



# SBS2

**C > A**

C > G

$C > T$

**T > A**

$T > C$

T>G

# Mutation probability

0.3

0.2

o

0

AACGTCAGCGGTATCTTCTTAAACAGATACCGTCGCCTCATCTCTTAACAAGTACCCTGGTATTCTTTAATAGATACTCTTGTA GTGTGTGTATT TTGTTATATATACTCTGTGTGTATT TTGTTATATATACTCTGTGTGTATT TTGTTATATATACTCTGTGTGTATT TTGTTATATATACTCTGTGTGTATT

# SBS3

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS4

$C > A$

C > G

$$C > T$$

**T > A**

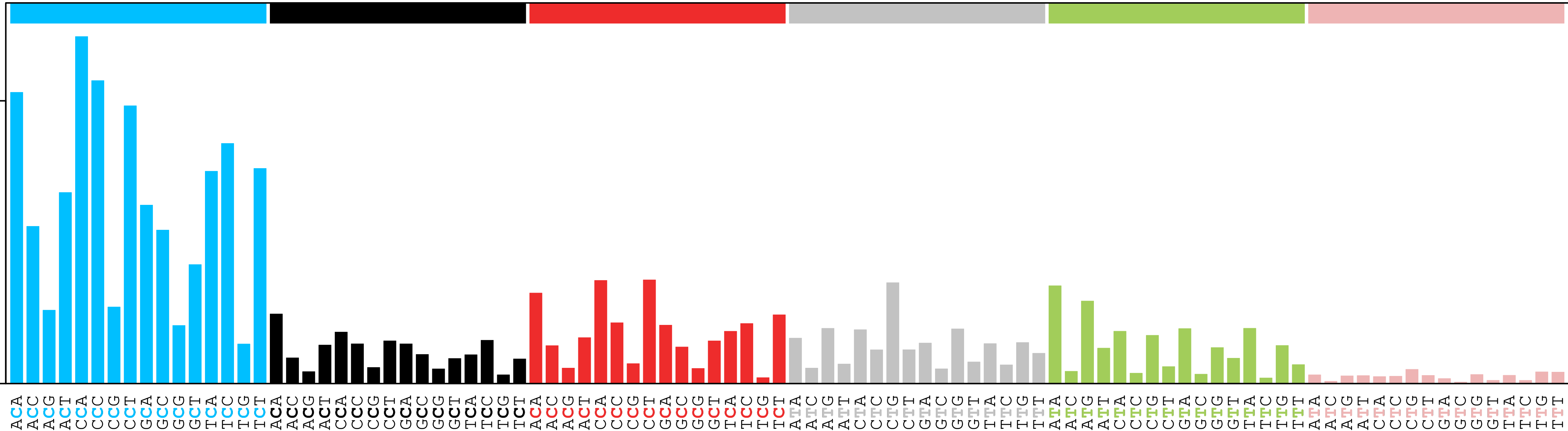
$T > C$

$T > G$

# Mutation probability

0.05

0.00



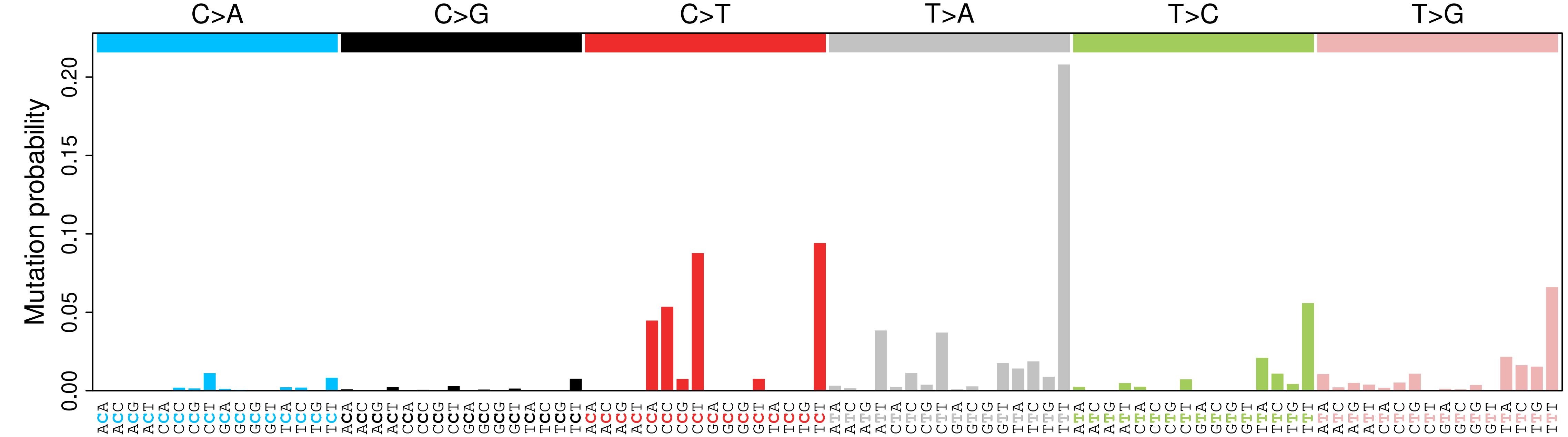
# SBS5





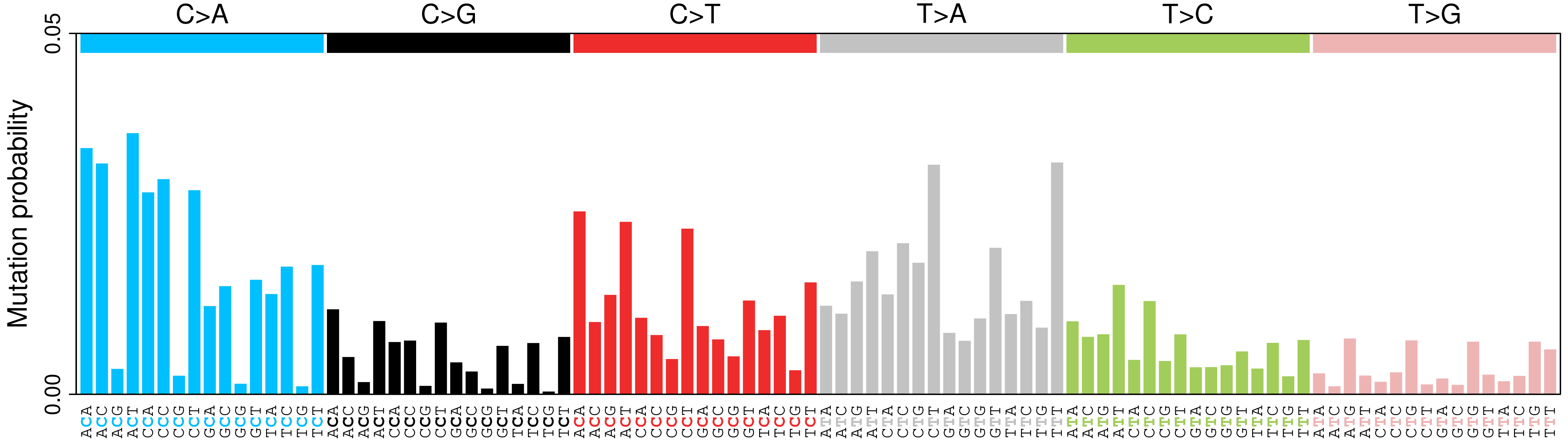


# SBS7c





# SBS8







# SBS10d

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.20  
0.15  
0.10  
0.05  
0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GCA GCC GGT TTA TCC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT



# SBS12

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS13

C>A

C>G

C>T

T>A

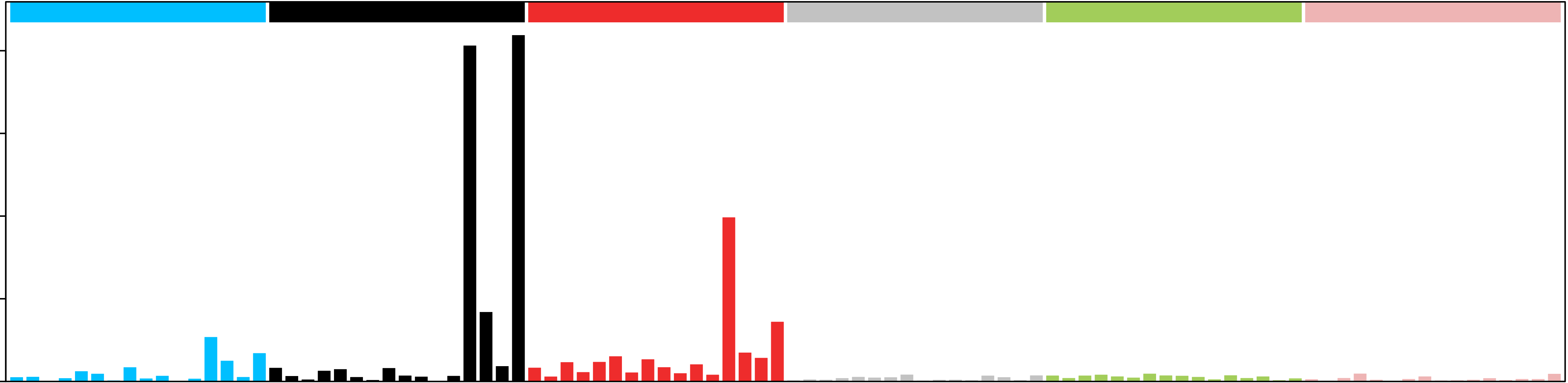
T>C

T>G

Mutation probability

0.20  
0.15  
0.10  
0.05  
0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

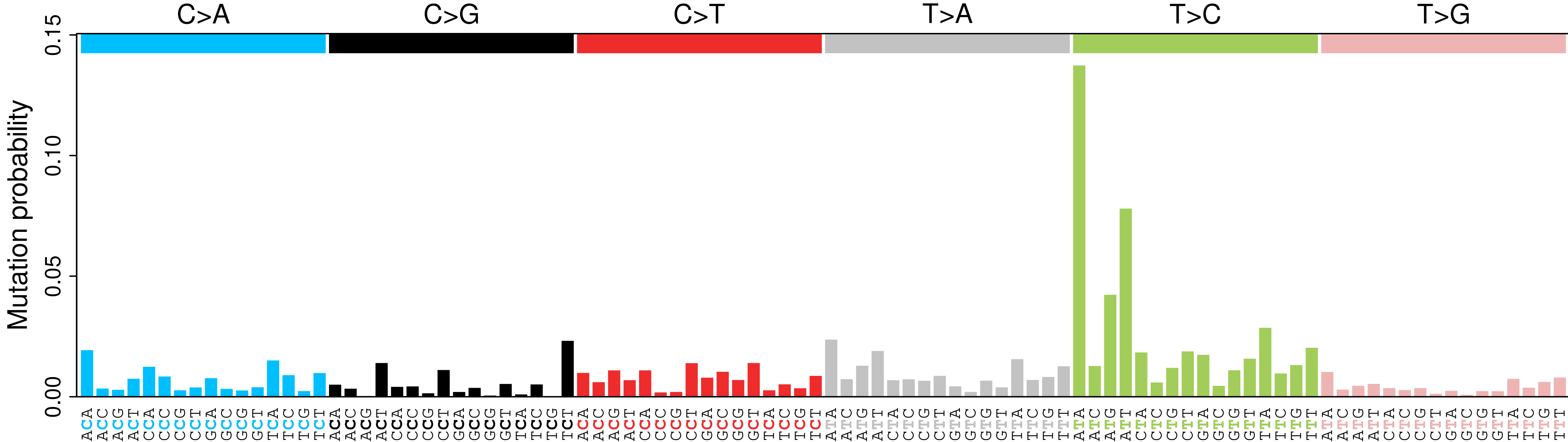








# SBS16



# SBS17

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.20  
0.15  
0.10  
0.05  
0.00





# SBS18

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.10

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGG GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGG GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGG GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS19

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.2

0.1

0.0

ACA ACC AGC ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCI GCA GCC GGT GCT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS20



# SBS22

$C > A$

C > G

$C > T$

**T > A**

$T > C$

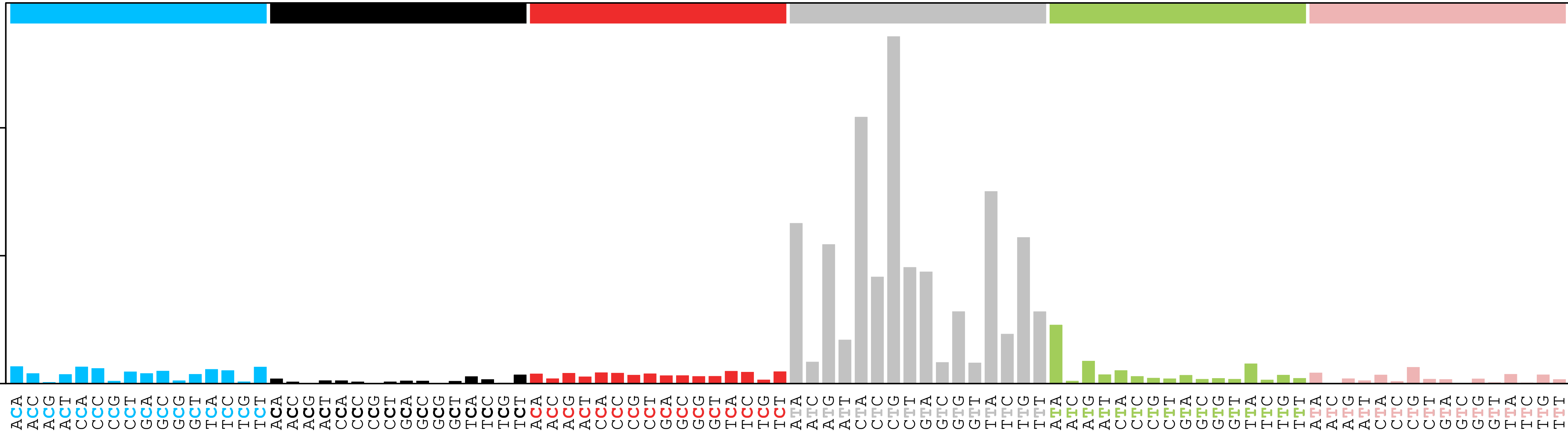
T>G

# Mutation probability

0.10

0

0.00





# SBS23



# SBS24





# SBS28





# SBS31

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.15  
0.10  
0.05  
0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GGC GTT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS32

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.10

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS33

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.2  
0.1  
0.0





# SBS35



# SBS38

**C > A**

C > G

$C > T$

**T > A**

$$T > C$$

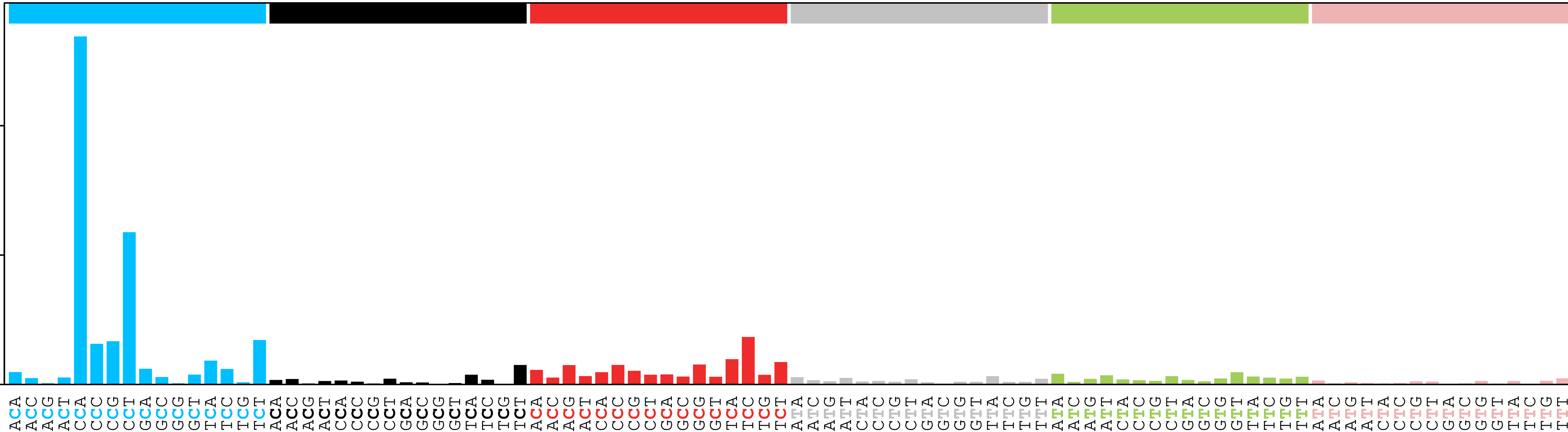
T > G

# Mutation probability

## 0.2

## 0.1

0.0







# SBS53

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.10

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS57

$$C > A$$

C > G

C>T

**T > A**

$$T > C$$

T>G

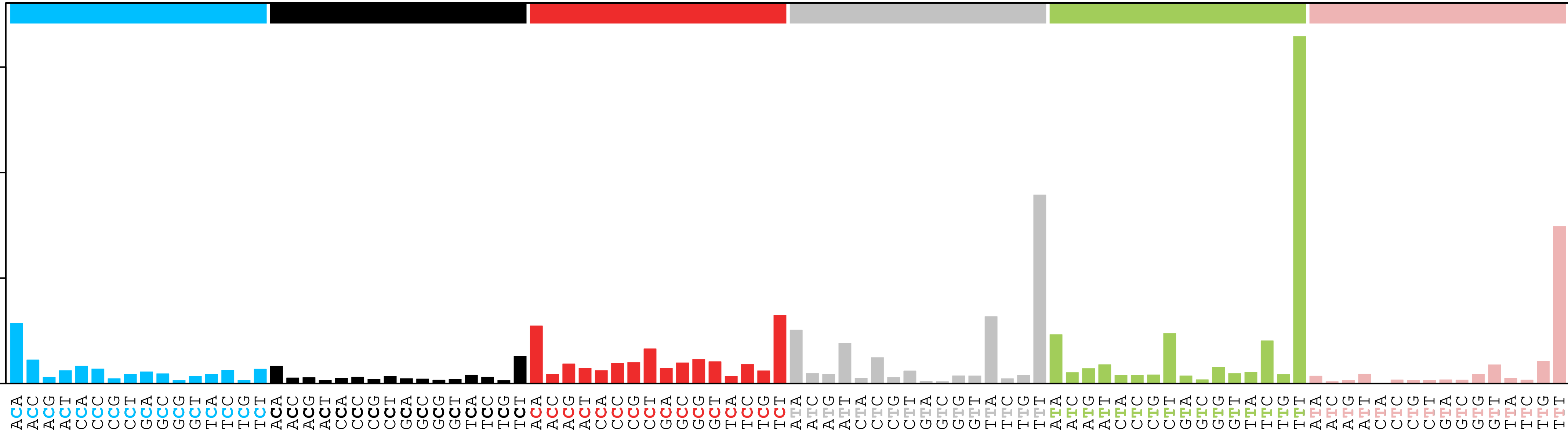
# Mutation probability

0.15

0.10

0.05

0.0









# SBS88

**C > A**

C > G

$C > T$

**T > A**

$T > C$

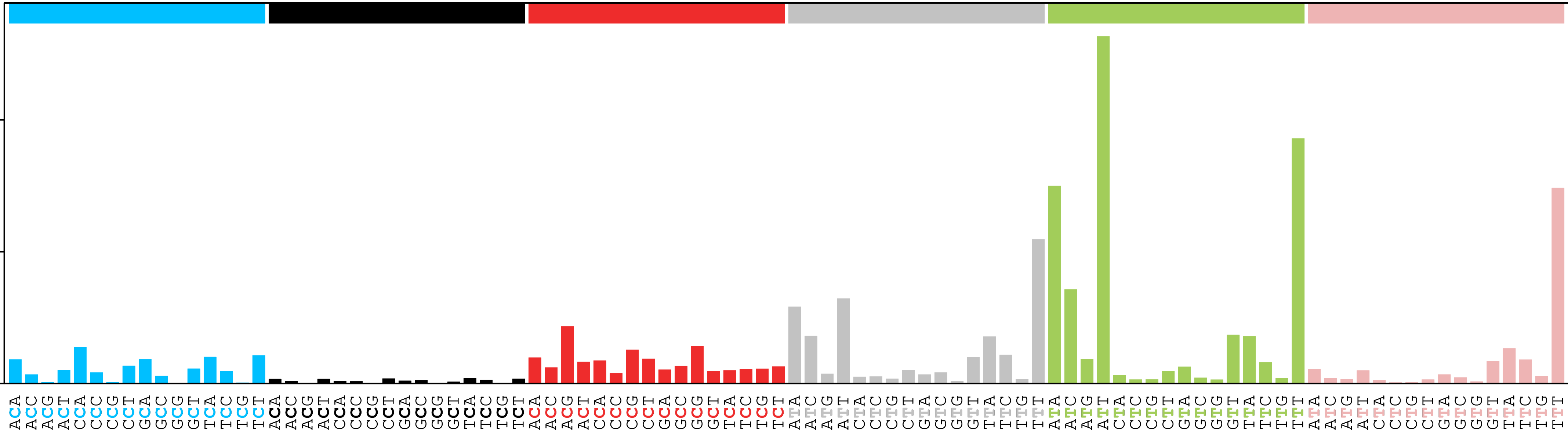
T>G

# Mutation probability

0.10

50

0.00



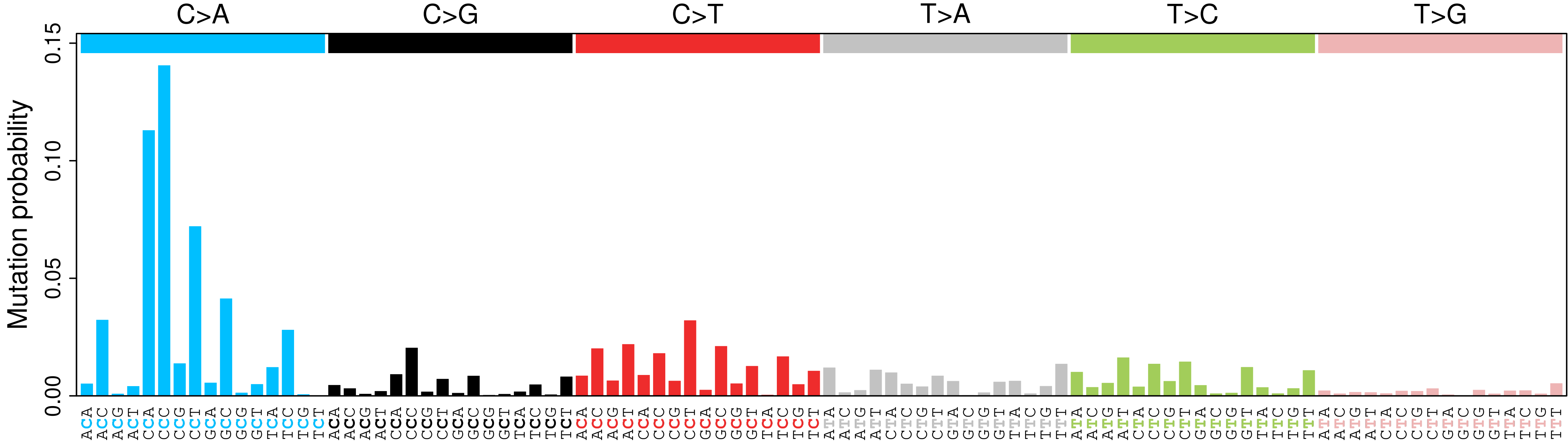




# SBS93



# SBS94



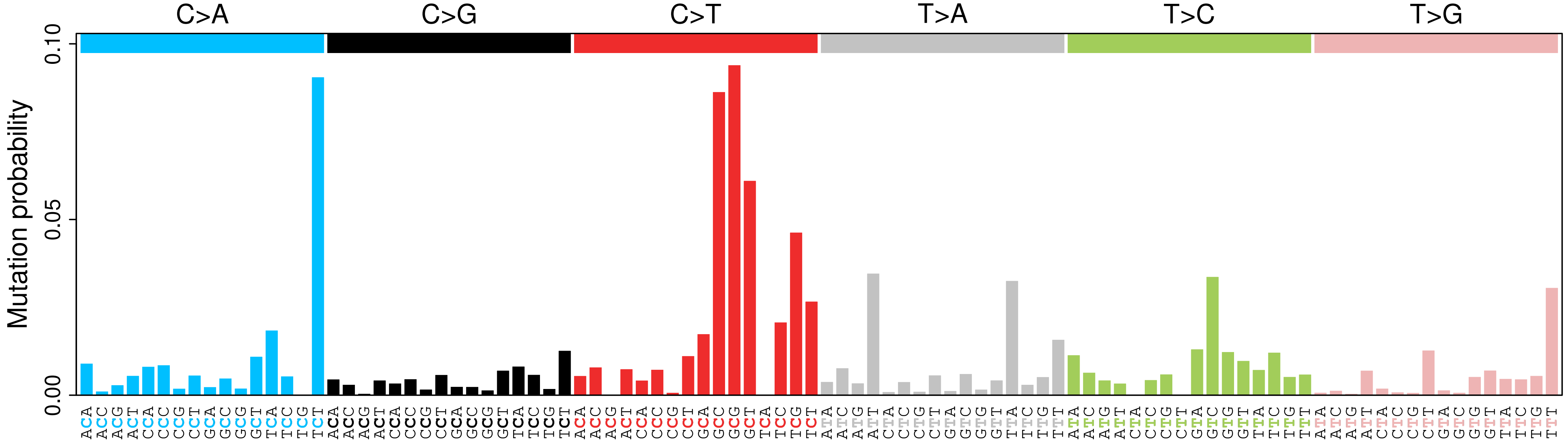








# SBS98



# SBS99

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.05

0.00

ACA ACC ACG ACT CCA CCC CCT CCA GCC GCG GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCT CCA GCC GCG GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCT CCA GCC GCG GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT



# SBS101

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.05

0.00

ACA ACC ACG ACT CCA CCC CGC CTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CGC CTC GCA GCC GCG GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CGC CTC GCA GCC GCG GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS102

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

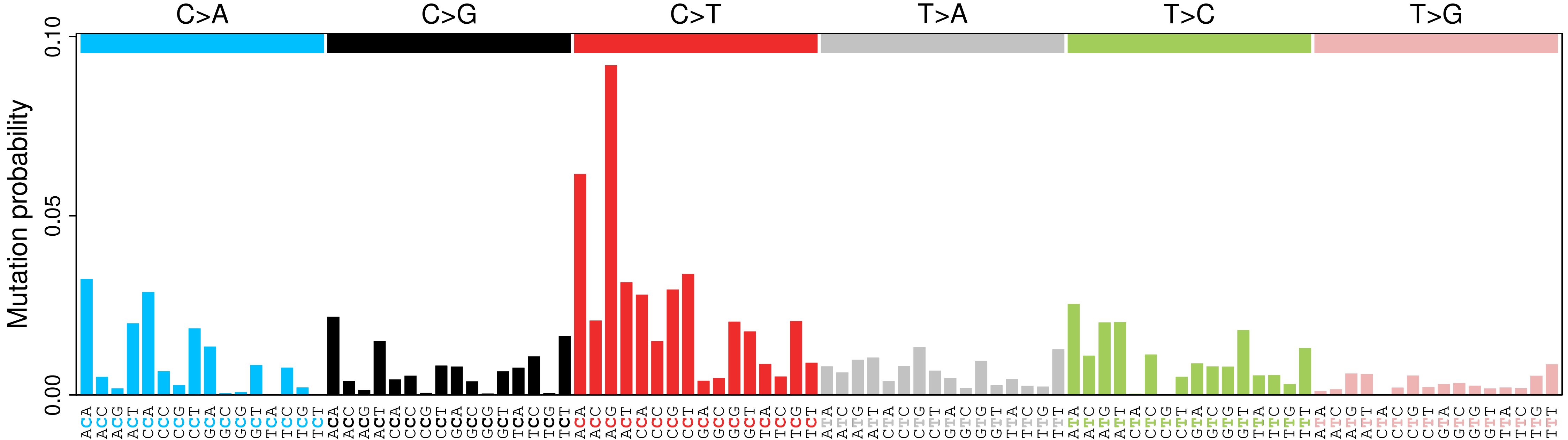
0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT



# SBS103



# SBS104

**C > A**

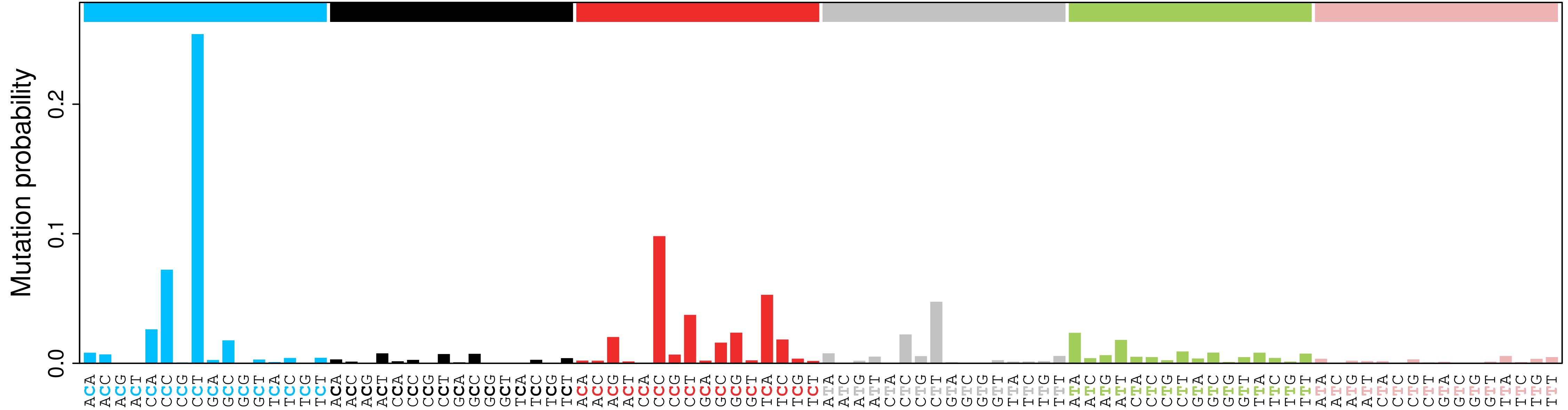
C > G

$C > T$

**T > A**

$T > C$

T>G



# SBS105





# SBS106

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.15  
0.10  
0.05  
0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TTC TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TTC TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT TCA TCC TCG TTC TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT



# SBS108

C>A

C>G

C>T

T>A

T>C

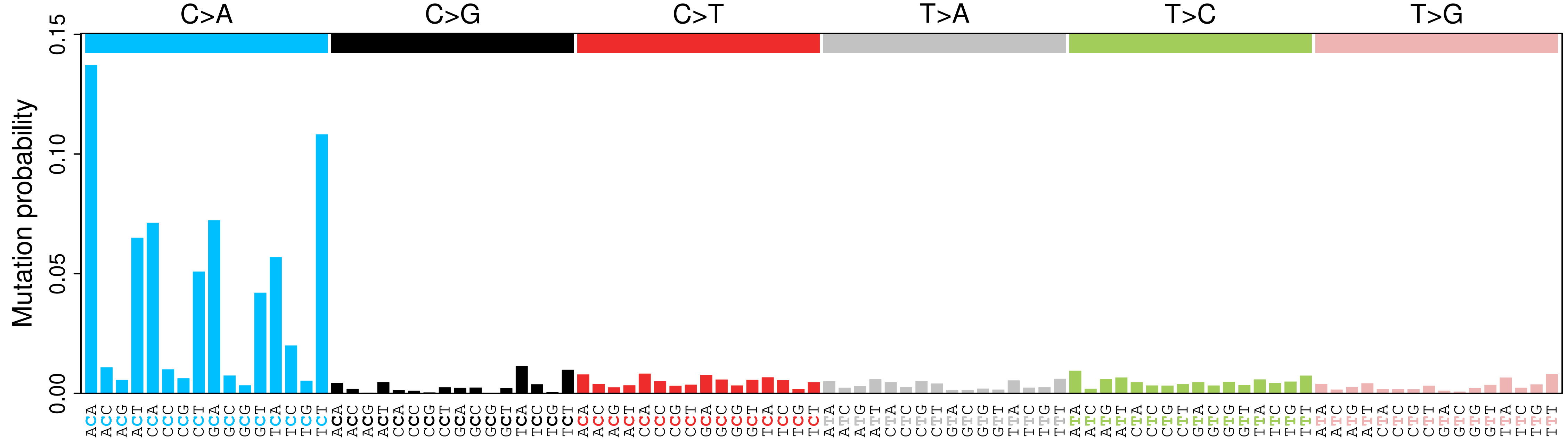
T>G

Mutation probability

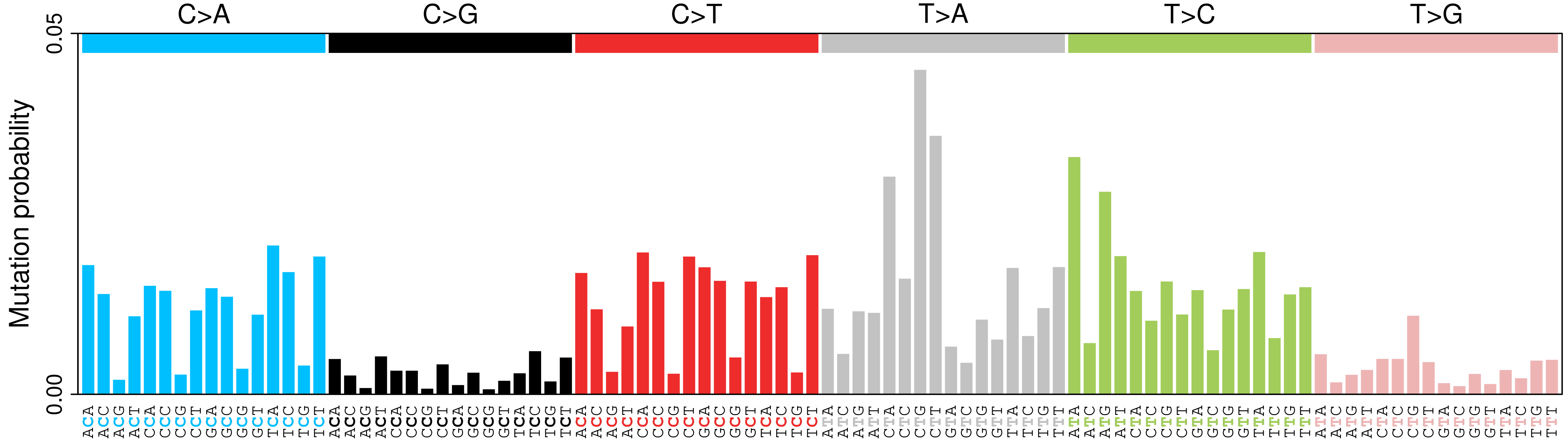
0.15  
0.10  
0.05  
0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCA GGC GGT GCA GGC GGT GCA GGC GGT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GGC GGT GCA GGC GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS109



# SBS110



# SBS111

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCA GCG GCT GCA GCG GCT GCA GCG GCT GCA GCG GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCG GCG GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT



# SBS113

**C > A**

C > G

$C > T$

**T > A**

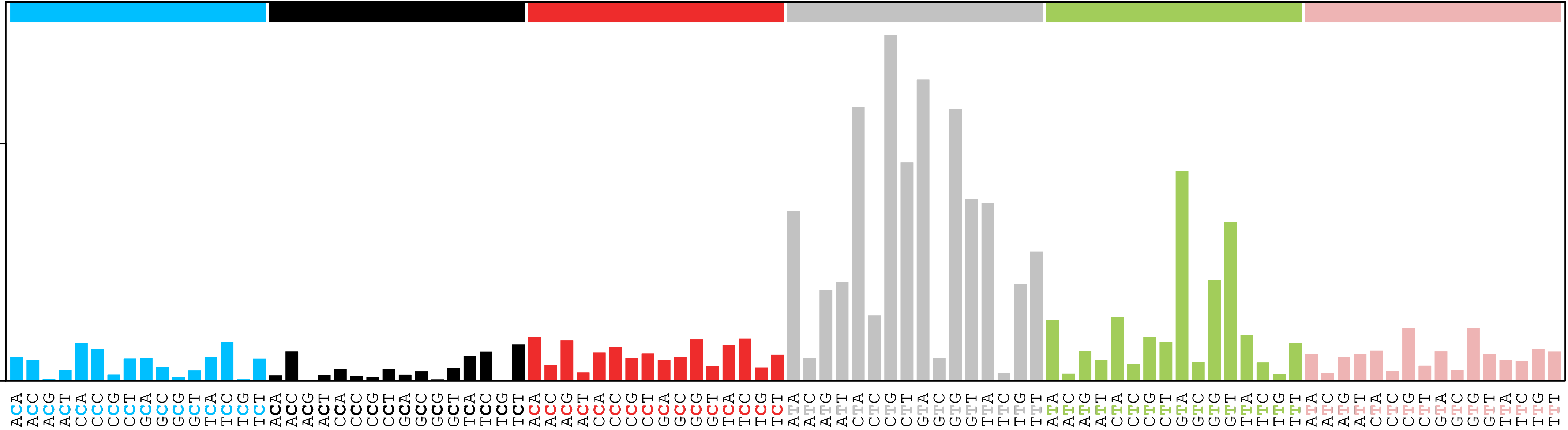
$T > C$

T>G

# Mutation probability

0.05

0.00.





# SBS114

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.10

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GTC TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

# SBS115

$C > A$

C > G

$C > T$

**T > A**

$T > C$

T>G

# Mutation probability

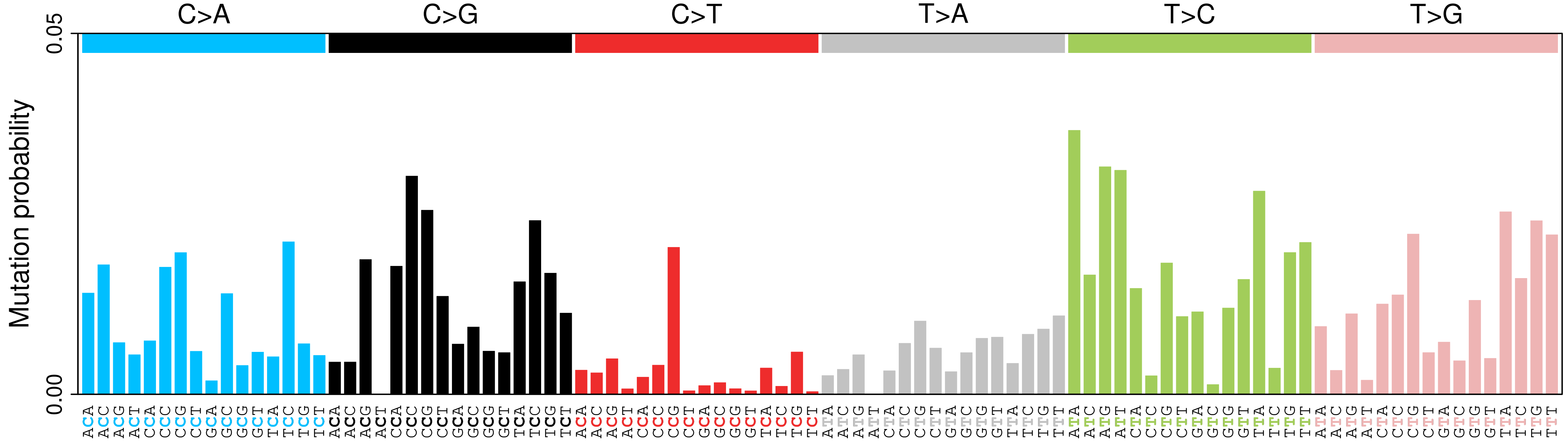
0.00 0.05 0.10 0.15 0.20

[illegible]

# SBS116



# SBS117



# SBS118

$C > A$

C > G

$C > T$

**T>A**

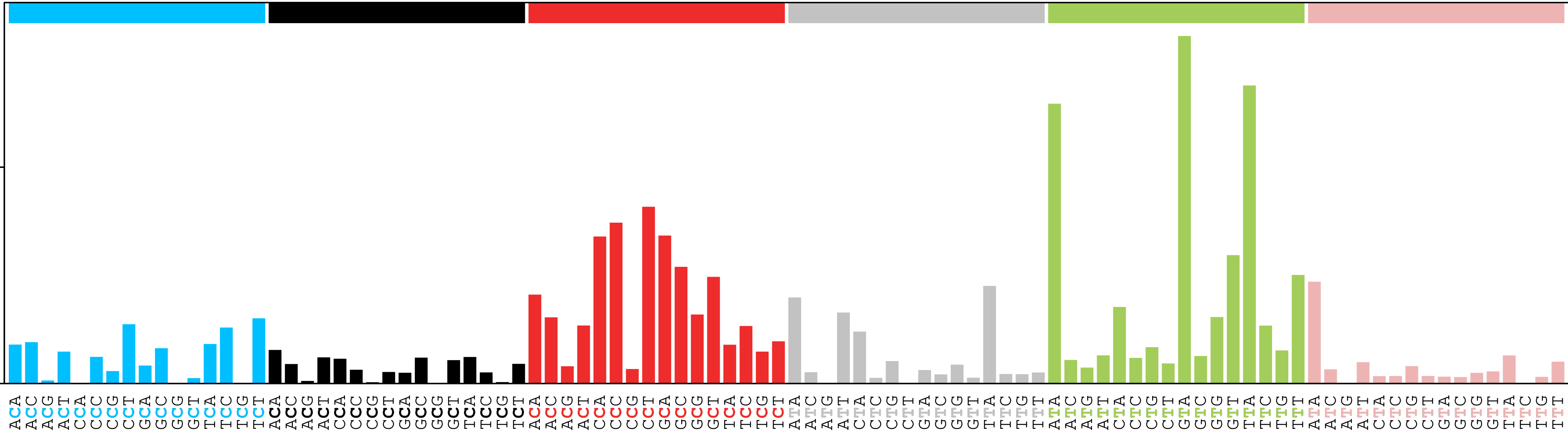
$$T > C$$

$T > G$

# Mutation probability

0.05

0.00







# SBS121

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

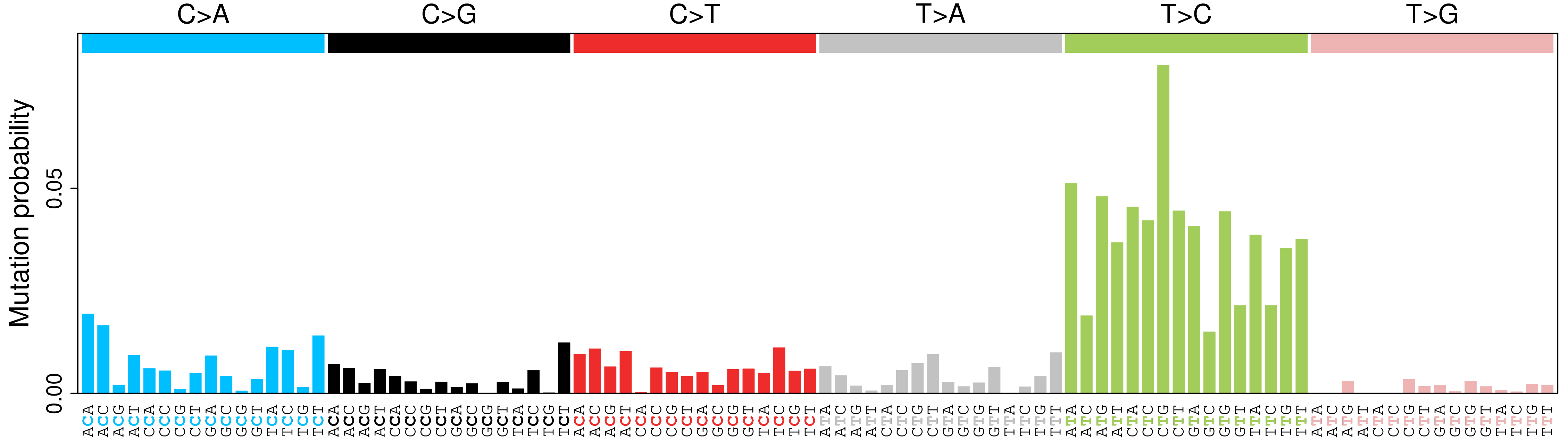
0.15  
0.10  
0.05  
0.00

ACA ACC AGC ACT CCA CCC CGC GCA GCC GGC GTT TCA TCC TGC TTC TTT AAT AAC AAG AAT CCA CCC CGC GCA GCC GGC GTT TCA TCC TGC TTC TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC AAG AAT CCA CCC CGC GCA GCC GGC GTT TCA TCC TGC TTC TTT AAT AAC AAG AAT CCA CCC CGC GCA GCC GGC GTT TCA TCC TGC TTC TTT





SBS123



# SBS124

$C > A$

C > G

$C > T$

**T > A**

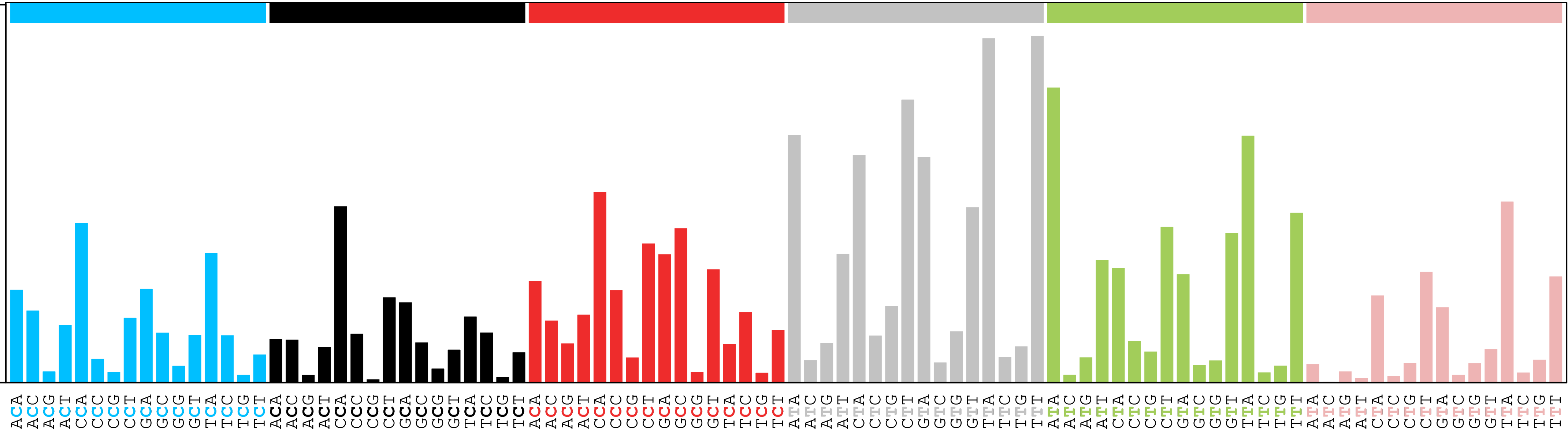
$T > C$

T > G

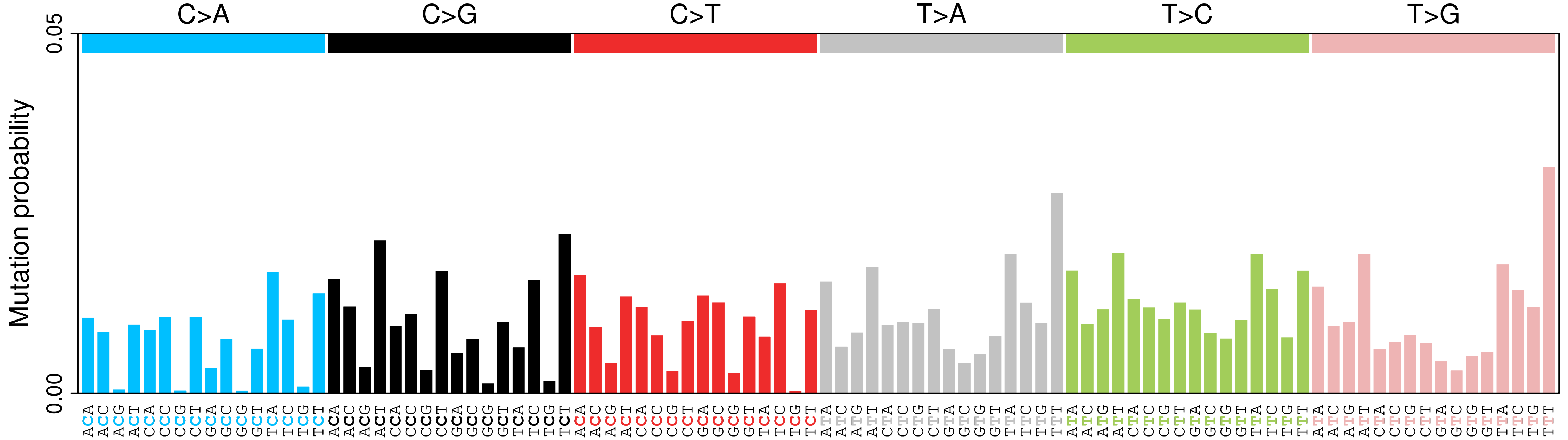
0.05

# Mutation probability

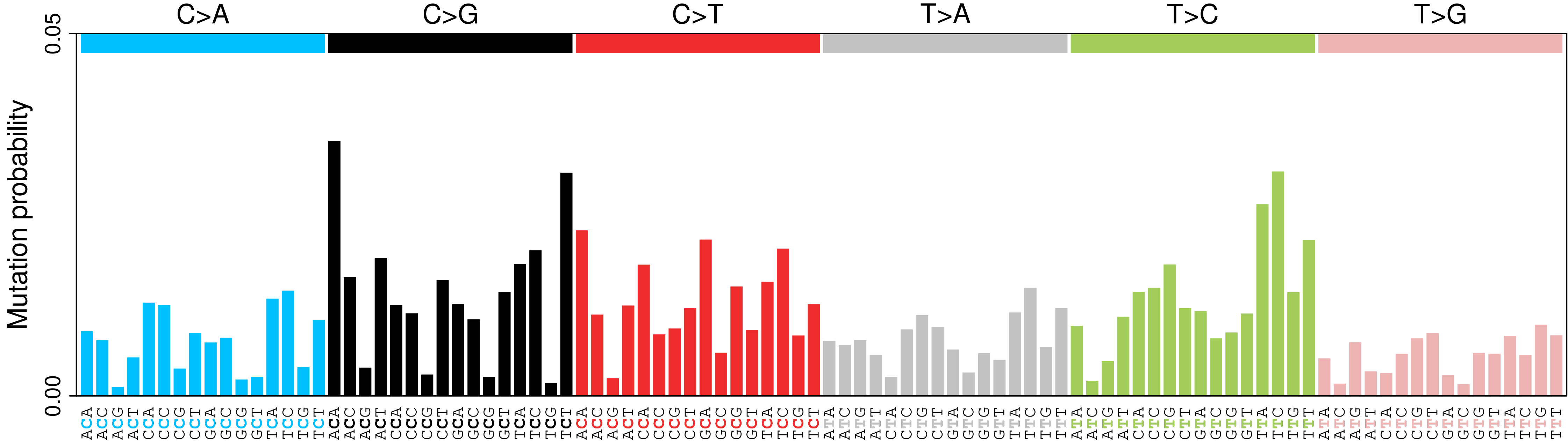
0.00



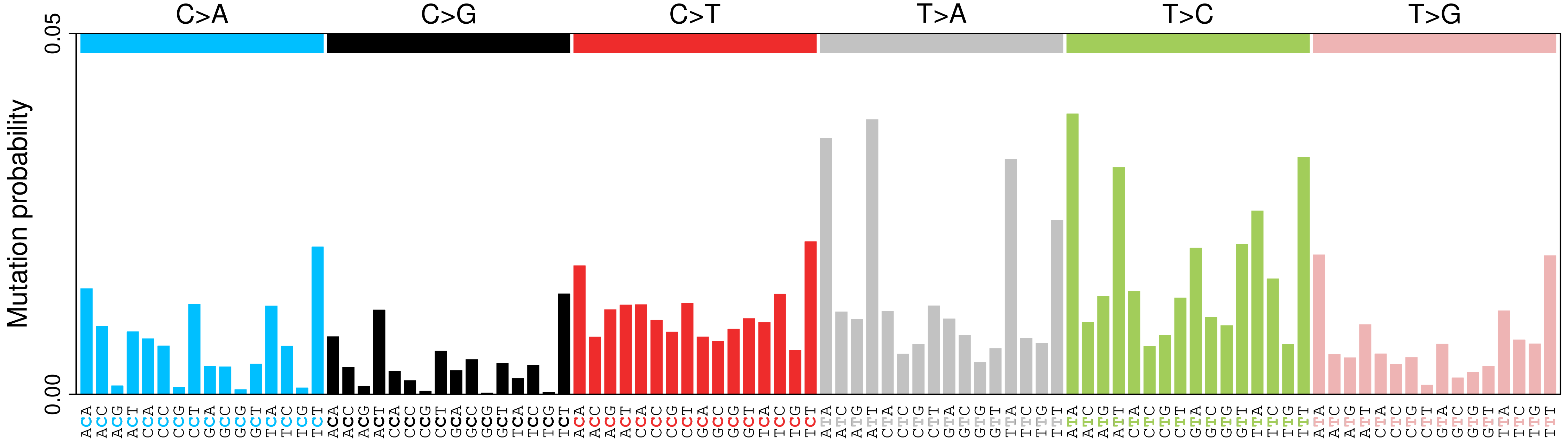
# SBS125



# SBS126



# SBS127

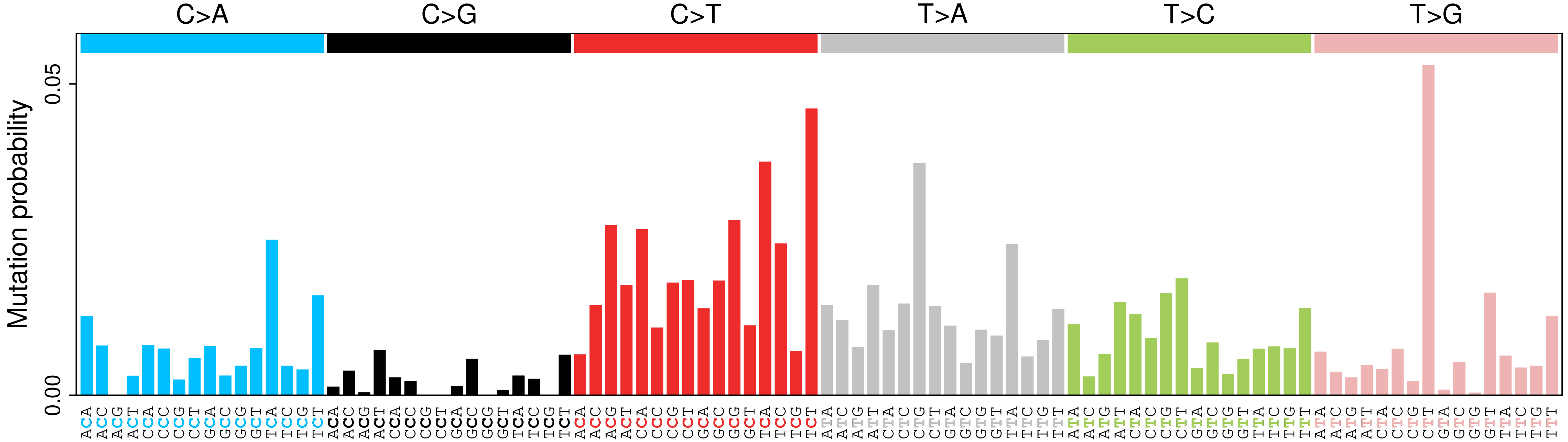








# SBS130



# SBS131

$C > A$

C > G

$C > T$

**T > A**

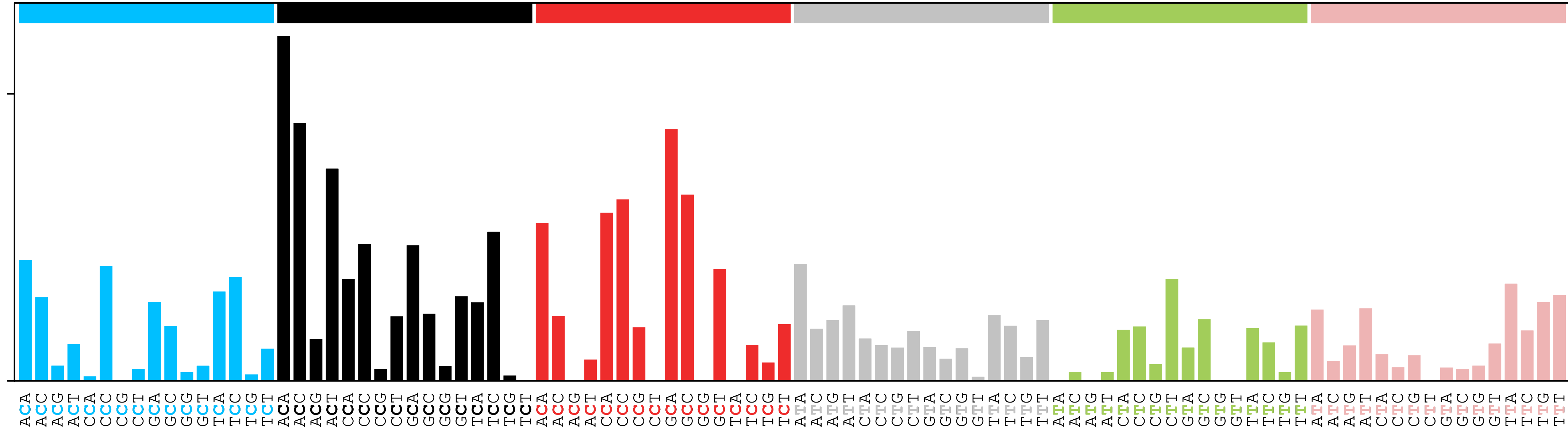
$$T > C$$

T>G

# Mutation probability

0.05

0.00



SBS132



# SBS133

**C > A**

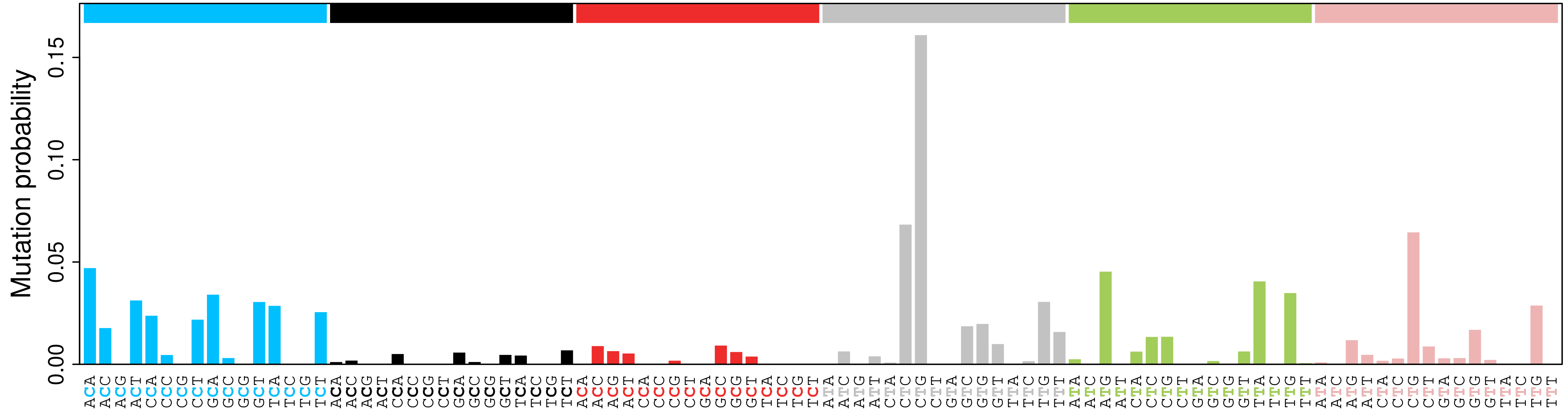
C > G

$$C > T$$

**T > A**

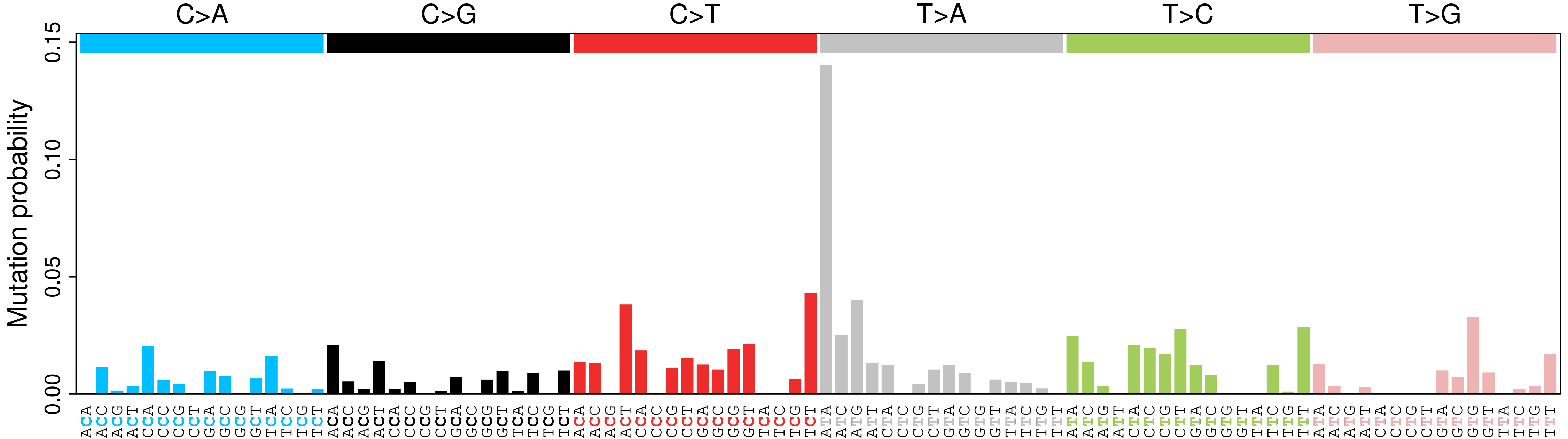
$T > C$

T>G

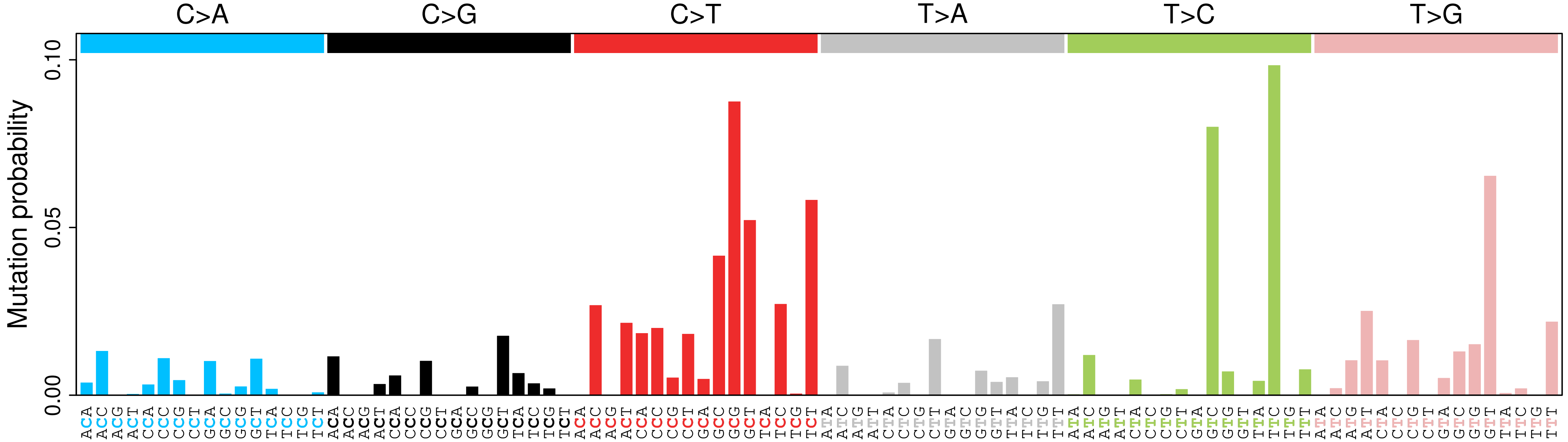




# SBS135



# SBS136



# SBS137

**C > A**

C > G

$$C > T$$

**T > A**

$T > C$

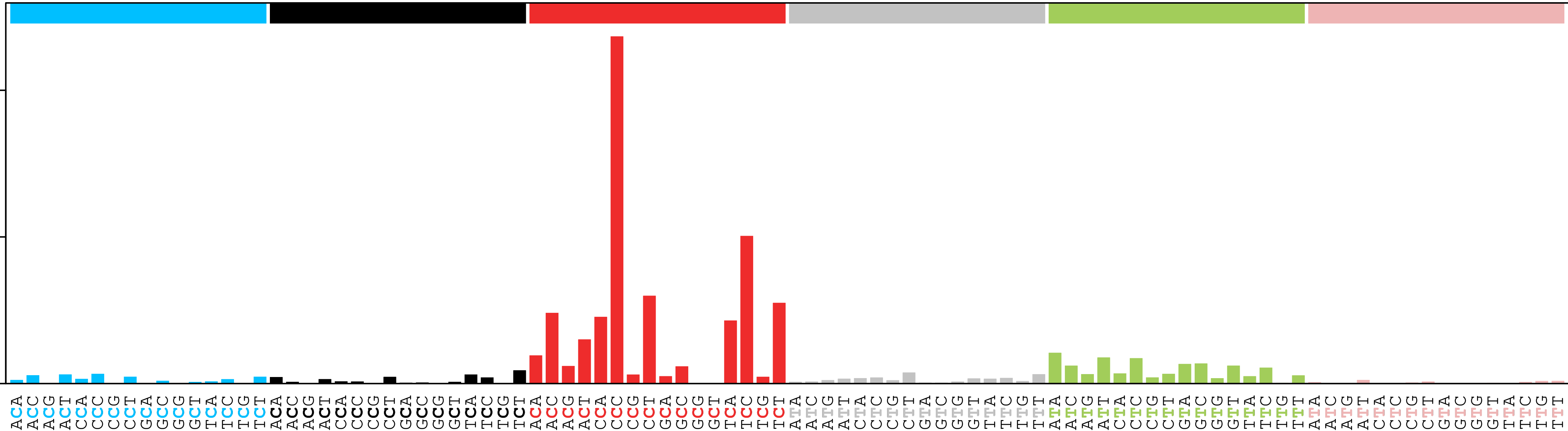
$T > G$

# Mutation probability

## 0.2

 $\circ$ 

0.









# SBS140

**C > A**

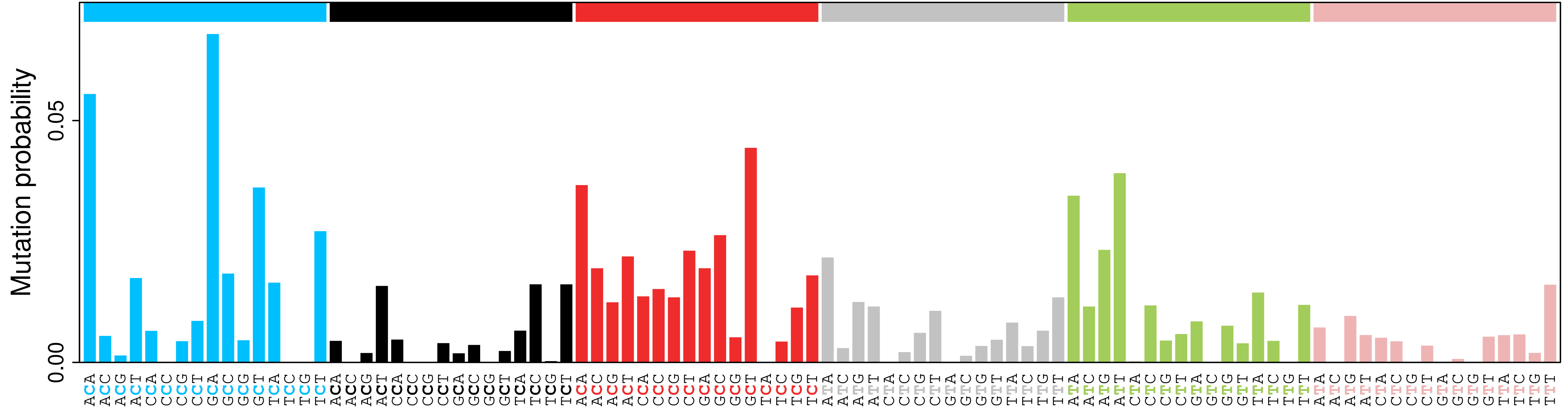
C > G

$C > T$

**T > A**

$T > C$

T>G



# SBS141

C>A

C>G

C>T

T>A

T>C

T>G

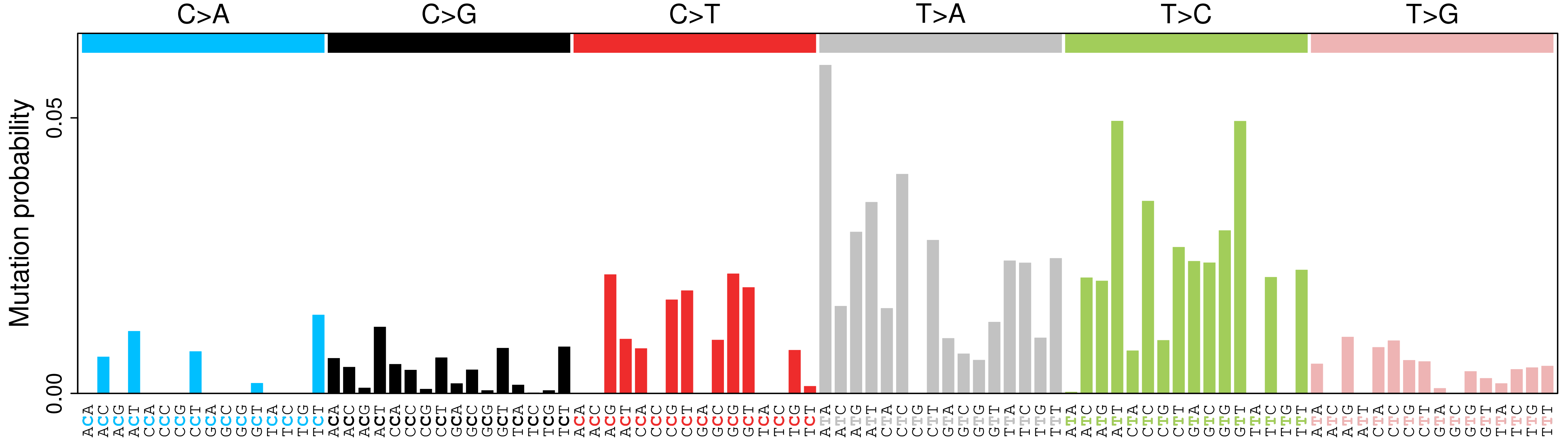
Mutation probability

0.05

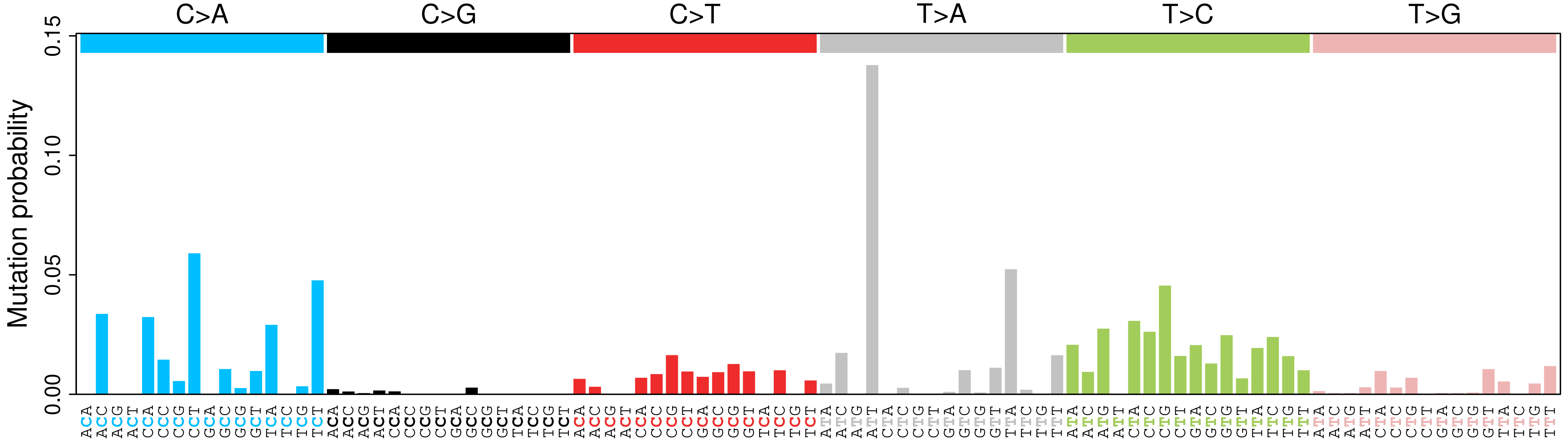
0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT

SBS142



# SBS143



# SBS144

$C > A$

C > G

C>T

**T > A**

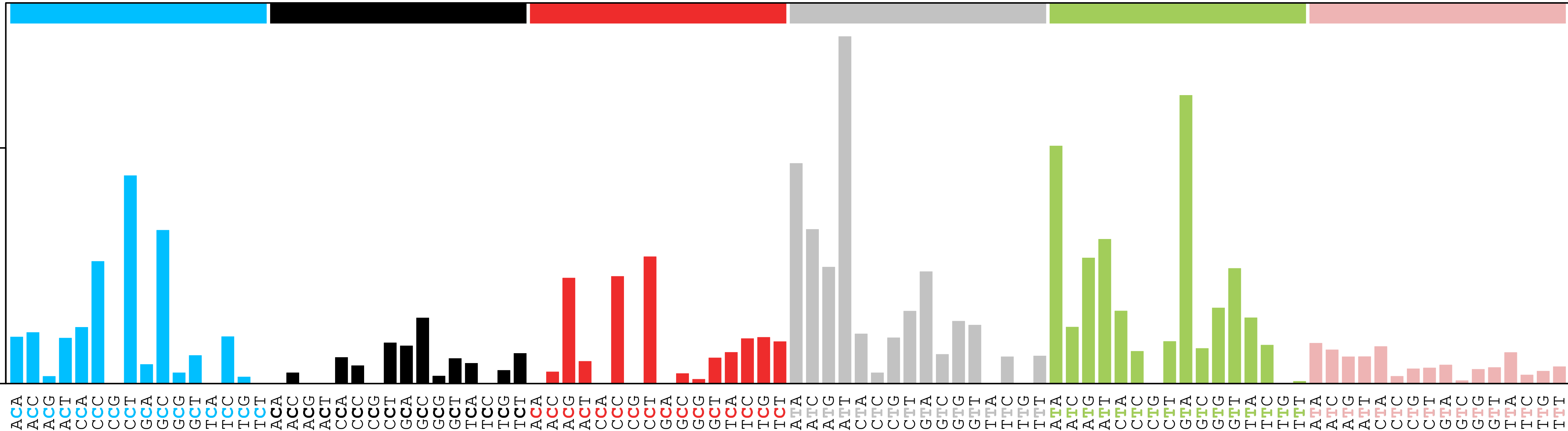
$T > C$

$T > G$

# Mutation probability

0.05

0.00



# SBS145

$C > A$

C > G

$C > T$

**T > A**

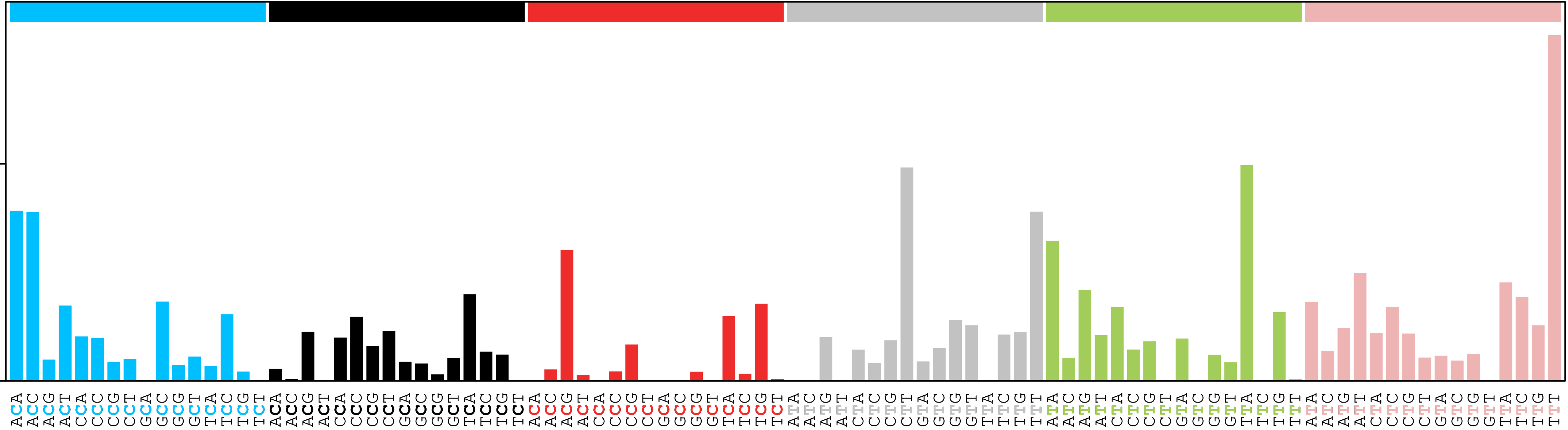
$$T > C$$

T>G

# Mutation probability

0.05

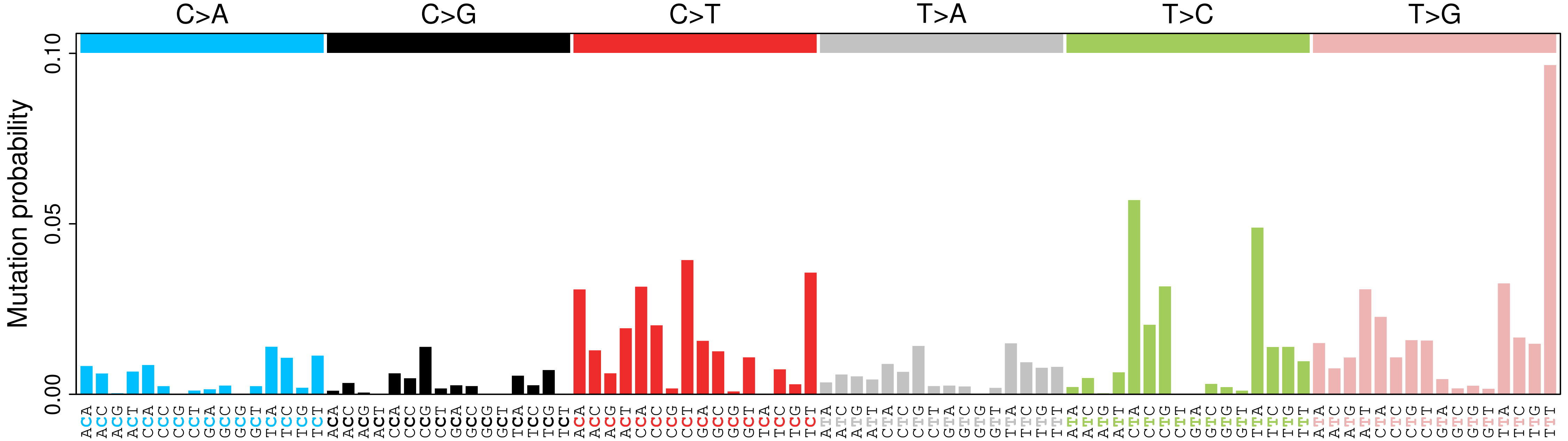
0.00







# SBS147





# SBS149

$C > A$

C > G

$C > T$

**T > A**

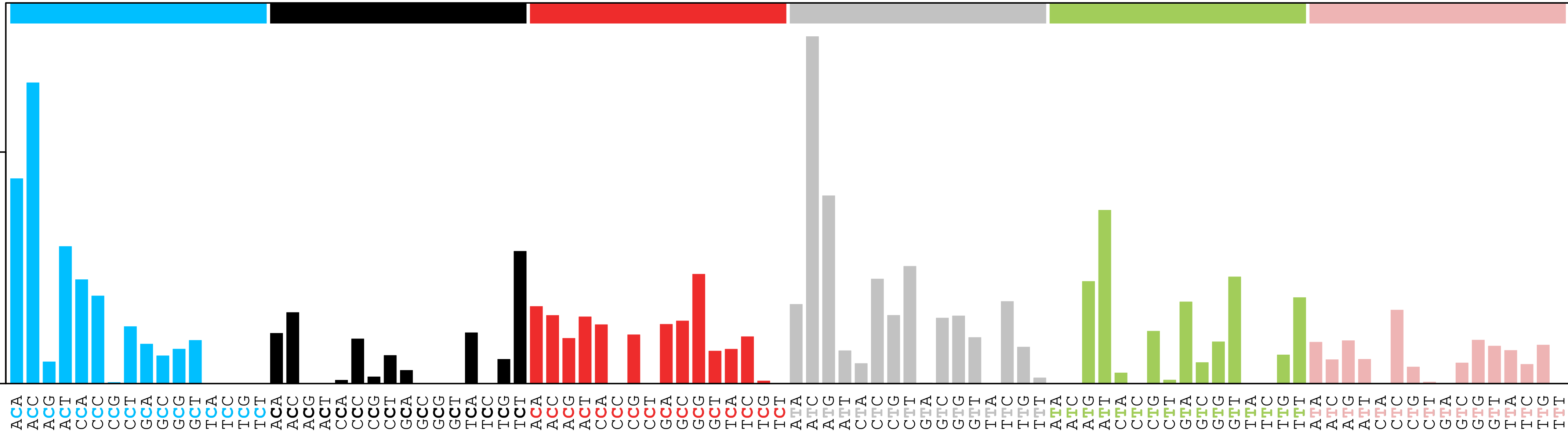
$T > C$

T>G

# Mutation probability

0.05

0.00







# SBS152

$C > A$

C > G

$$C > T$$

**T > A**

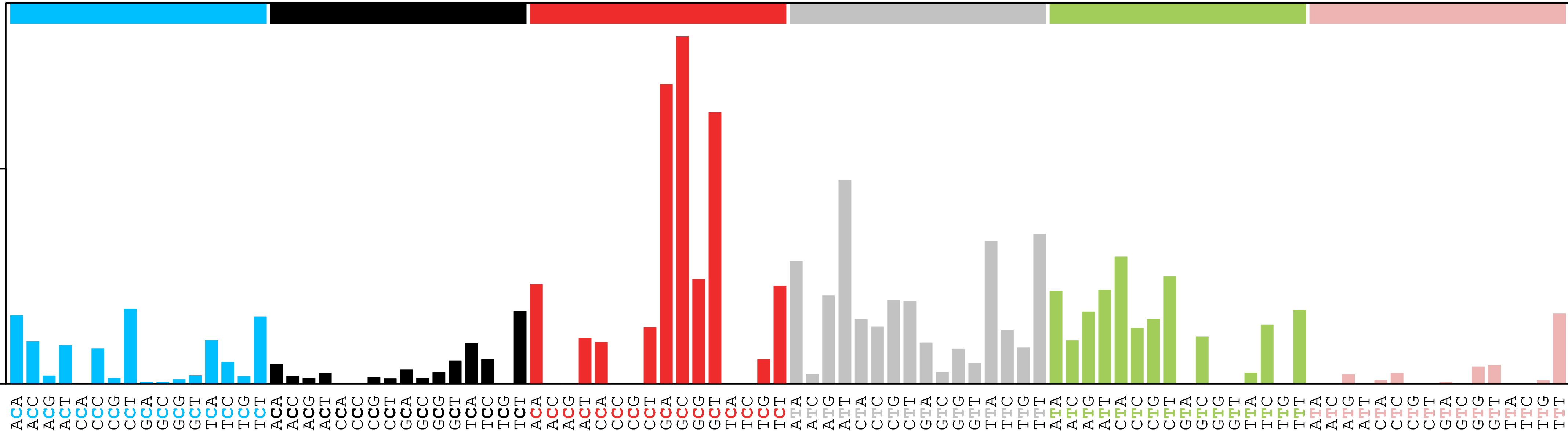
$T > C$

T>G

# Mutation probability

0.05

0.00



# SBS153

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

0.05

0.00

ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GCC GGT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT



# SBS154





# SBS156

$C > A$

C > G

C>T

**T > A**

$T > C$

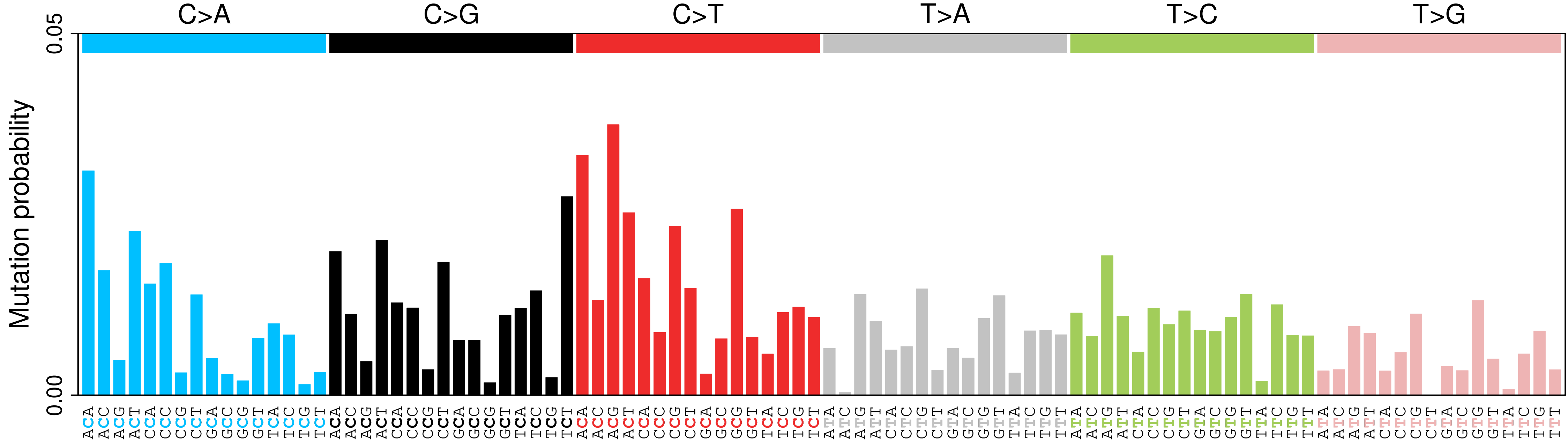
T>G

0.05

0.00

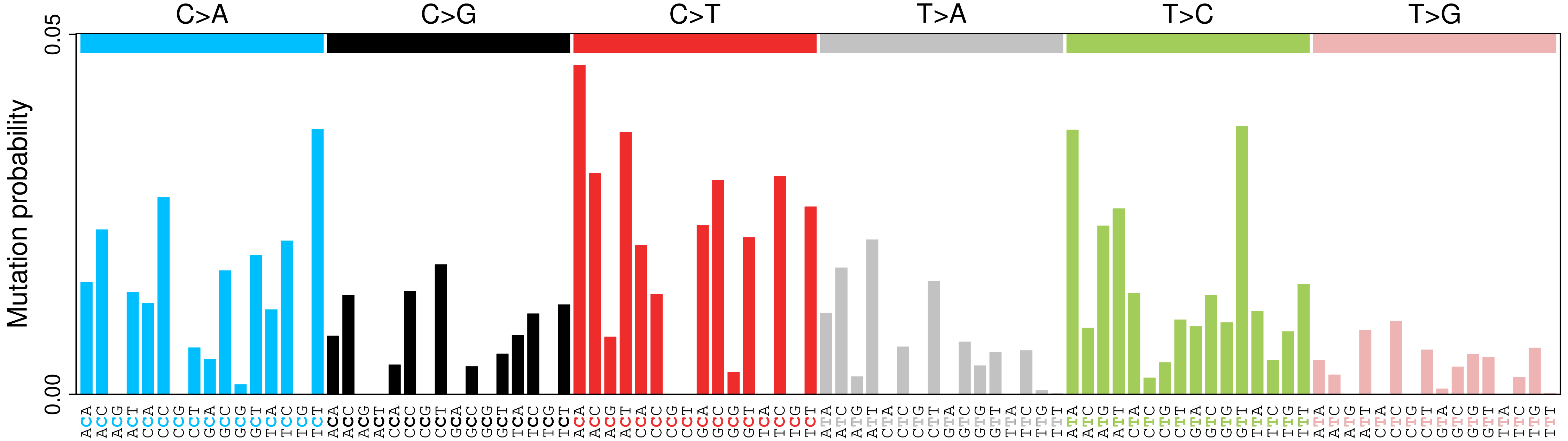
[illegible]

SBS157

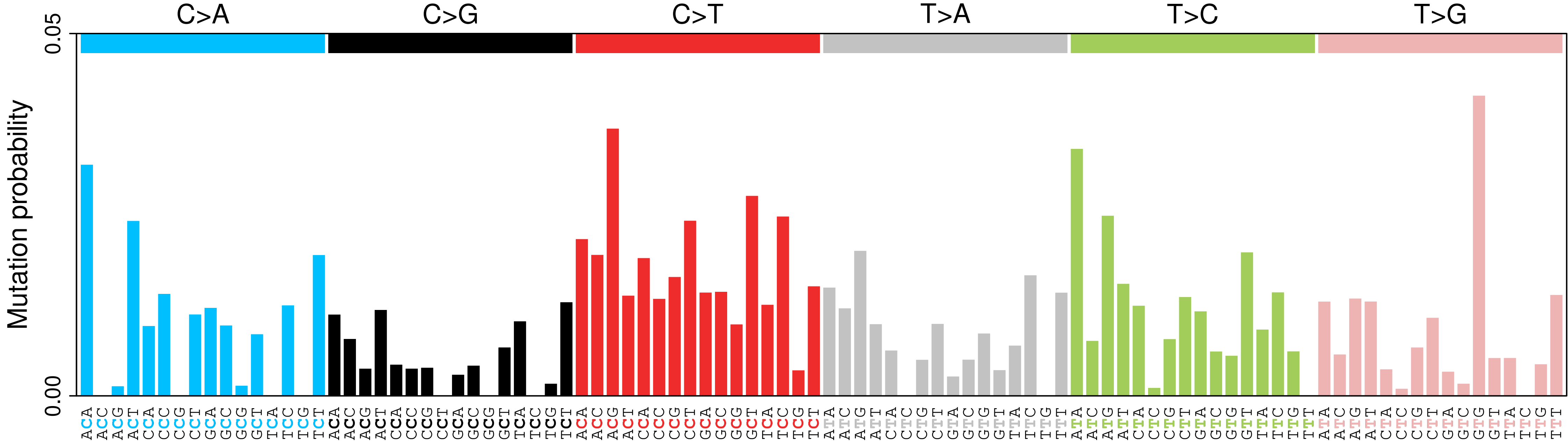




# SBS159



# SBS160



# SBS161

C>A

C>G

C>T

T>A

T>C

T>G

Mutation probability

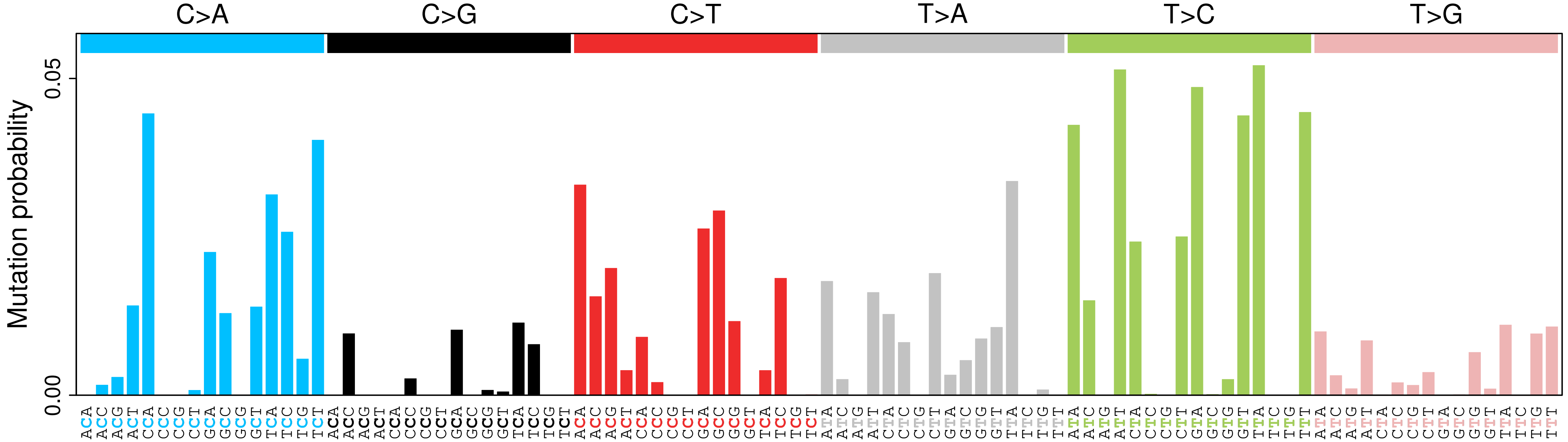
0.05

0.00

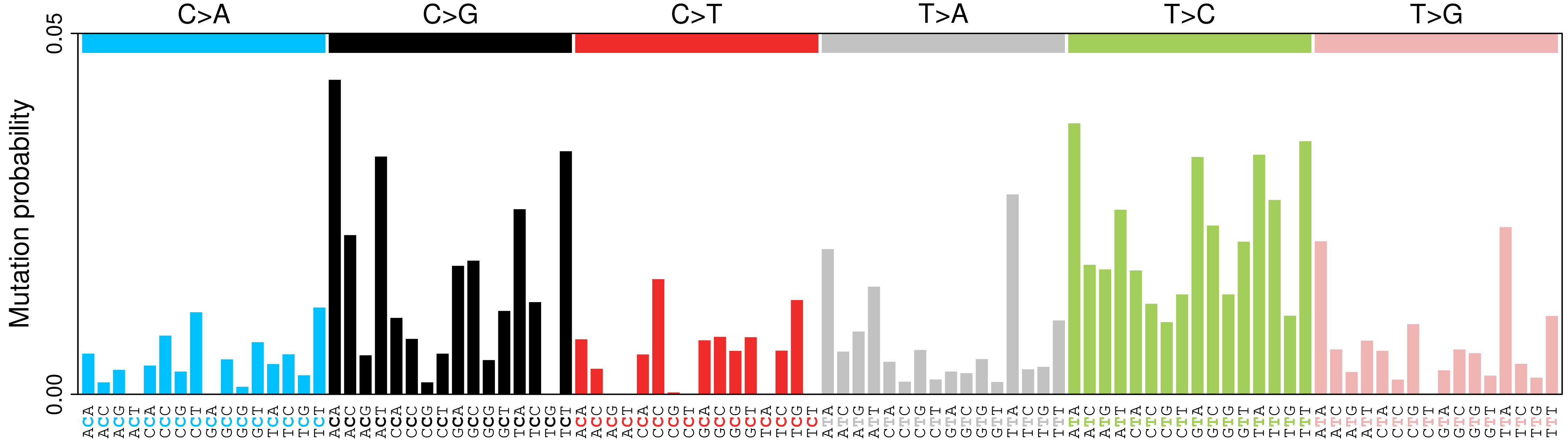
ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT TCA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ACA ACC ACG ACT CCA CCC CCG CCT GCA GCC GGT GCT TCA TCC TCG TCT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT ATA ATC ATG ATT CTA CTC CTG CTT GTA GTC GTG GTT TTA TTC TTG TTT



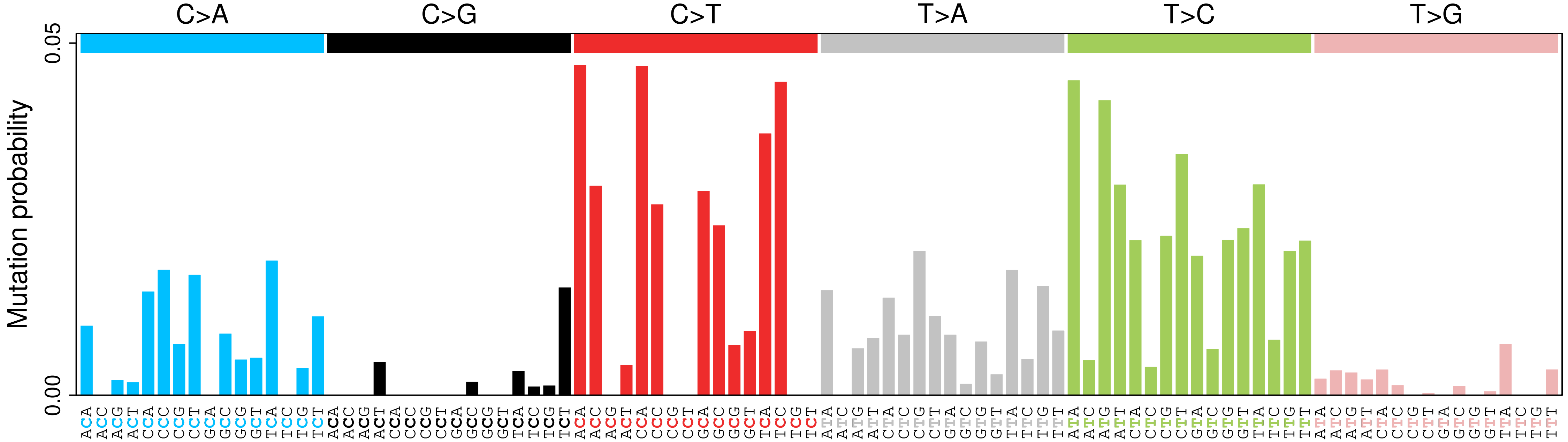
# SBS162



# SBS163



# SBS164



# SBS165

$C > A$

C > G

$C > T$

**T > A**

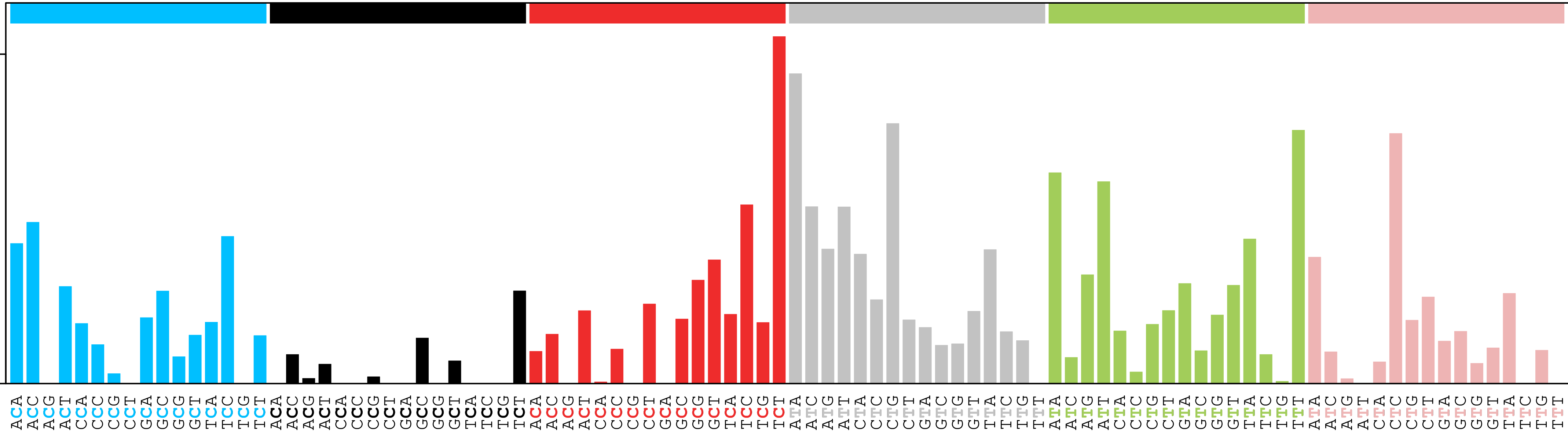
$T > C$

T>G

0.05

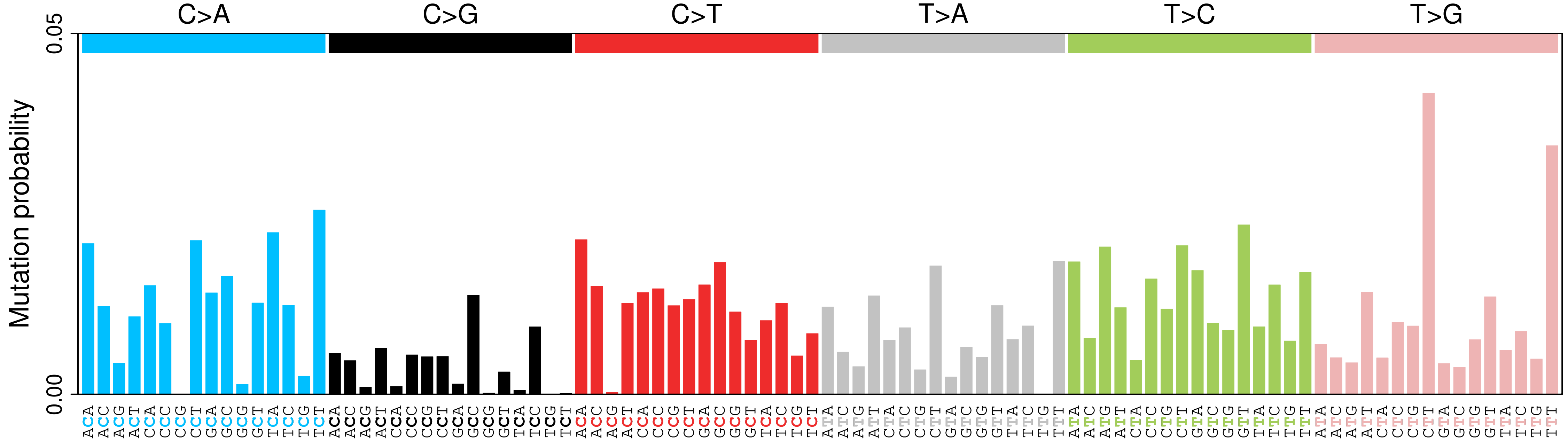
0.05

0.00





# SBS167



# SBS168

**C > A**

C > G

$C > T$

**T > A**

$T > C$

T>G

# Mutation probability

0.05

0.00



# SBS169

**C > A**

C > G

$C > T$

**T > A**

$$T > C$$

$T > G$

# Mutation probability

0.10

50

0.00

