```
IPython 7.2.0 -- An enhanced Interactive Python.
Restarting kernel...
In [1]: runfile('/Users/yifan/MiSeq/test/MutationFinder.py',
wdir='/Users/yifan/MiSeq/test')
This is the start of comparison
---01234567890123456789
GGGGCTAC--GTTATTTATACGTGT----
GGGGCTACACGTTATTTATACGTGTTTAGT
  Score=23
The first mismatch occurs at position 5
What is the name of this mutation? (e.g. AC in, G sub, etc.) AC in
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 0]]
We found a new mutation! Next Ouery:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
The first mismatch occurs at position 4
What is the name of this mutation? (e.g. AC in, G sub, etc.) A in
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 0], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 0]]
We found a new mutation! Next Query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
```

Python 3.7.0 (default, Jun 28 2018, 07:39:16)

Type "copyright", "credits" or "license" for more information.

```
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTA--TTATTTATACGTGTTTAGT
 Score=21
The first mismatch occurs at position 4
What is the name of this mutation? (e.g. AC in, G sub, etc.) CG
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 0], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 0], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 0]]
We found a new mutation! Next Ouerv:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTA-CGTTATTTATAC-GTGT----
GGGGCTAACGTTATTTATA-TGTGTTTAGT
  Score=22
The first mismatch occurs at position 4
What is the name of this mutation? (e.g. AC in, G sub, etc.) A in
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 0], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 1], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 0], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0]]
We found a new mutation! Next Ouerv:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
```

inis	mutation	nas	been a	arready	identified	as	А	1n	at	position	4
GGGGC	123456789 CTA-CGTTA          CTAACGTTA ore=23	TTTA1	TACGTG <sup>-</sup>		_						
This	mutation	has	been a	already	identified	as	"A	in"	at	position	4
GGGGC	123456789 CTACGTTAT          CTACGTTAT ore=23	TTAT <i>I</i>	ACGTGT-								
No mu	ıtation f	ound	:) Ne	ext que	ry:						
GGGGC	123456789 CTACGTTAT          CTACGTTAT ore=23	TTAT <i>I</i>	ACGTGT-								
No mu	ıtation f	ound	:) Ne	ext que	ry:						
GGGGC	123456789 CTACGTTAT          CTACGTTAT ore=23	TTAT <i>I</i>	ACGTGT-								
No mu	ıtation f	ound	:) Ne	ext que	ry:						
GGGGC	123456789 CTA-CGTTA           CTAACGTTA ore=23	TTTA1	TACGTG <sup>-</sup>								
This	mutation	has	been a	already	identified	as	"A	in"	at	position	4
GGGGC	23456789 CTA-CGTTA         C-AACGTTA Ore=22	TTTA1	TACGTG <sup>-</sup>		_						

```
The first mismatch occurs at position 2
What is the name of this mutation? (e.g. AC in, G sub, etc.) T sub
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 0], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 4], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 0], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 0]]
We found a new mutation! Next Ouerv:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
GGGGC-AACGTTATTTATACGTGTTTAGT
 Score=22
This mutation has been already identified as "T sub" at position 2
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTA--TTATTTATACGTGTTTAGT
 Score=21
This mutation has been already identified as "CG del" at position
4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
```

GGGGCTAACGTTATTTATACGTGTTTAGT

## Score=23

This	mutatio	on has	been	already	identified	as	''A	in"	at	position	4
GGGG      GGGG	 12345678 CTA-CGT7         CTAACGT7 ore=23		TACGTG		_						
This	mutatio	on has	been	already	identified	as	"A	in"	at	position	4
GGGG      GGGG	12345678 CTACGTT#         CTACGTT# ore=23	\TTTAT <i>A</i>	ACGTGT								
No m	utation	found	:) N	ext que	ry:						
GGGG      GGGG	12345678 CTACGTT <i>A</i>         CTACGTT <i>A</i> ore=23	\TTTAT <i>A</i>	ACGTGT								
No m	utation	found	:) N	ext que	^y:						
GGGG      GGGG	12345678 CTACGTTA         CTACGTTA ore=23	\TTTAT <i>A</i>	ACGTGT								
No m	utation	found	:) N	ext que	ry:						
GGGG      GGGG	12345678 CTACGTT/         CTACGTT/ ore=23	\TTTAT <i>A</i>	ACGTGT								
No m	utation	found	:) N	ext que	ry:						
GGGG	12345678 CTACGT			GT							

## GGGGCTACACGTTATTTATACGTGTTTAGT Score=23 This mutation has been already identified as "AC in" at position 5

---01234567890123456789 GGGGCTACGTTATTTATACGTGT----GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTAC-GTTATTTATACGTGT----GGGGCTA-TGTTATTTATACGTGTTTAGT Score=22 The first mismatch occurs at position 4 What is the name of this mutation? (e.g. AC in, G sub, etc.) C sub [['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 1], ['A in', 4, 'GGGGCTAACGTTATTTATACGTGTTTAGT', 6], ['CG del', 4, 'GGGGCTATTATTATACGTGTTTAGT', 1], ['A in', 4, 'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2, 'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTTATACGTGTTTAGT', 0]] We found a new mutation! Next Query: ---01234567890123456789 GGGGCTA-CGTTATTTATACGTGT-----1111111 111111111111111 GGGGCTAACGTTATTTATACGTGTTTAGT Score=23 This mutation has been already identified as "A in" at position 4 ---01234567890123456789 G--GG-11 11111111111111111111 -ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation, PAM sequence is off) Score=22

The first mismatch occurs at position -3

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What is the name of this mutation? (e.g. AC in, G sub, etc.)
unknown1
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 1], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 7], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 1], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTTATACGTGTTTAGT', 0], ['unknown1', -3,
'ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0]]
We found a new mutation! Next Query:
---01234567890123456789
GGGGCTAC--GTTATTTATACGTGT----
GGGGCTACACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "AC in" at position 5
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
```

## Score=23 This mutation has been already identified as "A in" at position 4 ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----111111111111111111111111 GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----111111111111111111111111 GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTA-CGTTATTTATACGTGT----GGGGCTAACGTTATTTATACGTGTTTAGT Score=23 This mutation has been already identified as "A in" at position 4

GGGGCTAACGTTATTTATACGTGTTTAGT

---01234567890123456789

GGGGCTACGTTATTTATACGTGT----

No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position 4
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGG- GCTACGTTATTTATACGTGT
This mutation has been already identified as "unknown1" at position $-3$
01234567890123456789  GGGGCTACGTTATTTATACGTGT

This mutation has been already 4	identified	as	"CG	i de	L'' á	at	posit	ion
01234567890123456789  GGGGCTACGTTATTTATACGTGT                           GGGGCTACGTTATTTATACGTGTTTAGT Score=23	-							
No mutation found :) Next quer	`y:							
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT								
This mutation has been already	identified	as	"A	in"	at	ро	sitio	n 4
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT	_							
This mutation has been already	identified	as	"A	in"	at	ро	sitio	n 4
01234567890123456789 GGGGCTACGTTATTTATACGTGT                         GGGGCTACGTTATTTATACGTGTTTAGT Score=23	-							
No mutation found :) Next quer	`y:							
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT								
This mutation has been already	identified	as	"A	in"	at	ро	sitio	n 4
01234567890123456789 GGGGCTACGTTATTTATACGTGT	-							

Score=23
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT                     GGGGCTATTATTTATACGTGTTTAGT Score=21
This mutation has been already identified as "CG del" at position $4 $
01234567890123456789  GGGGCTACGTTATTTATACGTGT
This mutation has been already identified as "AC in" at position 5
01234567890123456789  GGGGCTACGTTATTTATACGTGT
This mutation has been already identified as "AC in" at position 5
01234567890123456789

GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position 4
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position 4
01234567890123456789  GGGGCTACGTTATTTATACGTGT                        GGGGCTACGTTATTTATACGTGTTTAGT Score=23
No mutation found :) Next query:

```
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 1111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
 Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 1111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
 Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
```

No mutation found :) Next query:

01234567890123456789 GGGGCTA-CGTTATTTATACGTGT	
This mutation has been already identified as "A in" at position	4
01234567890123456789  GGGGCTACGTTATTTATACGTGT	
No mutation found :) Next query:	
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT	
This mutation has been already identified as "A in" at position	4
01234567890123456789  GGGGCTACGTTATTTATACGTGT	
No mutation found :) Next query:	
01234567890123456789 GGGGCTACGTTATTTATACGTGT	
No mutation found :) Next query:	
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT                           GGGGCTAACGTTATTTATACGTGTTTAGT  Score=23	

This mutation ha	as been already	identified	as	"A	in"	at	posit	ion 4
0123456789013 GGGGCTACGTTAT         GGGGCTACACGTTAT Score=23	TTATACGTGT							
This mutation h	as been already	identified	as	"AC	in"	at	posi	tion 5
0123456789013 GGGGCTACGTTATTTA           GGGGCTACGTTATTTA Score=23	ATACGTGT 							
No mutation fou	nd :) Next que	^y:						
0123456789017 GGGGCTA-CGTTATT             GGGGCTAACGTTATT Score=23	TATACGTGT							
This mutation h	as been already	identified	as	"A	in"	at	posit	ion 4
0123456789013 GGGGCTACGTTATTTA           GGGGCTACGTTATTTA Score=23	ATACGTGT 	_						
No mutation fou	nd :) Next que	ry:						
0123456789013 GGGGCTA-CGTTATT            GGGGCTAACGTTATT Score=23	TATACGTGT 							
This mutation h	as been already	identified	as	"A	in"	at	posit	ion 4
0123456789013 GGGGCTA-CGTTATT              GGGGCTAACGTTATT Score=23	TATACGTGT	_						

This mutation has been already	identified	as	"A	in"	at <sub>l</sub>	posit	ion	4
01234567890123456789  GGGGCTACGTTATTTATACGTGT                          GGGGCTATTATTTATACGTGTTTAGT Score=21	_							
This mutation has been already 4	identified	as	"CG	i de	L" a	t pos	itio	n
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT	_							
This mutation has been already	identified	as	"A	in"	at <sub>l</sub>	posit	ion	4
01234567890123456789 GGGGCTACGTTATTTATACGTGT	_							
This mutation has been already	identified	as	"AC	in'	' at	posi	ition	1 5
01234567890123456789 GGGGCTACGTTATTTATACGTGT								
No mutation found :) Next que	ry:							
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT								
This mutation has been already	identified	as	"A	in"	at <sub> </sub>	posit	ion	4
01234567890123456789 GGGGCTACGTTATTTATACGTGT	_							

GGGGCTACGTTATTTATACGTGTTTAGT Score=23
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position 4
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT                           GGGGCTAACGTTATTTATACGTGTTTAGT  Score=23
This mutation has been already identified as "A in" at position 4
01234567890123456789  GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT

This mutation has been already identified as "AC in" at position 5
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT                     GGGGCTAACGTTATTTATACGTGTTTAGT Score=23
This mutation has been already identified as "A in" at position 4
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position 4
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789

```
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
 Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
111111111111111111111111
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
111111111111111111111111
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
```

No mutation found :) Next query:

```
---01234567890123456789
G--GG-
GCTACGTTATTTATACGTGT------
   -ACGGCGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)
  Score=22
The first mismatch occurs at position -3
What is the name of this mutation? (e.g. AC in, G sub, etc.)
unknown2
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 7], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 33], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 4], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTTATACGTGTTTAGT', 0], ['unknown1', -3,
'ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 1], ['unknown2', -3,
'ACGGCGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0]]
We found a new mutation! Next Query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 1111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
```

This mutation has been already identified as "A in" at position 4

```
---01234567890123456789
G - - G -
GGCTACGTTATTTATACGTGT------
   1 111111111111111111111
-ACGTGGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)
  Score=22
The first mismatch occurs at position -3
What is the name of this mutation? (e.g. AC in, G sub, etc.)
unknown3
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 7], ['A in', 4, 'GGGGCTAACGTTATTTATACGTGTTTAGT', 34], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 4], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTTATACGTGTTTAGT', 0], ['unknown1', -3,
'ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 1], ['unknown2', -3,
'ACGGCGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown3', -3,
'ACGTGGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0]]
We found a new mutation! Next Ouery:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
1111111111111111111111
GGGGCTACGTTATTTATACGTGTTTAGT
```

```
Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTAC--GTTATTTATACGTGT----
GGGGCTACACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "AC in" at position 5
---01234567890123456789
G-GGG-CTA-
-CĠĠĠŦĊŦAAĊĠŦŦAŦŦŦAŦĠĊĠŦĠŦŦŦAGT (requires further investigation,
PAM sequence is off)
  Score=22
The first mismatch occurs at position -3
What is the name of this mutation? (e.g. AC in, G sub, etc.)
unknown4
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 8], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 34], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 4], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTATACGTGTTTAGT', 0], ['unknown1', -3, 'ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 1], ['unknown2', -3,
'ACGGCGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown3', -3,
'ACGTGGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown4', -3,
'CGGGTCTAACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0]]
We found a new mutation! Next Query:
---01234567890123456789
GCTACGTTATTTATACGTGT-------
```

Score=22 This mutation has been already identified as "unknown1" at position -3 ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----111111111111111111111111 GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTA-CGTTATTTATACGTGT----1111111 111111111111111 GGGGCTAACGTTATTTATACGTGTTTAGT Score=23 This mutation has been already identified as "A in" at position 4 ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----111111111111111111111111 GGGGCTACGTTATTTATACGTGTTTAGT Score=23 No mutation found :) Next query: ---01234567890123456789 GGGGCTACGTTATTTATACGTGT----GGGGCTACGTTATTTATACGTGTTTAGT Score=23

No mutation found :) Next query:

GGGGCTA-CGTTATTTATA-CGTGT-----

---01234567890123456789

```
Score=21
The first mismatch occurs at position 3
What is the name of this mutation? (e.g. AC in, G sub, etc.) A sub
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 8], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 35], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 4], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTTATACGTGTTTAGT', 0], ['unknown1', -3,
'ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 2], ['unknown2', -3,
'ACGGCGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown3', -3,
'ACGTGGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown4', -3,
'CGGGTCTAACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['A sub', 3,
'GGGGCTTCGTTATTTATTCGTGTTTAGT', 0]]
We found a new mutation! Next Query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
G--GGG-
CTACGTTATTTATACGTGT-----
   111 11111111111111111111

    ACGGGTCTACGTTATTTATACGTGTTTAGT (requires further investigation,

PAM sequence is off)
  Score=22
```

GGGGCT-TCGTTATTTAT-TCGTGTTTAGT

```
What is the name of this mutation? (e.g. AC in, G sub, etc.)
unknown5
[['AC in', 5, 'GGGGCTACACGTTATTTATACGTGTTTAGT', 8], ['A in', 4,
'GGGGCTAACGTTATTTATACGTGTTTAGT', 35], ['CG del', 4,
'GGGGCTATTATTTATACGTGTTTAGT', 4], ['A in', 4,
'GGGGCTAACGTTATTTATATGTGTTTAGT', 0], ['T sub', 2,
'GGGGCAACGTTATTTATACGTGTTTAGT', 1], ['C sub', 4, 'GGGGCTATGTTATTATACGTGTTTAGT', 0], ['unknown1', -3,
'ACGGTGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 2], ['unknown2', -3,
'ACGGCGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown3', -3,
'ACGTGGCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['unknown4', -3,
'CGGGTCTAACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0], ['A sub', 3,
'GGGGCTTCGTTATTTATTCGTGTTTAGT', 0], ['unknown5', -3,
'ACGGGTCTACGTTATTTATACGTGTTTAGT (requires further investigation,
PAM sequence is off)', 0]]
We found a new mutation! Next Query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
1111111111111111111111
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTAC--GTTATTTATACGTGT----
GGGGCTACACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "AC in" at position 5
```

The first mismatch occurs at position -3

```
---01234567890123456789
GGGGCTAC--GTTATTTATACGTGT----
GGGGCTACACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "AC in" at position 5
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
 Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
111111111111111111111111
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
```

No mutation found :) Next query:

01234567890123456789 GGGGCTA-CGTTATTTATACGTGT							
This mutation has been already	identified	as	"A	in"	at	position	4
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT                          GGGGCTAACGTTATTTATACGTGTTTAGT Score=23	-						
This mutation has been already	identified	as	"A	in"	at	position	4
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT                         GGGGCTAACGTTATTTATACGTGTTTAGT Score=23	-						
This mutation has been already	identified	as	"A	in"	at	position	4
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT							
This mutation has been already	identified	as	"A	in"	at	position	4
01234567890123456789 GGGGCTACGTTATTTATACGTGT                      GGGGCTACGTTATTTATACGTGTTTAGT Score=23	-						
No mutation found :) Next quer	-y:						
01234567890123456789 GGGGCTACGTTATTTATACGTGT                          GGGGCTACACGTTATTTATACGTGTTTAGT Score=23							

This mutation has been already identified as "AC in" at position 5
01234567890123456789  GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789  GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTA-CGTTATTTATACGTGT
This mutation has been already identified as "A in" at position 4
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT

This mutation has been atteauy fuentified as. A in at position 4
01234567890123456789  GGGGCTACGTTATTTATACGTGT                    GGGGCTATTATTTATACGTGTTTAGT Score=21
This mutation has been already identified as "CG del" at position 4
01234567890123456789  GGGGCTA-CGTTATTTATACGTGT                           GGGGCTAACGTTATTTATACGTGTTTAGT  Score=23
This mutation has been already identified as "A in" at position 4
01234567890123456789  GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT
No mutation found :) Next query:
01234567890123456789 GGGGCTACGTTATTTATACGTGT

```
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT----
1111111 111111111111111
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT-----
GGGGCTAACGTTATTTATACGTGTTTAGT
  Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
111111111111111111111111
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTA-CGTTATTTATACGTGT-----
```

```
Score=23
This mutation has been already identified as "A in" at position 4
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
GGGGCTACGTTATTTATACGTGTTTAGT
  Score=23
No mutation found :) Next query:
---01234567890123456789
GGGGCTACGTTATTTATACGTGT----
111111111111111111111111
ĠĠĠĠĊŤÄĊĠŤŤÄŤŤŤÄŤÄĊĠŤĠŤŦTAGT
 Score=23
No mutation found :) Next query:
In [2]:
```