp Ta=40°C  
gttcaaattgctgctgcacataaatgacctgctgcataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcaacgacgaacgaacaaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq8:

>bp2 21->40  
5'-gttcaaattgctgctgcgacat  
>urp 141<-160  
5'-tgcgaccgtaatcaaacc

>21-160 Amplicon size: 140bp Ta=40°C  
gttcaaattgctgctgcacataaatgacctgctgcataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctcgtttacaattaggcgacgcaatttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq10:

>bp2 21->40  
5'-gttcaaattgctgctgcgacat  
>urp 151<-170  
5'-tgcgaccgtaatcaaacc

>21-170 Amplicon size: 150bp Ta=41°C  
gttcaaattgctgctgcacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcaacgacgaacgaataattgccgcctccagttttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq12:

>bp2 21->40  
5'-gttcaaattgctgctgcgacat  
>urp 161<-180  
5'-tgcgaccgtaatcaaacc

>21-180 Amplicon size: 160bp Ta=41°C  
gttcaaattgctgctgcacattggctcatttcacaatcggtataaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctcgttttaattgccgcctccagttttggttgattacggtcgc

---

In silico Primer(s) search for: ///seq14:

>bp2 21->40  
5'-gttcaaattgctgctgcgacat  
>urp 171<-190  
5'-tgcgaccgtaatcaaacc

>21-190 Amplicon size: 170bp Ta=41°C



gttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacga  
ataattgccgctccagtttttggttgattacgggtcgc

---

In silico Primer(s) search for: ///seq16:

>bp2 21->40  
5'-gttcaaattgctgacat  
>urp 181<-200  
5'-tgcgaccgtaatacaaccaa

>21-200 Amplicon size: 180bp Ta=41°C  
gttcaaattgctgacatataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcaacgacgaacga  
atggctccgttttaattgccgctccagtttttggttgattacgggtcgc

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq4:

---

In silico Primer(s) search for: ///seq6:

---

In silico Primer(s) search for: ///seq8:

>rp2 21->40  
5'-ataaatgacctgccgtgcaa  
>cp2 81<-100  
5'-aacggagccatgagttgt

>21-100 Amplicon size: 80bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacatgagttgt

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

>rp2 21->40  
5'-ataaatgacctgccgtgcaa  
>cp2 121<-140  
5'-aacggagccatgagttgt

>21-140 Amplicon size: 120bp Ta=40°C  
ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacatgagttgt

(16) BP+TP then RP+CP: specific entry from specific table in specific block.

Data retrieval target:

Entry at the 2<sup>nd</sup> row 1<sup>st</sup> column from the 1<sup>st</sup> table in the 2<sup>nd</sup> block (entry #6)

Input primer list:

>BP2  
GTTCAAATTGCGTGCGACAT

>TP1

ATTCGCGTCGCCTAATTGT

Then,  
>RP2  
ATAAATGACCTGCCGTGCAA

>CP1  
TTCGTTCGTCGTTGATTGGT

In silico PCR result:

>>> 1<sup>st</sup> PCR round >>>

---

In silico Primer(s) search for: ////seq1:

---

In silico Primer(s) search for: ////seq3:

---

In silico Primer(s) search for: ////seq5:

---

In silico Primer(s) search for: ////seq7:

---

In silico Primer(s) search for: ////seq2:

>bp2 21->40  
5'-gttcaaattgctgacat  
>tp1 91<-110  
5'-attcgcgtgcctaattgt

>21-110 Amplicon size: 90bp Ta=41°C  
gttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaccaatcacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq4:

>bp2 21->40  
5'-gttcaaattgctgacat  
>tp1 101<-120  
5'-attcgcgtgcctaattgt

>21-120 Amplicon size: 100bp Ta=41°C  
gttcaaattgctgacattggctcatttcacaatcggtaaaaaaaaaaaaaaaaaaaaaaactcatggctcgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq6:

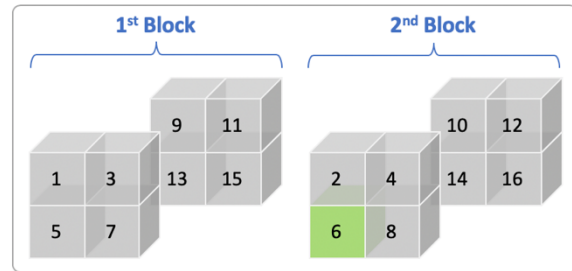
>bp2 21->40  
5'-gttcaaattgctgacat  
>tp1 111<-130  
5'-attcgcgtgcctaattgt

>21-130 Amplicon size: 110bp Ta=41°C  
gttcaaattgctgacatatataatgacctgcggtcaaaaaaaaaaaaaaaaaaaaaaaaaaaccaatcacgacgaacgaacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ////seq8:

>bp2 21->40  
5'-gttcaaattgctgacat  
>tp1 121<-140



5'-attcgcgtcgcctaatttgt

>21-140 Amplicon size: 120bp Ta=41°C

gttcaaattgcgtgcgacatatataatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaactcatggctccgtttacaaattaggcgacgcgaa

---

In silico Primer(s) search for: ///seq10:

---

In silico Primer(s) search for: ///seq12:

---

In silico Primer(s) search for: ///seq14:

---

In silico Primer(s) search for: ///seq16:

Then,

>>> 2<sup>nd</sup> PCR round >>>

---

In silico Primer(s) search for: ///seq2:

---

In silico Primer(s) search for: ///seq6:

>rp2 21->40

5'-ataaatgacctgccgtgcaa

>cp1 71<-90

5'-ttcggttcgtcgttgatttgt

>21-90 Amplicon size: 70bp Ta=40°C

ataaatgacctgccgtgcaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaacaaatcaacgacgaacga

---

In silico Primer(s) search for: ///seq8: