

```
$hyphy ~/Development/hyphy-analyses/FitMG94/FitMG94.bf --lrt Yes --alignment WestNileVirus_NS3.fas
```

Analysis Description

Fit an MG94xREV model with several selectable options frequency estimator and report the fit results including dN/dS ratios, and synonymous and non-synonymous branch lengths. v0.2 adds LRT test for dN/dS != 1

- __Requirements__: in-frame codon alignment and a phylogenetic tree
- __Written by__: Sergei L Kosakovsky Pond
- __Contact Information__: spond@temple.edu
- __Analysis Version__: 0.2

rooted: No

>code -> Universal

>Loaded a multiple sequence alignment with **19** sequences, **619** codons, and **1** partitions from `/Users/sergei/Dropbox/Talks/VEME-2021/data/WestNileVirus_NS3.fas`

>type -> global

>frequencies -> CF3x4

>lrt -> Yes

Obtaining branch lengths and nucleotide substitution biases under the nucleotide GTR model

>kill-zero-lengths -> Yes

```
### Deleted 2 zero-length internal branches: `Node1, Node2`
* Log(L) = -7745.48, AIC-c = 15577.06 (43 estimated parameters)
* 1 partition. Total tree length by partition (subs/site) 0.672
```

```
### Fitting Standard MG94
* Log(L) = -6413.46, AIC-c = 12923.32 (48 estimated parameters)
* non-synonymous/synonymous rate ratio = 0.0086 (95% profile CI 0.0069- 0.0106)
```

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### Running the likelihood ratio tests for dN/dS=1
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```
>Testing _non-synonymous/synonymous rate ratio_ == 1
```

```
Likelihood ratio test for _non-synonymous/synonymous rate ratio == 1_, **p = 0.0000**.
```

```
### **Synonymous tree**
(HNY1999:0.001081533713434183,NY99_EQHS:0.001066739556141331,NY99_FLAMINGO:0,((((((RABENSBURG_ISOLATE:1.02609485578009,
(WNFCG:0.009747728897547157,SPU116_89:0.006173701209230282)Node11:0.4965243777785416)Node9:0.5660609164185494,KUNCG:0.085800899625552
03)Node8:0.06825862226912914,(ETHAN4766:0.02340495761620409,
(CHIN_01:0.01183597486736843,EG101:0.0147869746725866)Node17:0.007539849787066069)Node15:0.003381601852478645)Node7:0.018166959127327
35,(((ITALY_1998_EQUINE:0.008869163186759085,PAAN001:0.007726247531366057)Node22:0.002644807163484107,
(R097_50:0.001612646775301341,VLG_4:0.001063048479450396)Node25:0.002742256244585967)Node21:0.0007105581836354553,KN3829:0.0030011303
30081092)Node20:0.01077404359987302)Node6:0.009119438361664152,AST99:0.01648564314579341)Node5:0.006362164798999309,PAH001:0.00975889
8063241322)Node4:0.01061022608779064,IS_98:0.002196841638364542)Node3:0.001024862946203058,MEX03:0.003213545672362693)
```

```
### **Non-synonymous tree**
(HNY1999:2.027602010061738e-05,NY99_EQHS:1.99986670907985e-05,NY99_FLAMINGO:0,((((((RABENSBURG_ISOLATE:0.0192366818181515,
(WNFCG:0.0001827452483514863,SPU116_89:0.0001157412739507511)Node11:0.009308575534198456)Node9:0.01061220965829361,KUNCG:0.0016085497
32522618)Node8:0.001279676426151033,(ETHAN4766:0.00043878372461769,
(CHIN_01:0.0002218945755829819,EG101:0.0002772183538658889)Node17:0.0001413531024869812)Node15:6.339647694885701e-05)Node7:0.00034058
45087002921,(((ITALY_1998_EQUINE:0.0001662743646514413,PAAN001:0.0001448475884777466)Node22:4.958344112897044e-05,
(R097_50:3.023304592824938e-05,VLG_4:1.992946874381341e-05)Node25:5.141036478624048e-05)Node21:1.332116774085881e-05,KN3829:5.6263598
75928158e-05)Node20:0.0002019860517360077)Node6:0.0001709663908120937,AST99:0.0003090640889356378)Node5:0.0001192744893160473,PAH001:
0.0001829546419425591)Node4:0.0001989148879557604,IS_98:4.11852211947375e-05)Node3:1.921358663116306e-05,MEX03:6.024584886973394e-05)
```

```
### Writing detailed analysis report to `/Users/sergei/Dropbox/Talks/VEME-2021/data/WestNileVirus_NS3.fas.FITTER.json'
```