Supplementary material

	Title
Table 1	Sequence data & evolutionary models
Figure 1	Phylogeny
A	Capsid
B	Mp
C	Envelope
D	NS1
E	NS2a
F	NS2b
G	NS3
H	NS4a
I	NS4b
J	NS5
Figure 2	IUPred & GLOOME
A	Capsid analysis
B	Mp analysis
C	Envelope analysis
D	NS1 analysis
E	NS2a analysis
F	NS2b analysis

	Title
G	NS3 analysis
H	NS4a analysis
I	NS4b analysis
J	NS5 analysis
Figure 3	IUPred vs PONDR-FIT
A	Capsid analysis
B	Mp analysis
C	Envelope analysis
D	NS1 analysis
E	NS2a analysis
F	NS2b analysis
G	NS3 analysis
H	NS4a analysis
I	NS4b analysis
J	NS5 analysis
Figure 4	
	IUPred vs PONDR-FIT
Figure 5	
	TBEV vs. DENV1 Envelope protein

Abbreviations

capsid protein, C: membrane glycoprotein precursor, Mp; envelope protein, E; nonstructural protein, NS; 2K protein, 2K; Tamana bat virus, TABV; Quang Binh virus, QBV; Cell Fusing Agent virus CFAV; Culex flavivirus, CxFV; Aedes flavivirus, AeFV; Kamiti River virus, KRV; Louping ill virus, LIV; Tick-borne encephalitis virus, TBEV; Omsk hemorrhagic fever virus, OHFV; Langat virus, LGTV; Alkhurma hemorrhagic fever virus, AHFV; Karshi virus, KARV; Powasson virus, POWV; Montana myotis leukoencephalitis virus, MMLV; Modoc virus, MODV; Apoi virus, APOIV; Rio Bravo virus, RBV; Sepik virus, SEPV; Wesselbron virus, WESSV; Yellow fever virus, YFV; Yokose virus, YOKV; Entebbe bat virus, ENTV; Dengue virus serotypes 1-4, DENV-1-4; Kedougou virus, KEDV; Zika virus, ZIKV; Kokobera virus, KOKV; Aroa virus, AROAV; Bagaza virus, BAGV; Ilheus virus, ILHV; St. Louis Encephalitis virus, SLEV; West nile virus p, WNVp; West nile virus, WNV; Murray Valley Encephalitis virus, MVEV; Usutu virus, USUV; Japanese Encephalitis virus, JEV; multiple sequence alignment, MSA; disorder to order transition, DOT

Table 1. Sequence data

C	
DENV-1	NP_722457
DENV-3	YP_001531164
DENV-2	NP_739591
DENV-4	NP_740313
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KOKV	YP_001040007, 3-99
KEDV	YP_002790882, 1-97
AROAV	YP_001040004, 3-100
SLEV	ABN11815, 3-98
BAGV	YP_002790883, 4-101
USUV	AEK21245, 1-104
MVEV	P05769, 1-105
ILHV	YP_001040006, 7-97
WNVp	YP_001527878
JEV	NP_775662
WNV	NP_776010

Mp	
DENV-1	NP_733807
DENV-3	YP_001531166
DENV-2	NP_739582
DENV-4	NP_740315
ZIKV	AEN75266, 124-290
KEDV	YP_002790882, 122-282
KOKV	YP_001040007, 121-286
BAGV	YP_002790883, 130-289
USUV	YP_164809
WNVp	NP_776012
ILHV	YP_001040006, 119-285
SLEV	ADD49664, 122-288
ENTV	YP_950477, 135-287
MVEV	NP_733817
JEV	NP_775664
WNV	YP_001527879
SEPV	YP_950478, 147-280
YFV	NP_776000
YOKV	NP_872627, 162-296
POWV	NP_775514
RBV	NP_776070
TBEV	NP_775501
LIV	NP_740274
AHFV	NP_775468
LGTV	NP_740294
MMLV	NP_775644
APOIV	NP_775678
AROAV	YP_001040004, 126-290
WESSV	ABI54474, 147-280
OHFV	AAR98531, 147-280
KARV	YP_224133, 117-280

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DENV-3	YP_001621843, 281-773
DENV-2	NP_056776, 281-775
DENV-4	ADA00410, 280-774
ZIKV	YP_002790881 , 291-790
KEDV	YP_002790882, 283-782
JEV	NP_059434, 295-794
WNVp	NP_041724, 291-787
KOKV	YP_001040007, 287-787
WNV	ADD23629, 272-772
ILHV	YP_001040006, 286-786
USUV	AFE85504, 294-793
MVEV	NP_051124, 293-793
AROAV	YP_001040004, 293-793
SLEV	ACJ70662, 16-514
BAGV	YP_002790883, 292-790
YFV	AAC35908, 286-778
WESSV	ABI54474, 283-770
SEPV	AAV34159, 283-770
ENTV	YP_950477, 290-776
YOKV	NP_872627, 299-786
POWV	NP_620099, 279-775
AHFV	AFF18426, 282-777
KARV	YP_224133, 282-776
OHFV	NP_878909, 282-774
LGTV	NP_620108, 281-779
TBEV	NP_043135, 281-776
LIV	NP_044677, 281-776
RBV	NP_776072
MMLV	NP_689391, 270-753
APOIV	NP_620045, 272-756
MODV	NP_619758, 273-754
TABV	NP_658908, 285-786
KRV	NP_937773
AeFV	YP_003084125
CFAV	NP_776040

NS1	
DENV-1	NP_722461
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DENV-2	NP_739584
DENV-4	NP_740318
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AROAV	YP_001040004, 794-1142
SLEV	AAA47786, 790-1141
KOKV	YP_001040007, 788-1138
USUV	YP_164811
WNVp	NP_776015
WNV	YP_001527881
MVEV	NP_722532
JEV	NP_775667
KEDV	YP_002790882, 784-1135
ILHV	YP_001040006, 787-1139
YOKV	NP_872627, 787-1139
SEPV	YP_950478, 773-1123
BAGV	YP_002790883, 791-1142
WESSV	ABI54474, 773-1123
ENTV	YP_950477, 777-1129
YFV	NP_776002
AHFV	NP_775471
POWV	NP_775517
OHFV	AAR98531, 777-1128
MODV	NP_740261
LIV	NP_740723
TBEV	NP_775504
RBV	NP_776073
LGTV	P_740296
KARV	ABB90671, 777-1129
MMLV	NP_775646
APOIV	NP_775681
CxFV	YP_006470612, 1-364
AeFV	YP_003084126
KRV	NP_937774
CFAV	NP_776041

Best Models according to Prottest (and used for phylogenetic reconstruction):

c	LG+G+F
e	LG+G+F
mp	LG+G
ns1	LG+G
ns2a	LG+G+F
ns2b	LG+G+F
nS3	RtREV+G+F
ns4a	LG+G+F
ns4b	LG+G+F
ns5	LG+G+F

Table 1. Sequence data

NS2A	
DENV-1	NP_733808
DENV-3	YP_001531170
DENV-2	NP_739585
DENV-4	NP_740319
AROAV	YP_001040004, 1146-1309
WNV	YP_001527882
JEV	NP_775668
WNVp	NP_776016
KOKV	YP_001040007, 1146-1309
USUV	YP_164812
MVEV	NP_722533
ILHV	YP_001040006, 1139-1279
YFV	NP_776003
KEDV	YP_002790882, 1138-1282
SEPV	YP_950478, 1125-1267
POWV	NP_775518
TBEV	NP_775505

NS2A	
DENV-1	NP_733808
DENV-3	YP_001531170
DENV-2	NP_739585
DENV-4	NP_740319
AROAV	YP_001040004, 1146-1309
WNV	YP_001527882
JEV	NP_775668
WNVp	NP_776016
KOKV	YP_001040007, 1146-1309
USUV	YP_164812
MVEV	NP_722533
ILHV	YP_001040006, 1139-1279
YFV	NP_776003
KEDV	YP_002790882, 1138-1282
SEPV	YP_950478, 1125-1267
POWV	NP_775518
TBEV	NP_775505

NS2B	
DENV-1	NP_733809
DENV-3	YP_001531171
DENV-2	NP_739586
DENV-4	NP_740320
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KOKV	YP_001040007, 1363-1492
AROAV	YP_001040004, 1373-1503
ZIKV	ABI54475, 1367-1496
SEPV	AAV34159, 1350-1479
WESSV	ABI54474, 1350-1479
YOKV	NP_872627, 1372-1496
WNV	YP_001527883
WNVp	NP_776017
MVEV	NP_722534
BAGV	YP_002790883, 1371-1500
YFV	NP_776004
JEV	NP_775669
USUV	YP_164813
SLEV	AAA47786, 1369-1499
ENTV	YP_950477, 1363-1471
ILHV	YP_001040006, 1368-1497
RBV	NP_776075
AHFV	NP_775473
POWV	NP_775519

NS2B	
DENV-1	NP_733809
DENV-3	YP_001531171
DENV-2	NP_739586
DENV-4	NP_740320
KEDV	ABI54477, 1360-1489
KOKV	YP_001040007, 1363-1492
AROAV	YP_001040004, 1373-1503
ZIKV	ABI54475, 1367-1496
SEPV	AAV34159, 1350-1479
WESSV	ABI54474, 1350-1479
YOKV	NP_872627, 1372-1496
WNV	YP_001527883
WNVp	NP_776017
MVEV	NP_722534
BAGV	YP_002790883, 1371-1500
YFV	NP_776004
JEV	NP_775669
USUV	YP_164813
SLEV	AAA47786, 1369-1499
ENTV	YP_950477, 1363-1471
ILHV	YP_001040006, 1368-1497
RBV	NP_776075
AHFV	NP_775473
POWV	NP_775519

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DENV-4	ABO45246, 1475-2092
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KEDV	YP_002790882, 1490-2105
WNV	AEE99060, 1506-2124
WNVp	AFO64353, 1502-2120
ILHV	YP_001040006, 1499-2115
JEV	NP_059434, 1505-2123
AROAV	YP_001040004, 1504-2121
SLEV	ABN11820, 1501-2117
BAGV	YP_002790883, 1501-2119
MVEV	NP_051124, 1504-2122
USUV	YP_164264, 1504-2122
KOKV	YP_001040007, 1493-2108
SEPV	YP_950478, 1480-2102
WESSV	YP_002922020, 1480-2102
YFV	AFQ32464, 1485-2107
YOKV	NP_872627, 1497-2116
OHFV	AAR98531, 1511-2110
ENTV	YP_950477, 1488-2107
MMLV	NP_689391, 1464-2079
TBEV	ADQ00972, 1490-2110
APOIV	NP_620045, 1465-2080
LIV	NP_044677, 1490-2110
RBV	AFG73004, 1464-2080
LGTV	ACH42698, 1490-2110
MODV	NP_740264
AHFV	AFF18426, 1492-2112
KARV	ABB90671, 1509-2110
POWV	ACD88752, 1490-2110
KRV	AAO24117, 1465-2041
CFAV	AAA48509, 1452-2038
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QBV	YP_002884239, 1474-1976
AeFV	YP_003084129
TABV	NP_658908

NS4a	
DENV-1	NP_733811
DENV-2	NP_739589
DENV-3	YP_00151175
DENV-4	NP_740324
KEDV	YP_002790882, 2256-2507
ZIKV	YP_0027900881, 2266-2511
KOKV	YP_001040007, 2258-2500
ILHV	YP_001040006, 2265-2504
AROAV	YP_001040004, 2272-2524
WNVp	NP_776021
SLEV	YP_001008348, 2267-2517
MVEV	NP_722538
JEV	NP_7765673
USUV	YP_164817
WNV	YP_001527886
YOKV	NP_872627, 226-2519
SEPV	YP_950478, 2252-2501
BAGV	YP_002790883, 2269-2517
ENTV	YP_950477, 2257-2489
YFV	NP_776008
WESSV	YP_002922020, 2252-2490
AHFV	NP_775477
OHFV	NP_878909, 2260-2511
LGTV	NP_740301
LIV	NP_740728
TBEV	NP_775510
KARV	YP_224133, 2260
APOIV	NP_775687
RBV	NP_776079
POWV	NO_775523
MODV	NP_740266
MMLV	NP_775652

NS4b	
DENV-1	NP_733810
DENV-4	NP_740322
DENV-2	NP_739588
DENV-3	YP_001531173
JEV	NP_775671
BAGV	YP002790883, 2131-2245
SLEV	NP_059434, 2132-2249
ILHV	YP_001008348, 2117-2241
USUV	YP_164815
SEPV	YP_950478, 2103-2228
ZIKV	YP_002790881, 2125-2242
AROAV	YP_001040004, 2122-2248
KEDV	YP_002790882, 2111-2232
KOKV	YP_00104007, 2117-2234
YFV	NP_776006
YOKV	NP_872627, 2121-2242
WNV	YP_001527885
WNVp	NP_77019
ENTV	YP_950477, 2112-2233
AHFV	NP_775475
LGTV	NP_003328988
POWV	NP_775521
MMLV	NP_775650
MODV	NP_740265
APOIV	NP_775685
LIV	NP_740727
TBEV	NP_775508
OHFV	NP_878909, 2113-2236
KARV	NP_YP_224133
RBV	NP_776077
WESSV	YP_002922020 , 2252-2490
MVEV	NP_722538

NS5	
DENV-1	NP_722465
DENV-3	YP_001531176
DENV-2	NP_739590
DENV-4	NP_740325
ILHV	YP_001040006, 2521-3416
SLEV	YP_001008348, 2531-3421
BAGV	YP_002790883, 2523-3416
AROAV	YP_001040004, 2526-3419
WNV	YP_0010527887
MVEV	NP_722539
KEDV	YP_002790882, 2513-3408
WNVp	NP_776022
USUV	YP_164818
JEV	NP_775674
ZIKV	YP_2790881, 2527-3411
KOKV	YP_001040007, 2509-3405
YFV	NP_776009
WESSV	YP_002922020, 2502-3405
SEPV	YP_950478, 2502-3402
KARV	YP_224133, 2515-3415
YOKV	NP_872627, 2521-3415
LGTV	NP_740302
POWV	NP_775524
OHFV	NP_878909, 2513-3400
AHFV	NP_775478
TBEV	NP_775511
ENTV	YP_950477, 2516-3399
LIV	NP_740729
RBV	NP_776080
MMLV	NP_775653
APOIV	NP_775688
MODV	NP_740267
KRV	NP_937780
CFAV	NP_776048
AeFV	YP_003084132
CxFV	YP_899469, 2484-3359
QBV	YP_002884239, 2480-3356
TABV	NP_776035

Figure 1.

Phylogenies for the different proteins in DENV-1. At the nodes, bootstraps are given indicating node support. 1000 bootstraps were run. The branches are scaled to reflect sequence divergence.

Figure 1A. Capsid

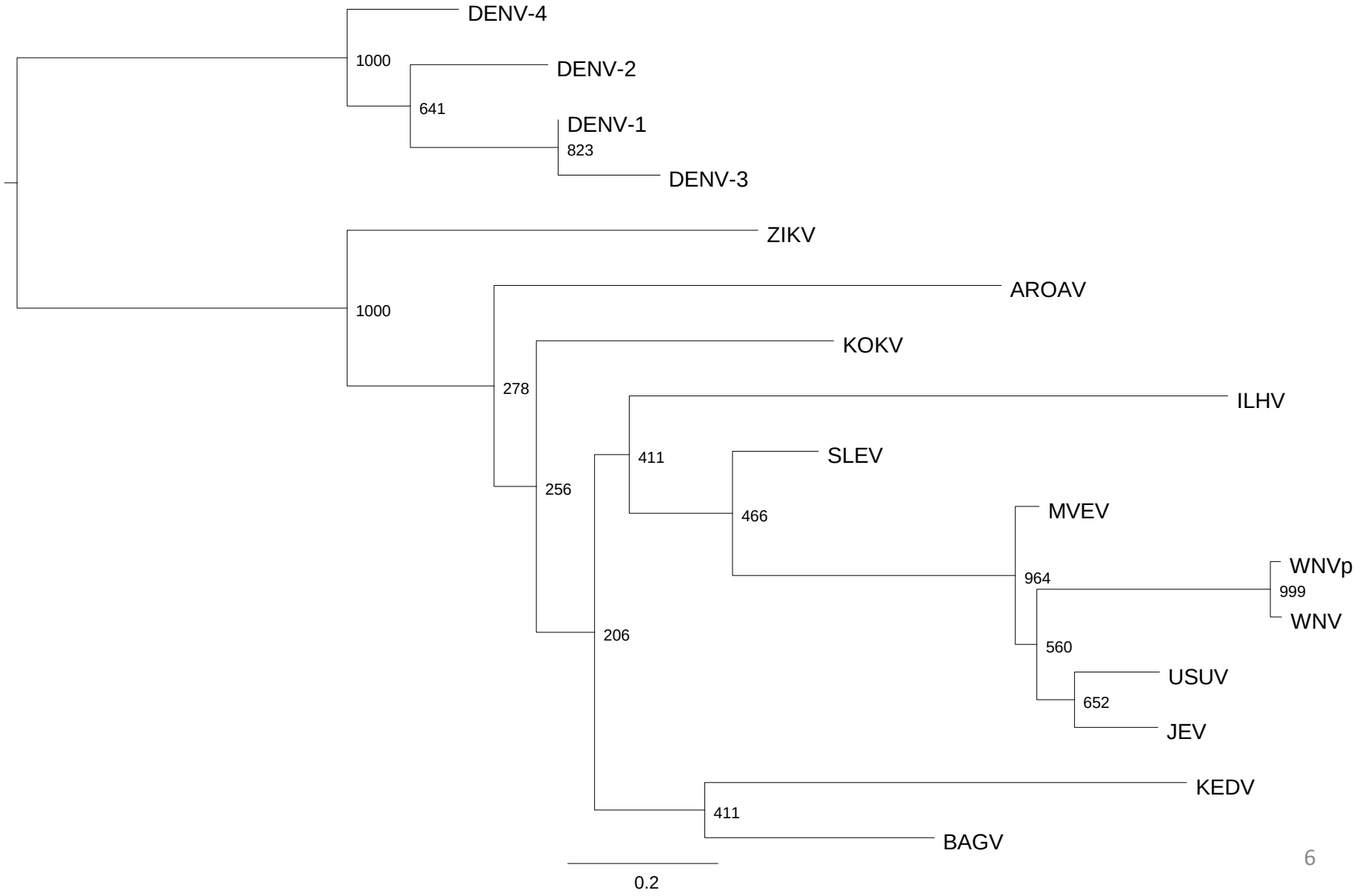
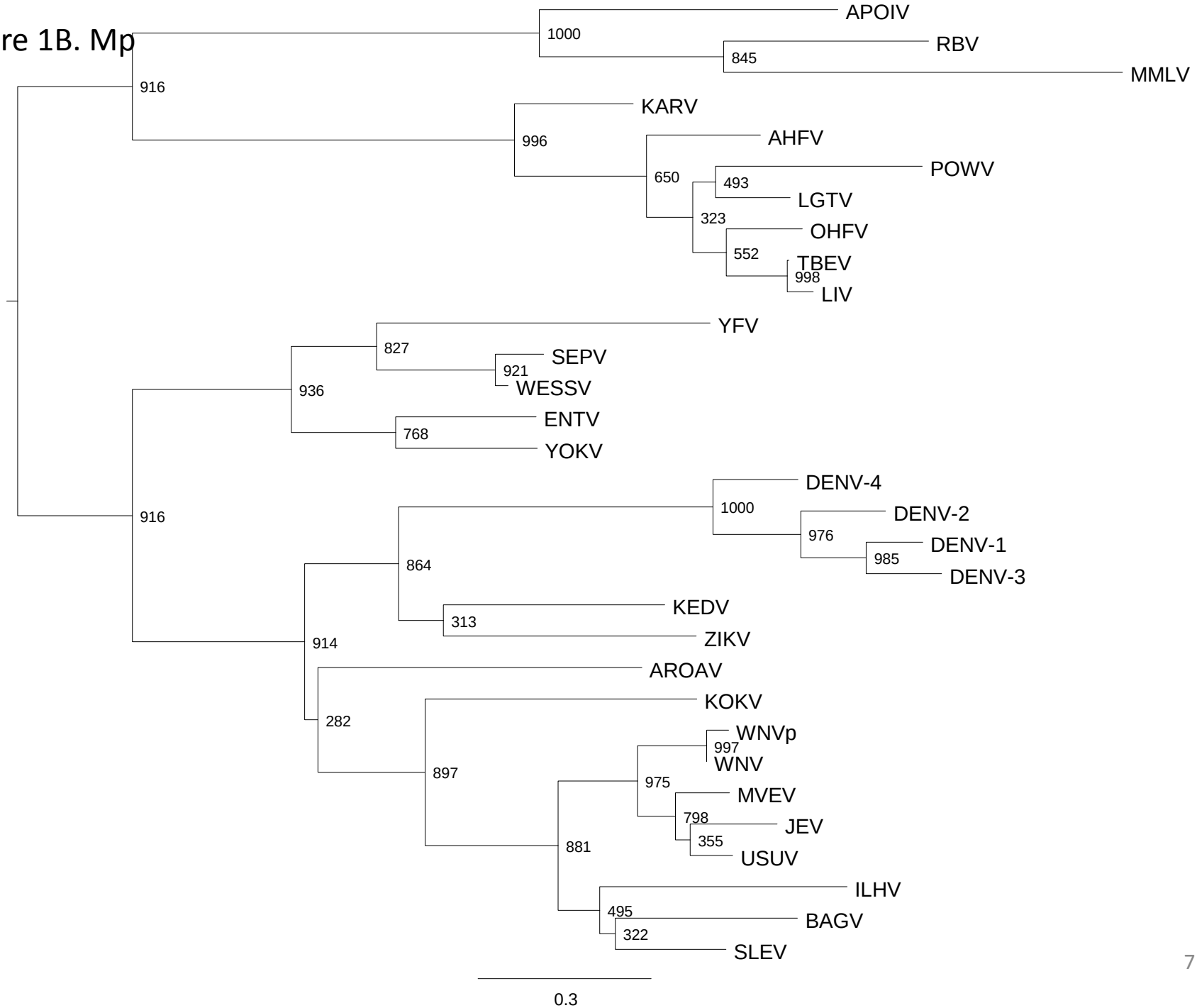


Figure 1B. Mp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RBV
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MMLV
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KARV
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AHFV
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POWV
493
LGTV
323
OHFV
552
TBEV
998
LIV
YFV
827
SEPV
921
WESSV
936
ENTV
768
YOKV
DENV-4
1000
DENV-2
976
DENV-1
985
DENV-3
916
864
KEDV
313
ZIKV
914
AROAV
KOKV
282
WNVp
997
WNV
897
975
MVEV
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JEV
355
USUV
881
ILHV
495
BAGV
322
SLEV
0.3

Figure 1C.
Envelope

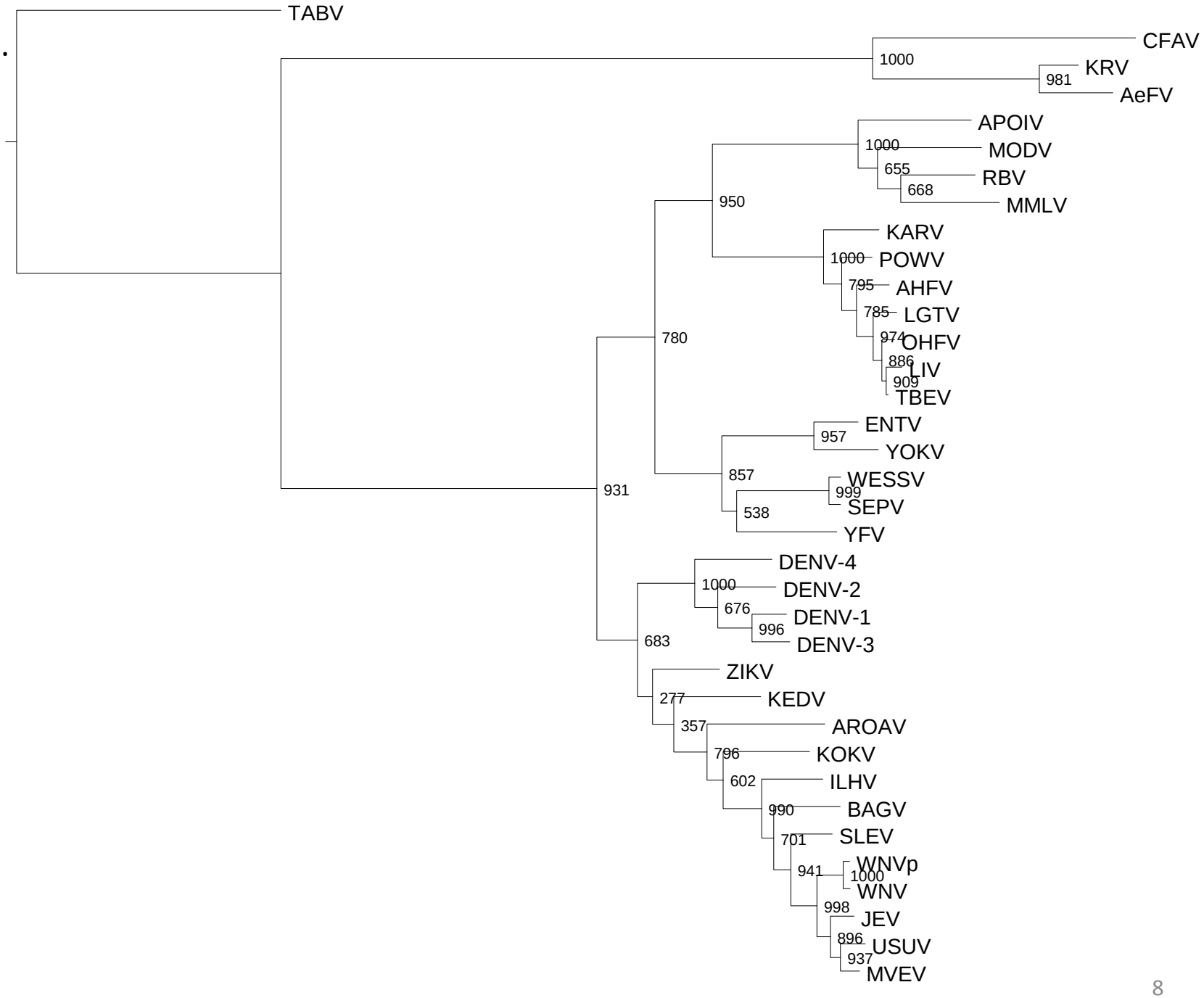


Figure 1D. NS1

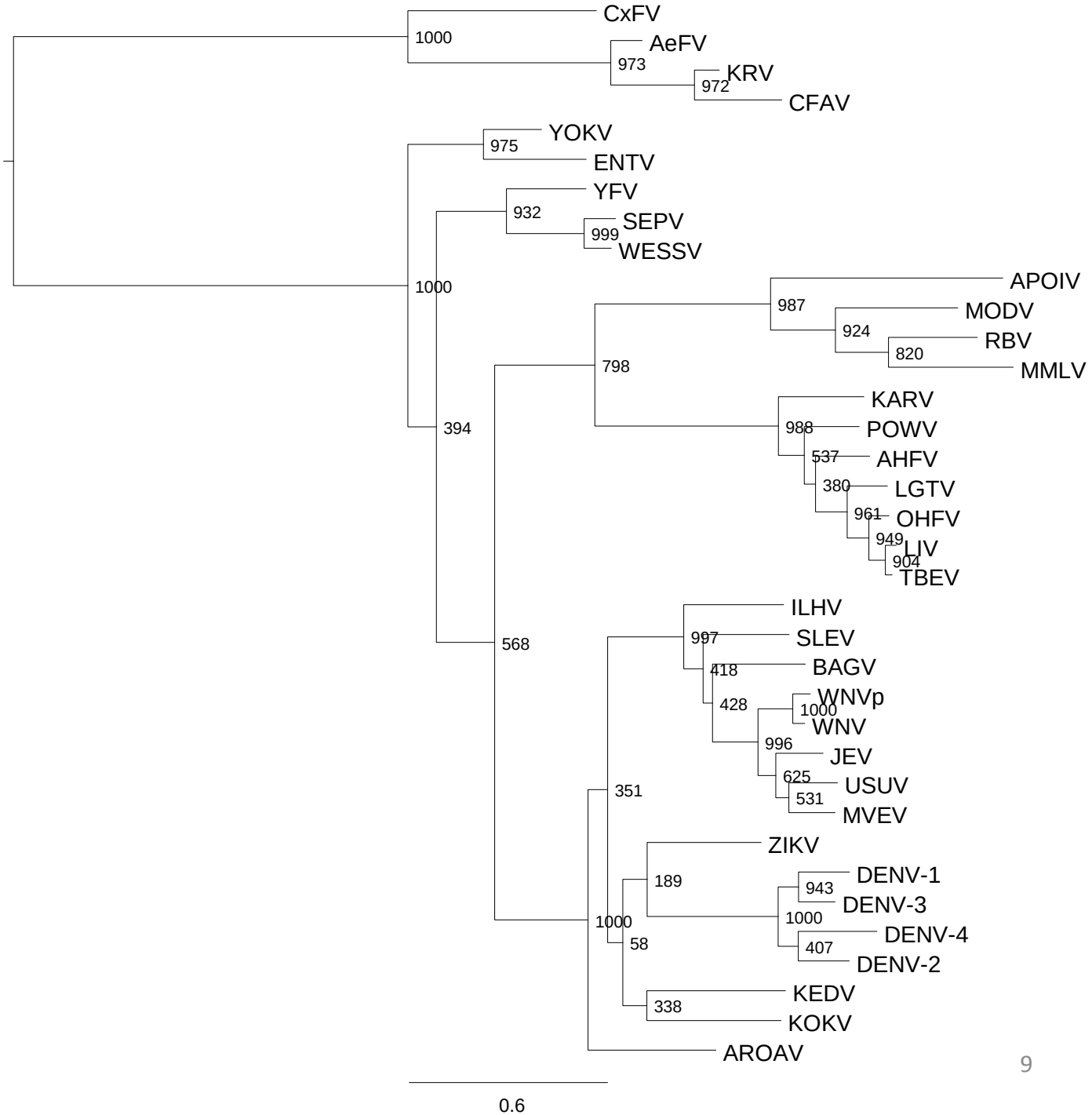


Figure 1E. NS2a

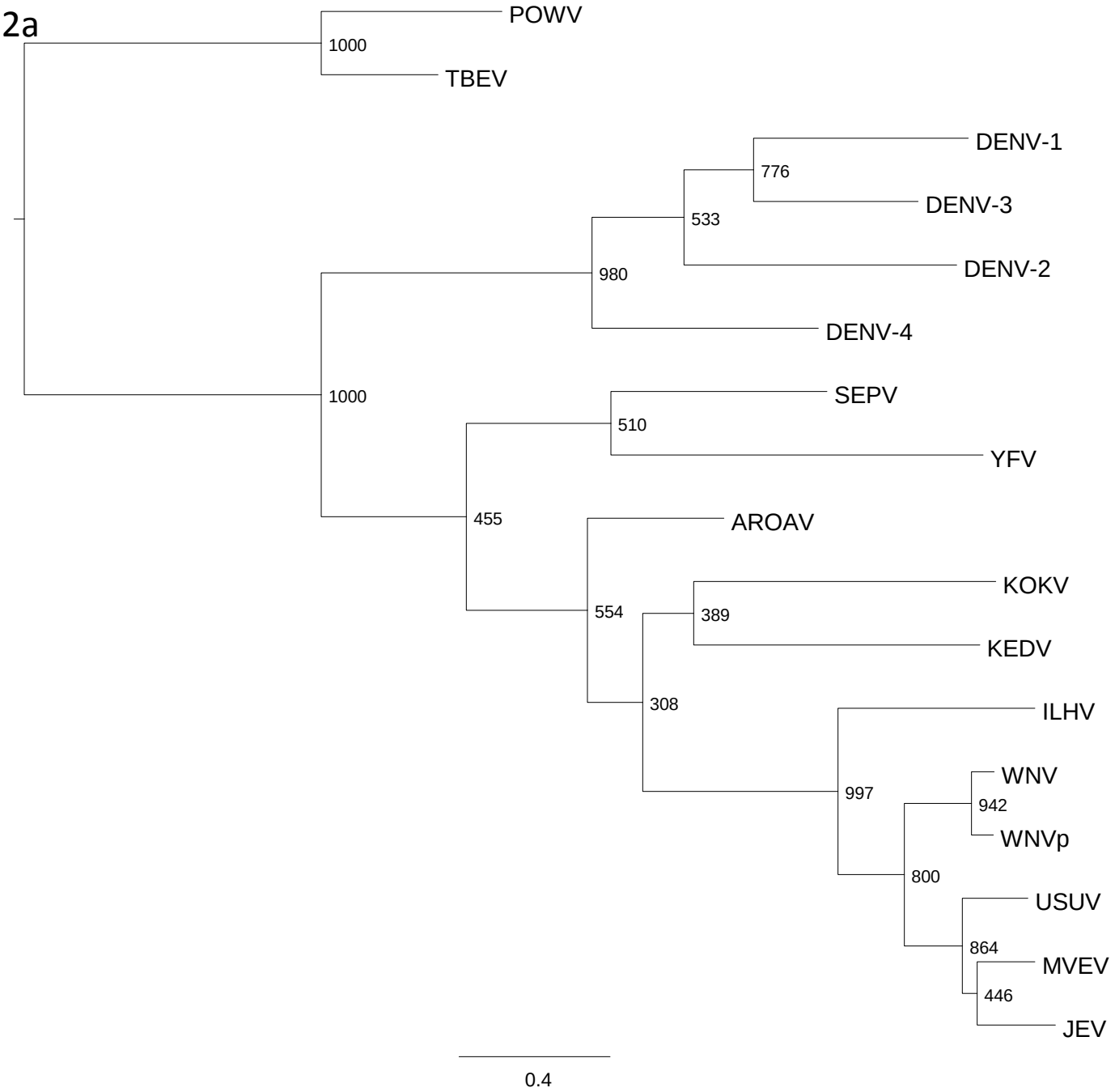


Figure 1F. NS2b

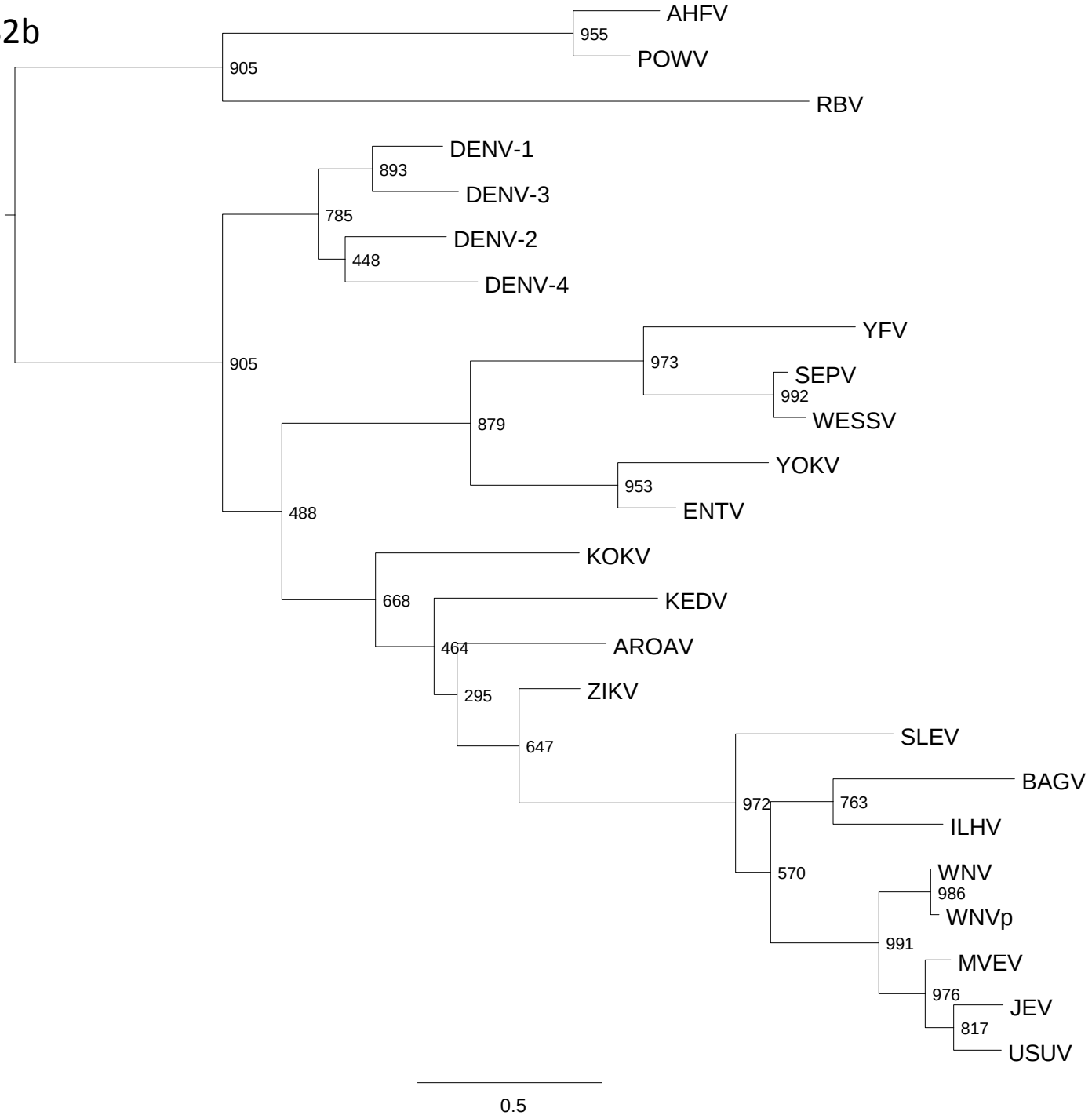


Figure
1G. NS3

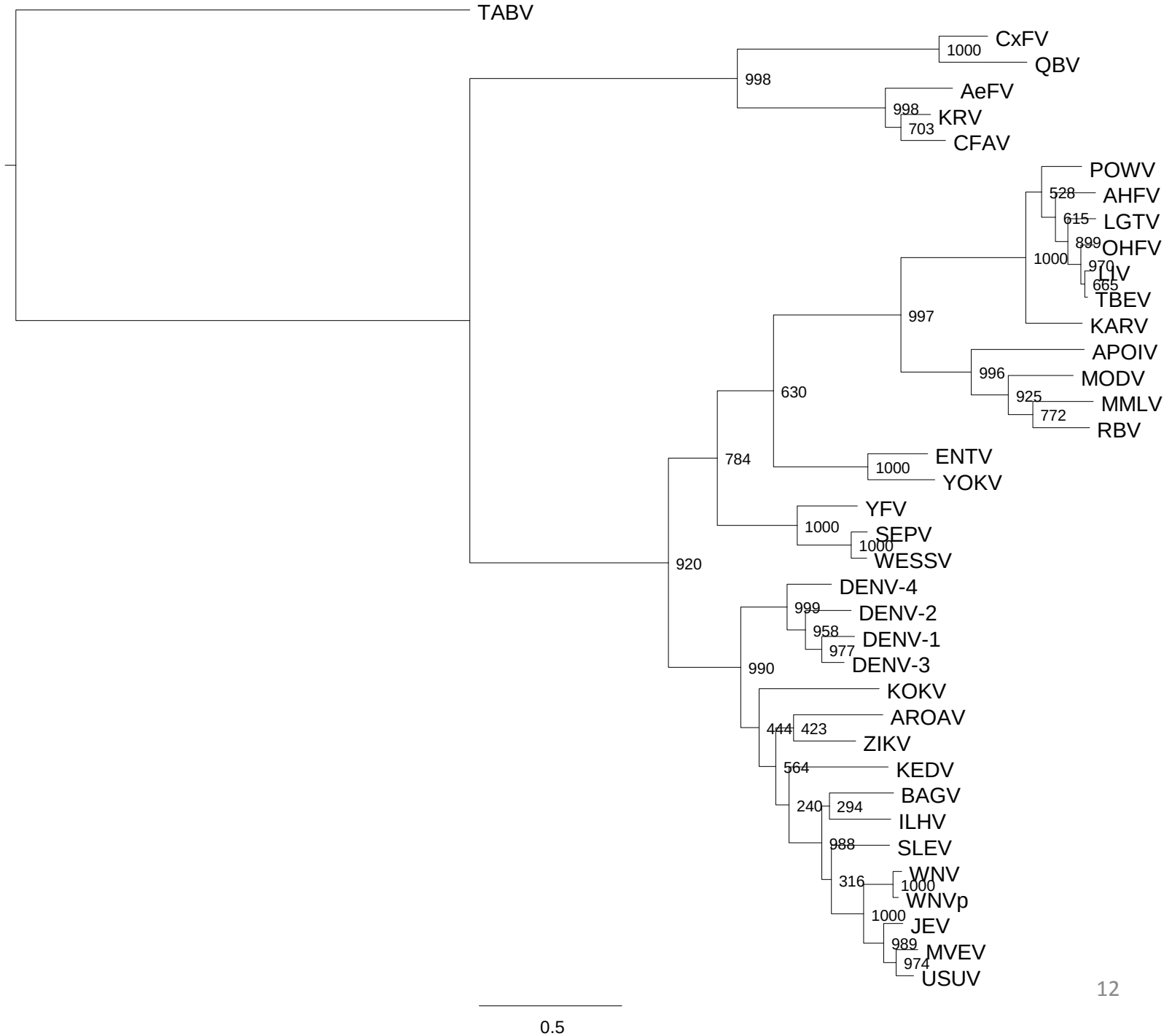
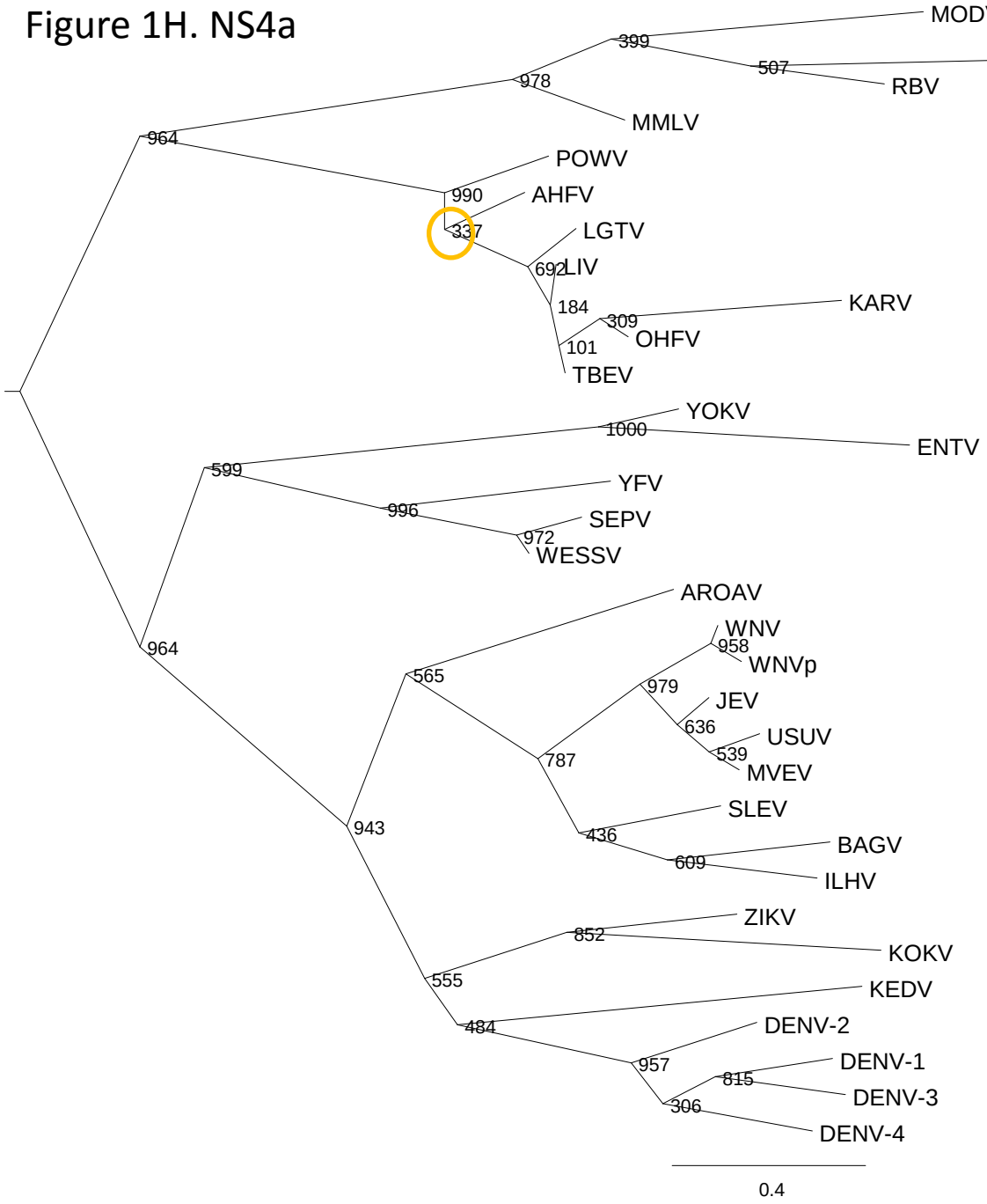


Figure 1H. NS4a



This tree is displayed using an alternative style due to the circled branch, for AHFV. This branch looks unresolved in the traditional style (below) but in the alternative style we can see that it is resolved.

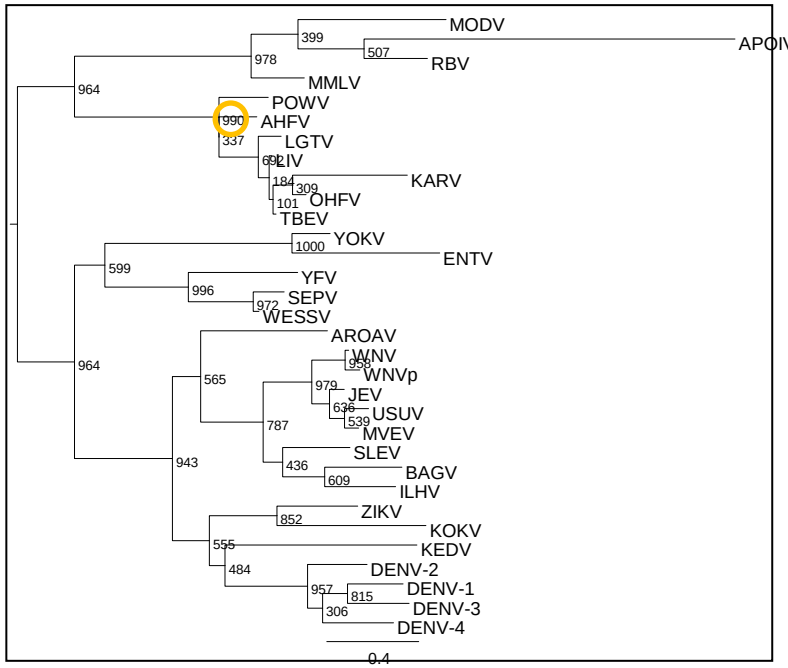


Figure 1I. NS4b

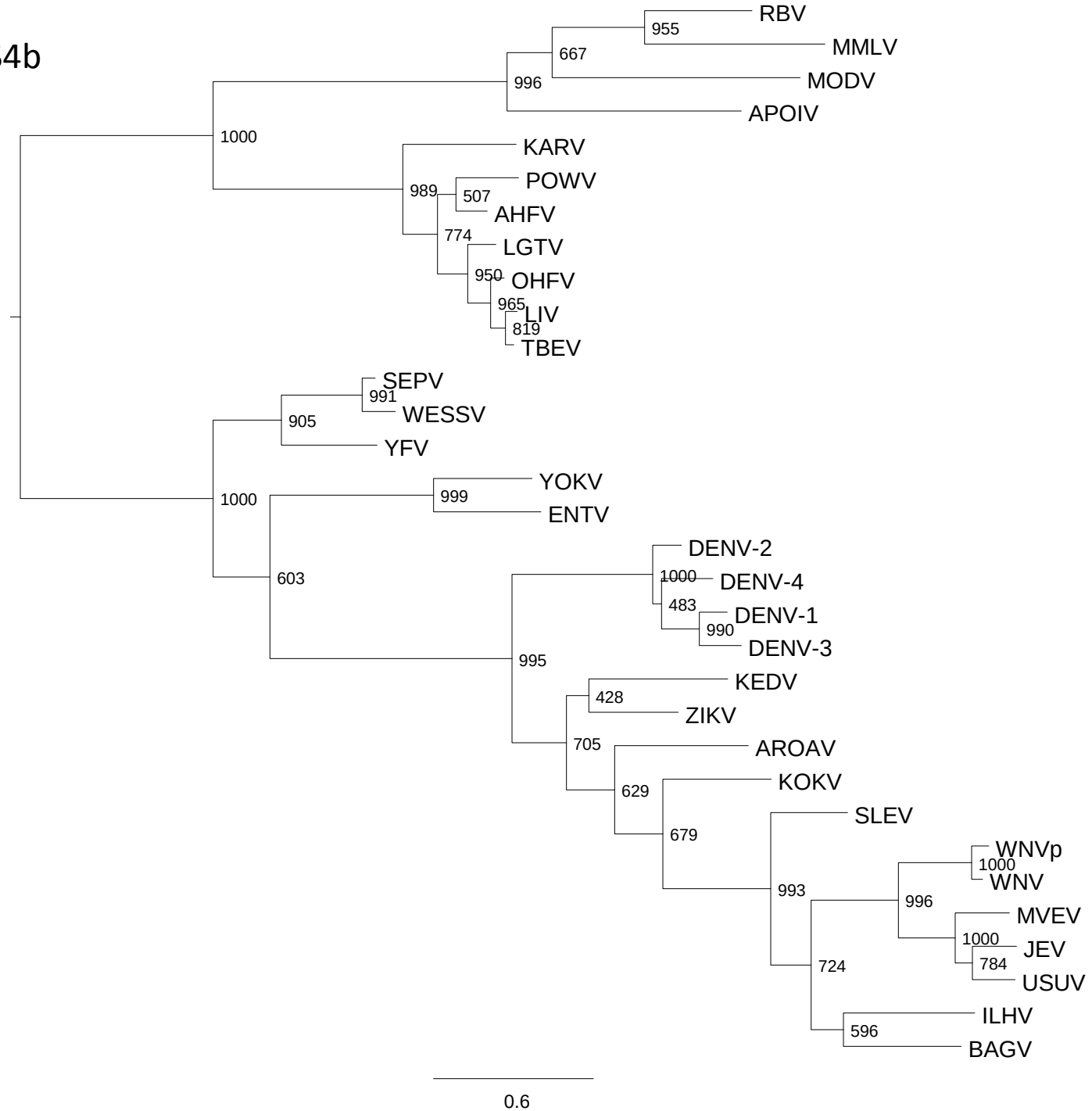


Figure 1J. NS5

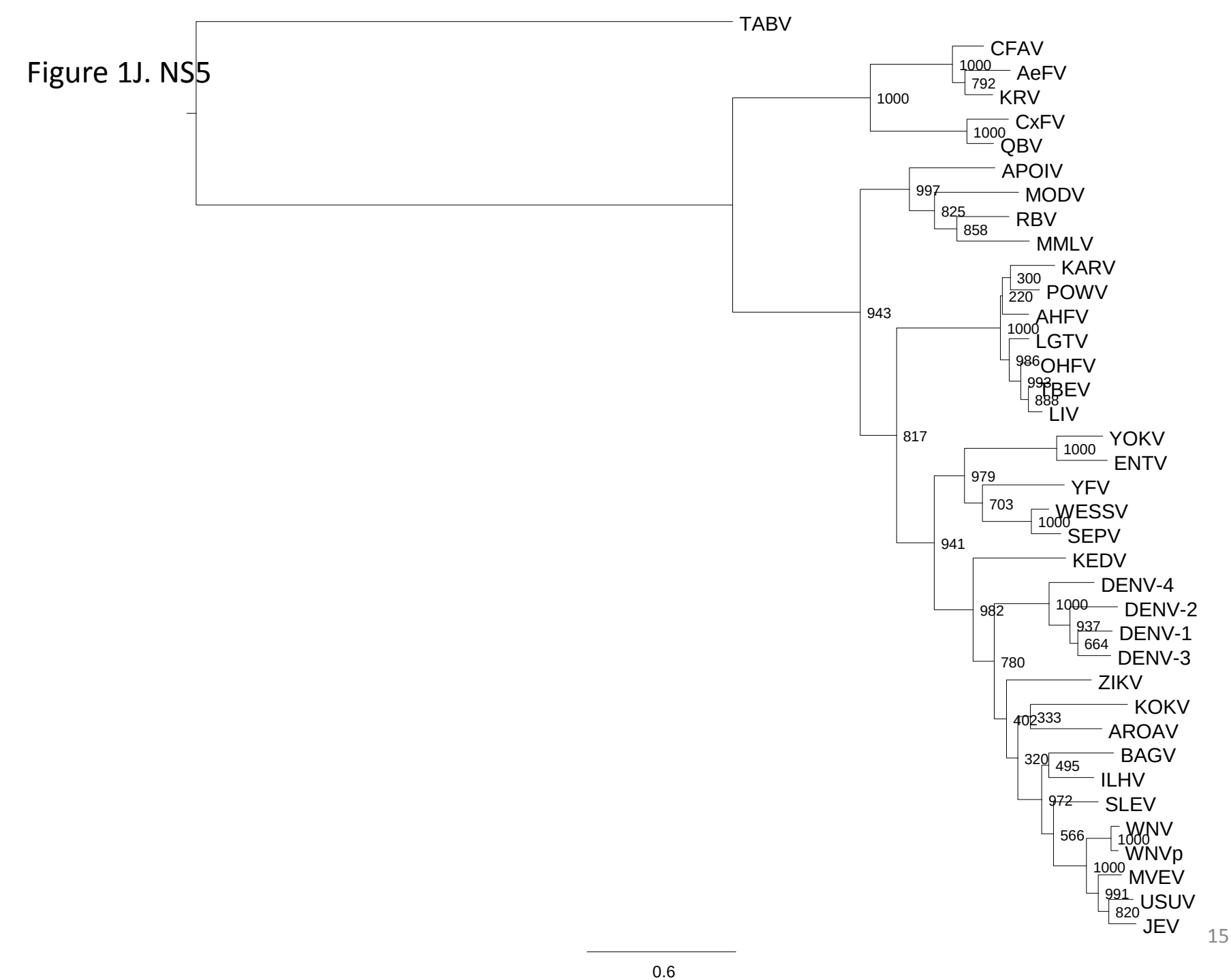
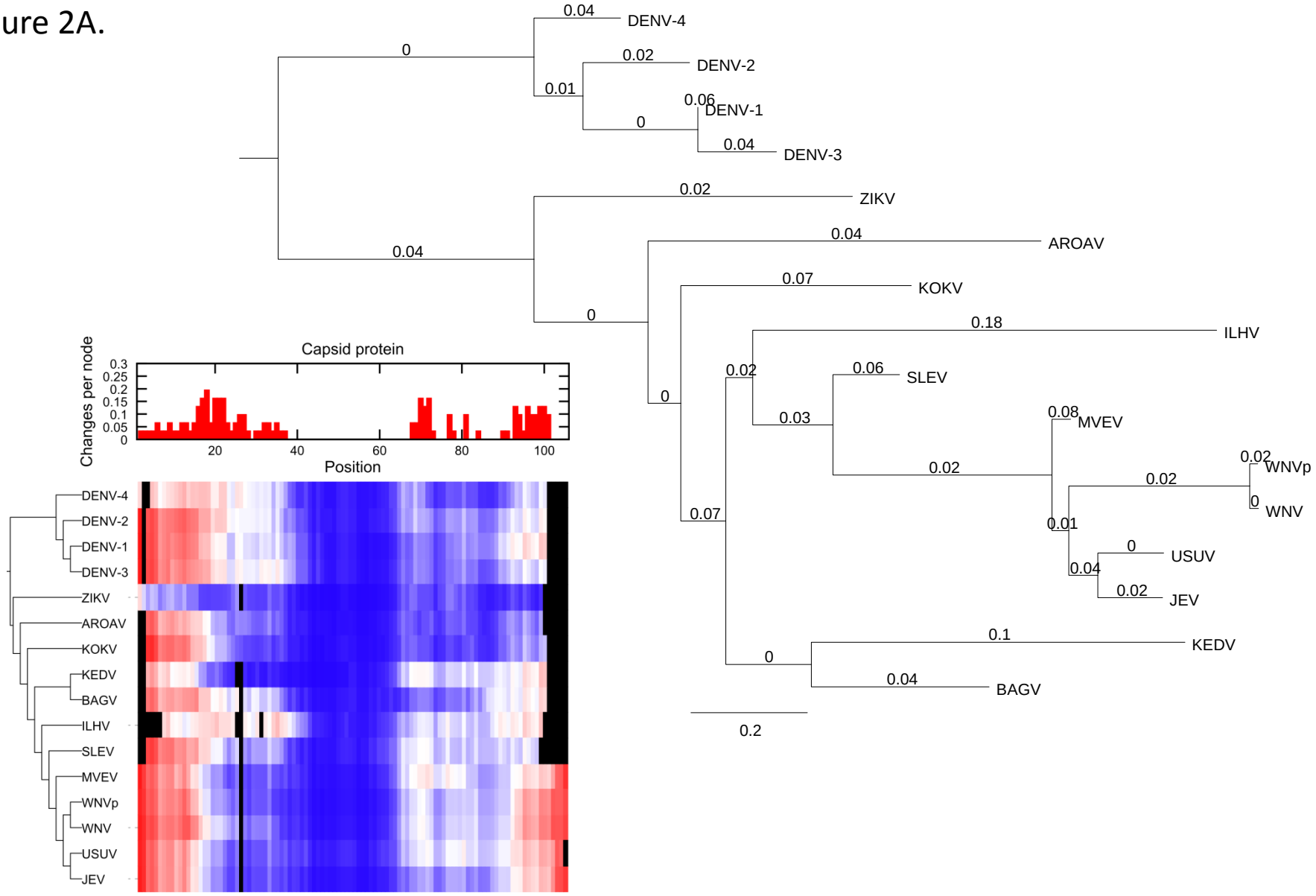


Figure 2.

The heatmap shows the continuous Iupred predictions. Dark blue means more ordered, light blue means less order, but not disorder. White is the 0.4 cutoff between order and disorder. Light pink means little disorder and red means more disorder. The sequences are shown according to where they fall in the phylogeny. Simplifying the continuous data in the heatmap to two discrete states: order and order, using the 0.4 cut off and analyzing the sites across the phylogeny using parsimony as implemented in GLOOME gives the disorder to order transition (DOT) per site and node in the bar graph on top of the heatmap. In the phylogenetic tree on the right, the numbers along the branches represents the fraction of sites with DOTs per branch using GLOOME. The branch lengths are scaled to represent sequence divergence.

Figure 2A.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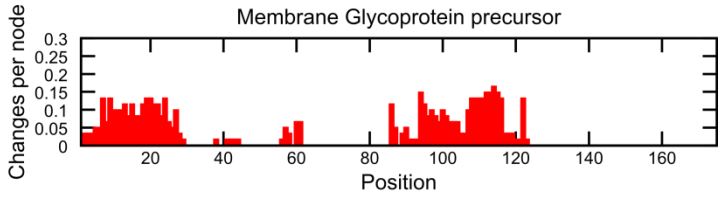
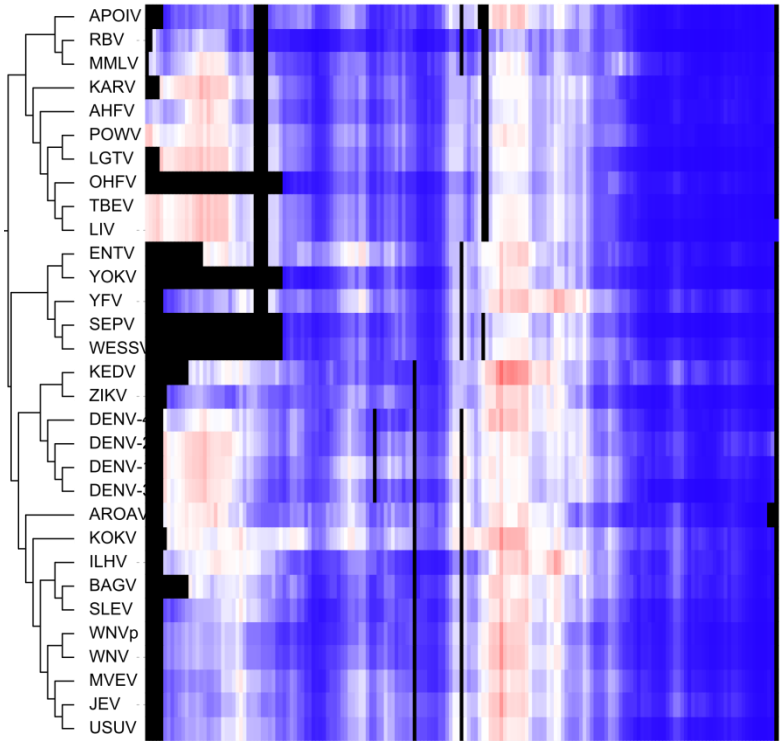
0.02
DENV-2
0.01
0.06
DENV-1
0
0.04
DENV-3
0.02
ZIKV
0.04
AROAV
0.04
0.07
KOKV
0
0.18
ILHV
0.02
0.06
SLEV
0
0.03
0.08
MVEV
0.02
0.02
WNVp
0.02
0
WNV
0.07
0.01
0
USUV
0.04
0.02
JEV
0.1
KEDV
0
0.04
BAGV
0.2
Capsid protein
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
Position
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
AROAV
KOKV
KEDV
BAGV
ILHV
SLEV
MVEV
WNVp
WNV
USUV
JEV

Figure 2B.


Membrane Glycoprotein precursor
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
120
140
160
Position


APOIV
RBV
MMLV
KARV
AHFV
POWV
LGTV
OHFV
TBEV
LIV
ENTV
YOKV
YFV
SEPV
WESSV
KEDV
ZIKV
DENV-4
DENV-2
DENV-1
DENV-3
AROAV
KOKV
ILHV
BAGV
SLEV
WNVp
WNV
MVEV
JEV
USUV

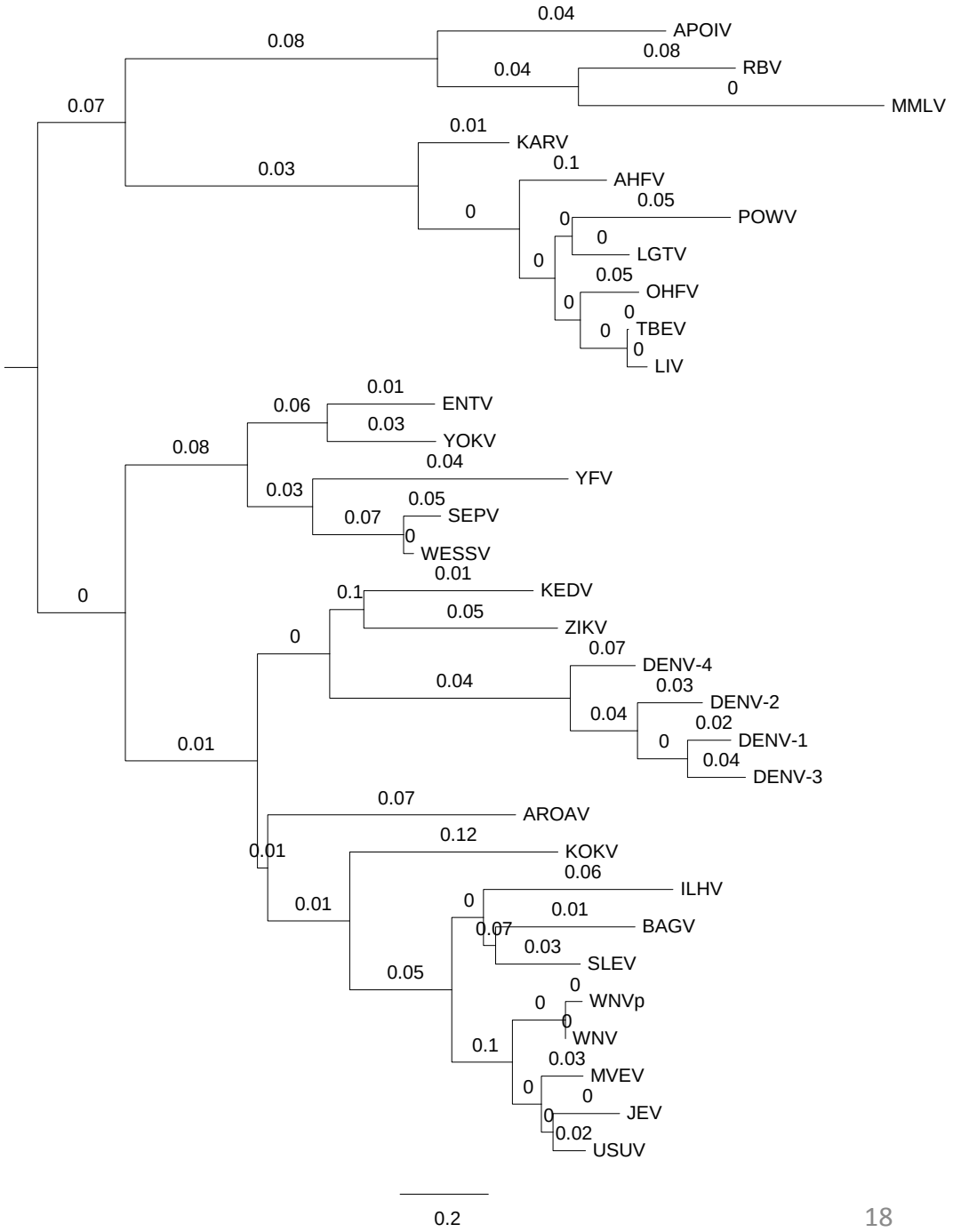

0.04
APOIV
0.08
0.08
RBV
0.04
0
MMLV
0.07
0.01
KARV
0.03
0.1
AHFV
0.05
POWV
0
0
LGTV
0
0.05
OHFV
0
0
TBEV
0
LIV
0.01
0.06
ENTV
0.03
YOKV
0.08
0.04
YFV
0.03
0.05
SEPV
0.07
0
WESSV
0.01
0
0.1
KEDV
0.05
ZIKV
0
0.07
DENV-4
0.04
0.03
DENV-2
0.04
0.02
DENV-1
0
0.04
DENV-3
0.01
0.07
AROAV
0.12
0.01
KOKV
0.06
ILHV
0.01
0
0.01
BAGV
0.07
0.03
SLEV
0.05
0
WNVp
0
0
WNV
0.1
0.03
MVEV
0
0
JEV
0
0.02
USUV
0.2

Figure 2C.

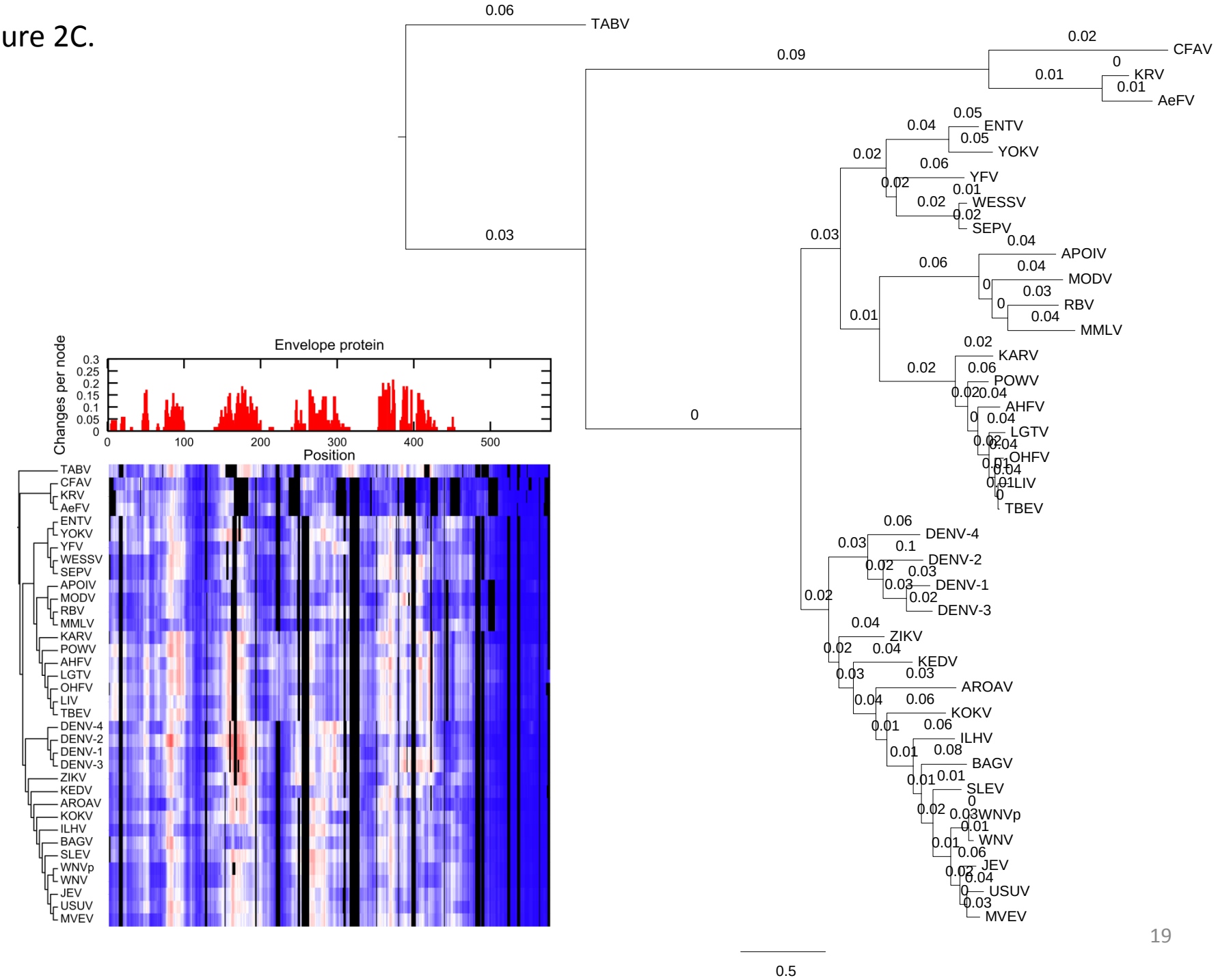

Envelope protein
Changes per node
Position
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
TABV
CFAV
KRV
AeFV
ENTV
YOKV
YFV
WESSV
SEPV
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
KEDV
AROAV
KOKV
ILHV
BAGV
SLEV
WNVp
WNV
JEV
USUV
MVEV
0.5

Figure 2D.

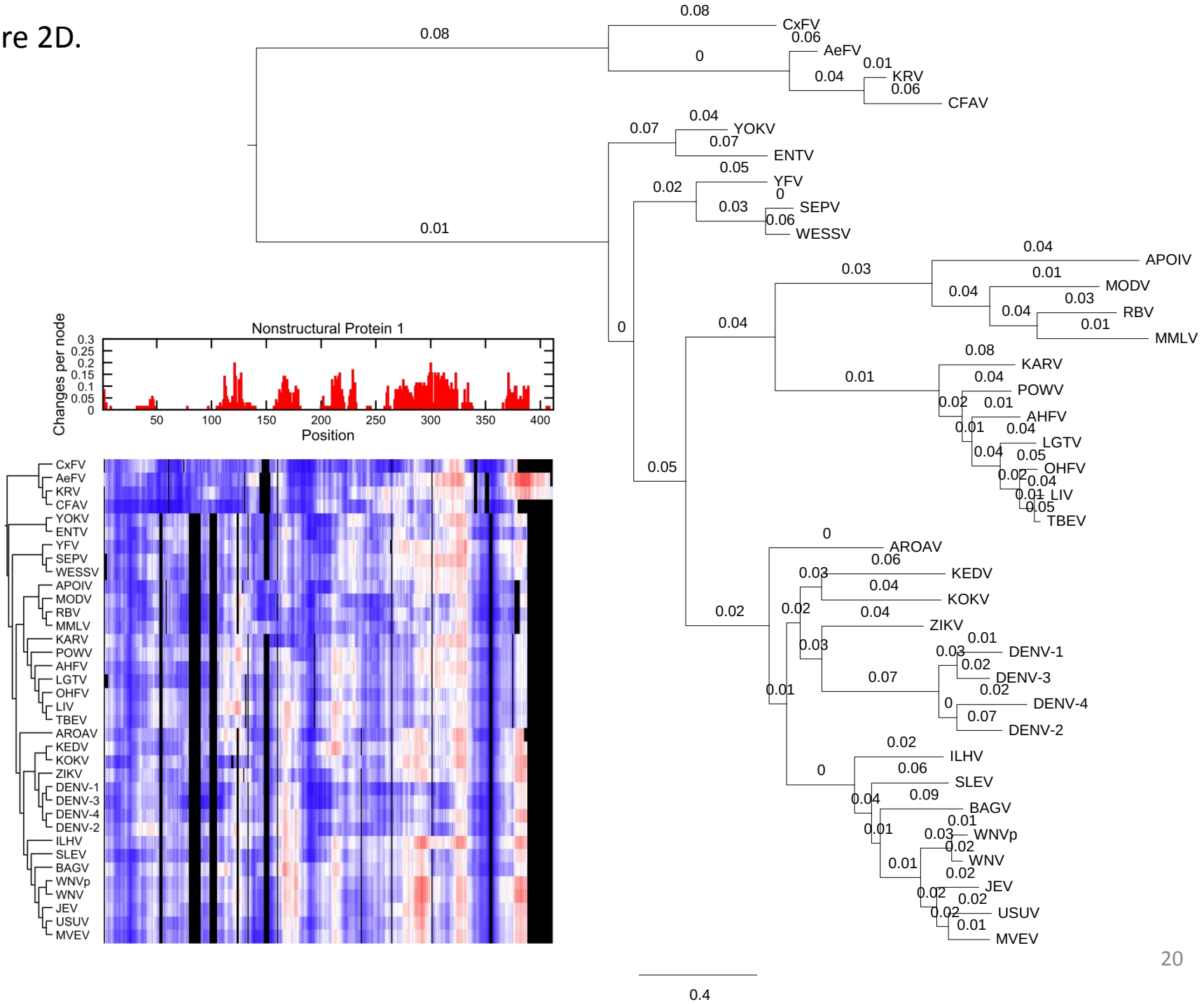

Nonstructural Protein 1
Changes per node
Position
CxFV
AeFV
KRV
CFAV
YOKV
ENTV
YFV
SEPV
WESSV
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
AROAV
KEDV
KOKV
ZIKV
DENV-1
DENV-3
DENV-4
DENV-2
ILHV
SLEV
BAGV
WNVp
WNV
JEV
USUV
MVEV
0.4

Figure 2E.

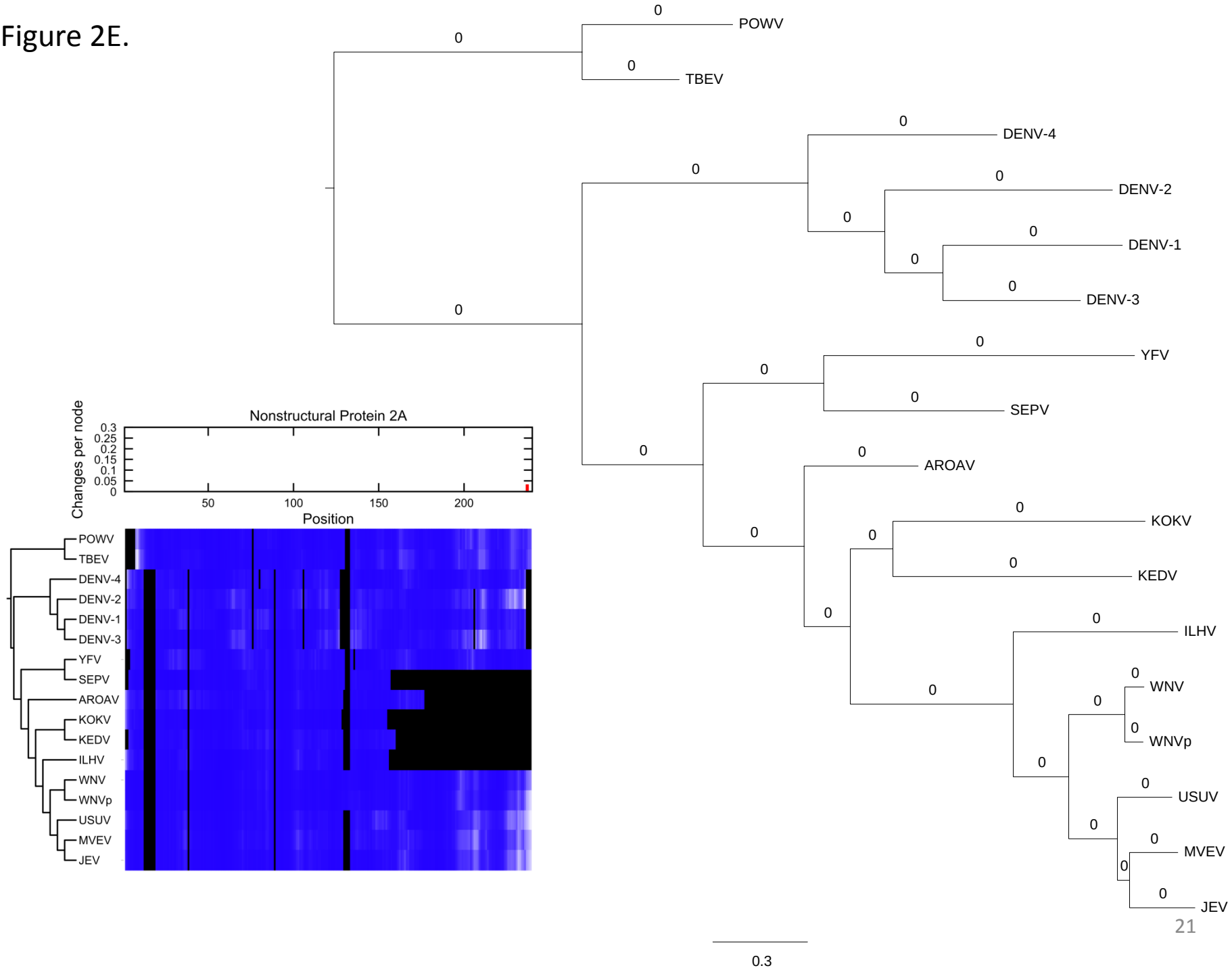

POWV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
YFV
SEPV
AROAV
KOKV
KEDV
ILHV
WNV
WNVp
USUV
MVEV
JEV
0.3
Nonstructural Protein 2A
Changes per node
Position
0.3
0.25
0.2
0.15
0.1
0.05
0
50
100
150
200

Figure 2F.

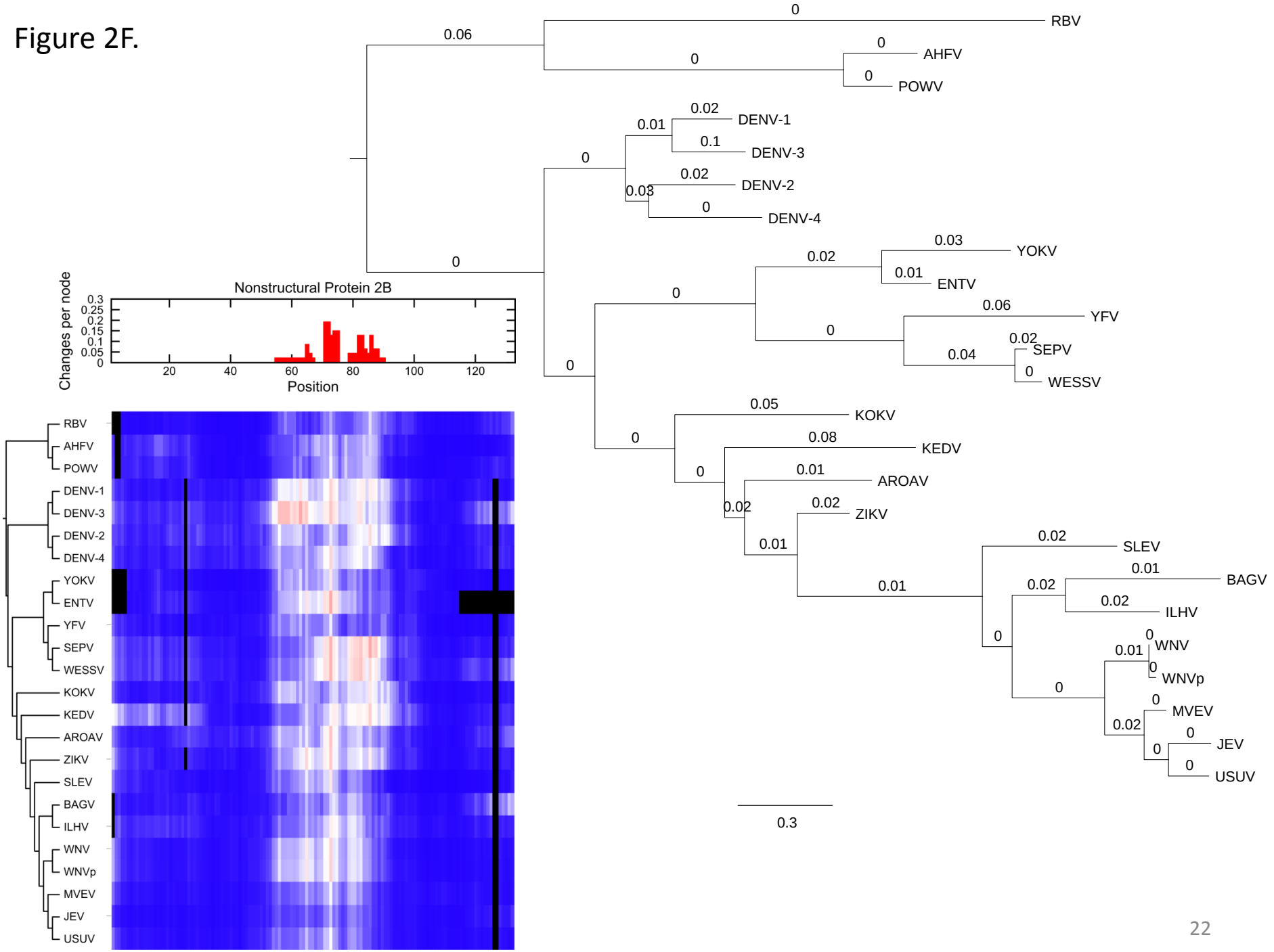

Nonstructural Protein 2B
Changes per node
Position
RBV
AHFV
POWV
DENV-1
DENV-3
DENV-2
DENV-4
YOKV
ENTV
YFV
SEPV
WESSV
KOKV
KEDV
AROAV
ZIKV
SLEV
BAGV
ILHV
WNV
WNVp
MVEV
JEV
USUV
0.3

Figure 2G.

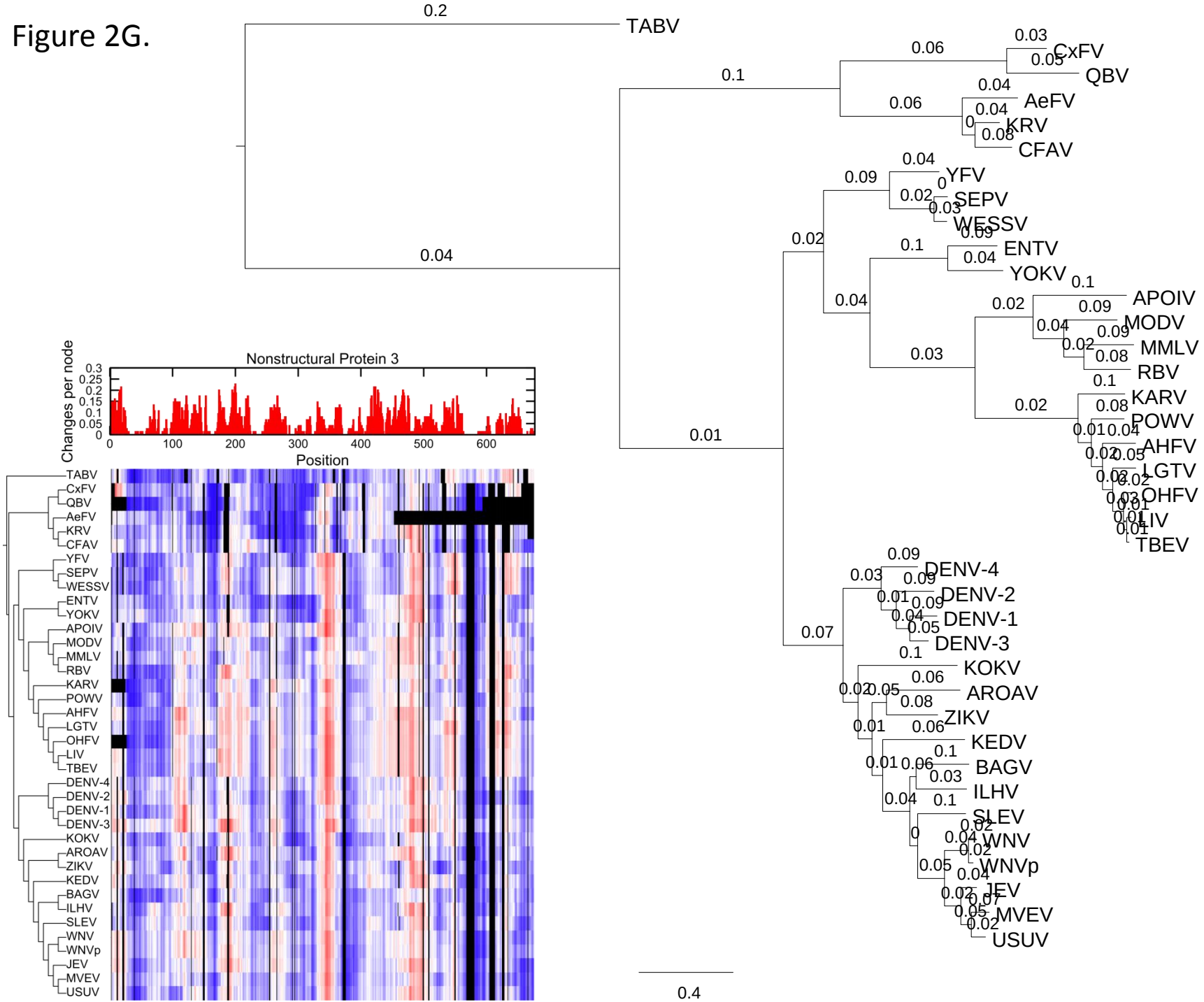
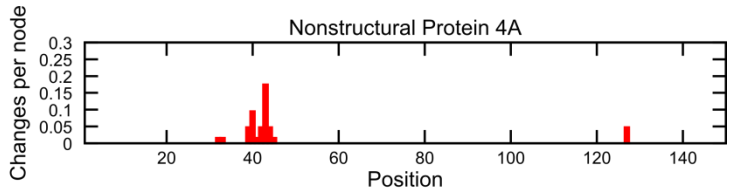
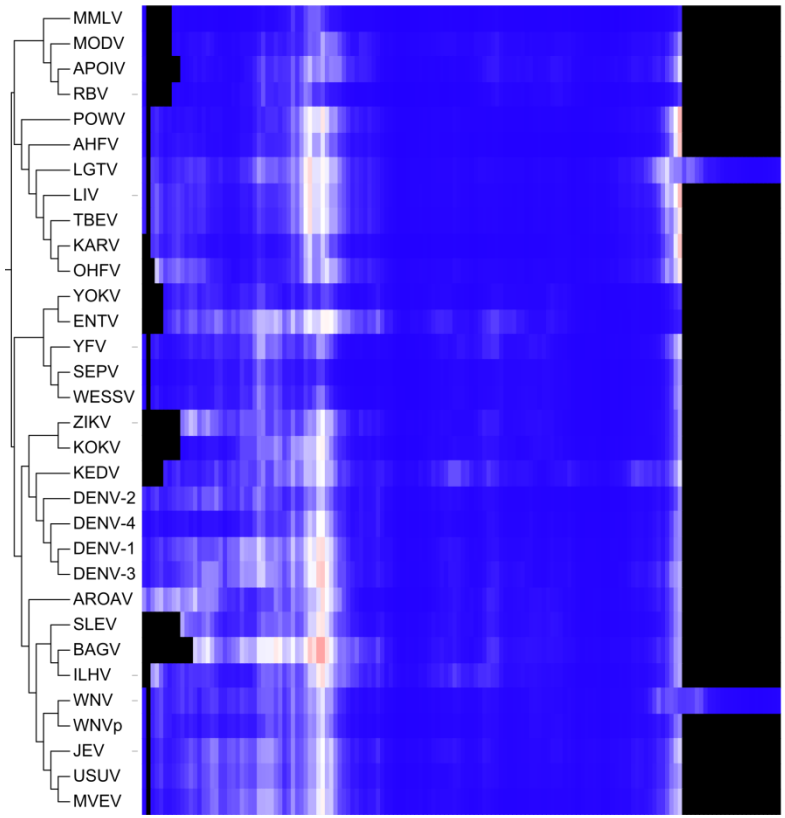

Nonstructural Protein 3
Changes per node
Position
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
TABV
CxFV
QBV
AeFV
KRV
CFAV
YFV
SEPV
WESSV
ENTV
YOKV
APOIV
MODV
MMLV
RBV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
KOKV
AROAV
ZIKV
KEDV
BAGV
ILHV
SLEV
WNV
WNVp
JEV
MVEV
USUV
0.2
0.04
0.1
0.01
0.07
0.4

Figure 2H.


Nonstructural Protein 4A
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
120
140
Position


MMLV
MODV
APOIV
RBV
POWV
AHFV
LGTV
LIV
TBEV
KARV
OHFV
YOKV
ENTV
YFV
SEPV
WESSV
ZIKV
KOKV
KEDV
DENV-2
DENV-4
DENV-1
DENV-3
AROAV
SLEV
BAGV
ILHV
WNV
WNVp
JEV
USUV
MVEV

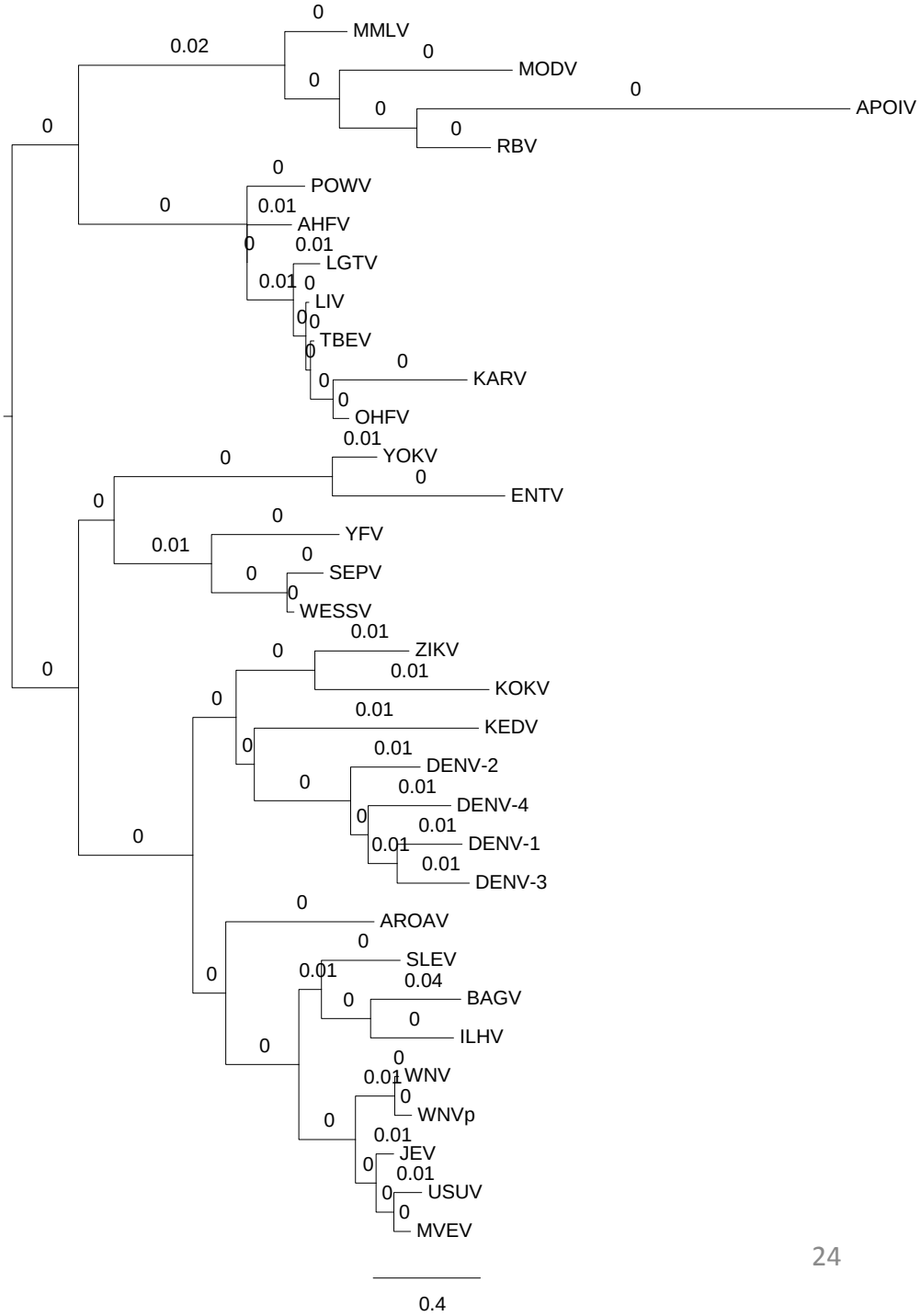

MMLV
MODV
APOIV
RBV
POWV
AHFV
LGTV
LIV
TBEV
KARV
OHFV
YOKV
ENTV
YFV
SEPV
WESSV
ZIKV
KOKV
KEDV
DENV-2
DENV-4
DENV-1
DENV-3
AROAV
SLEV
BAGV
ILHV
WNV
WNVp
JEV
USUV
MVEV
0.4

Figure 2I.

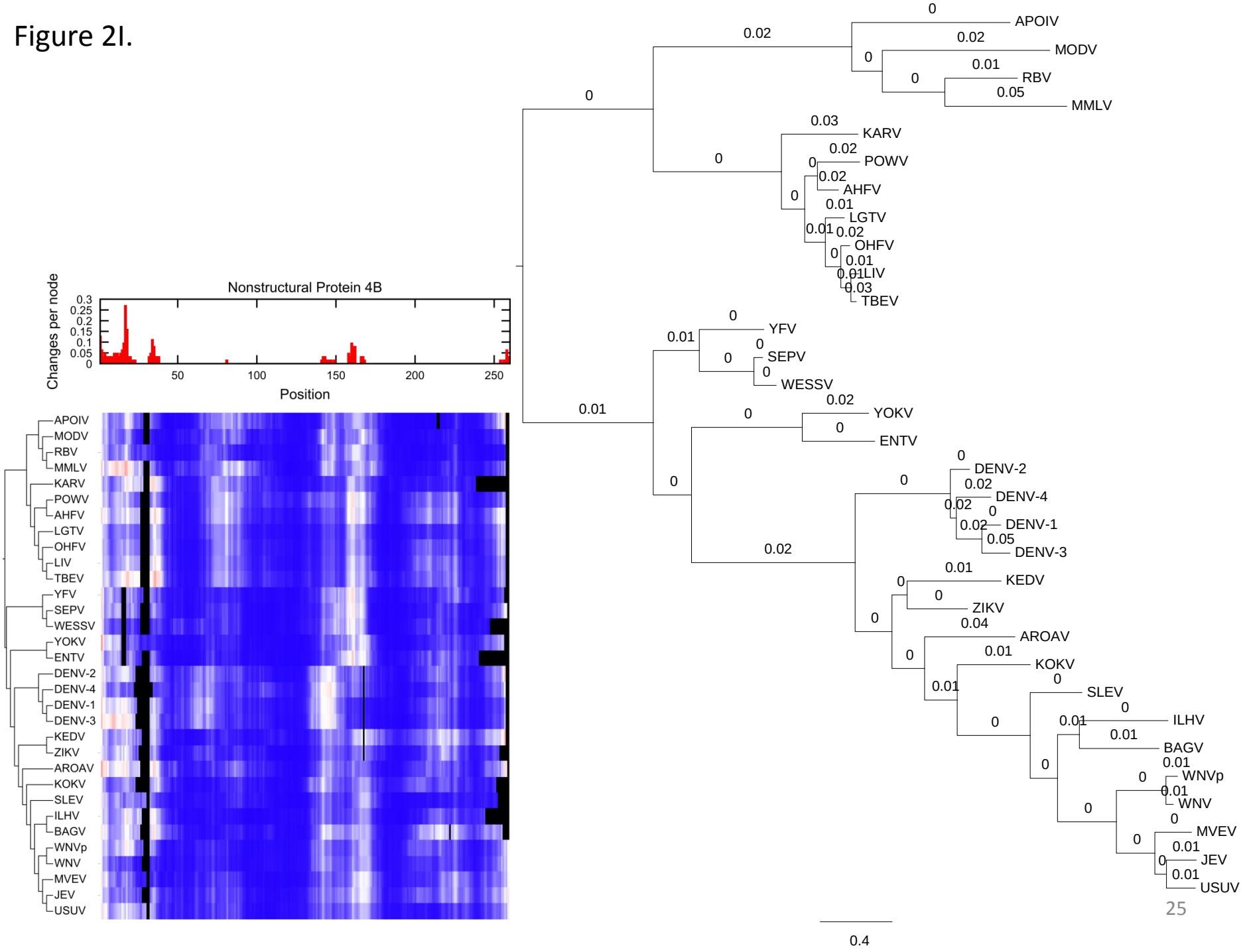

Nonstructural Protein 4B
Changes per node
Position
0.3
0.25
0.2
0.15
0.1
0.05
0
50
100
150
200
250
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
YFV
SEPV
WESSV
YOKV
ENTV
DENV-2
DENV-4
DENV-1
DENV-3
KEDV
ZIKV
AROAV
KOKV
SLEV
ILHV
BAGV
WNVp
WNV
MVEV
JEV
USUV
0.4

Figure 2J.

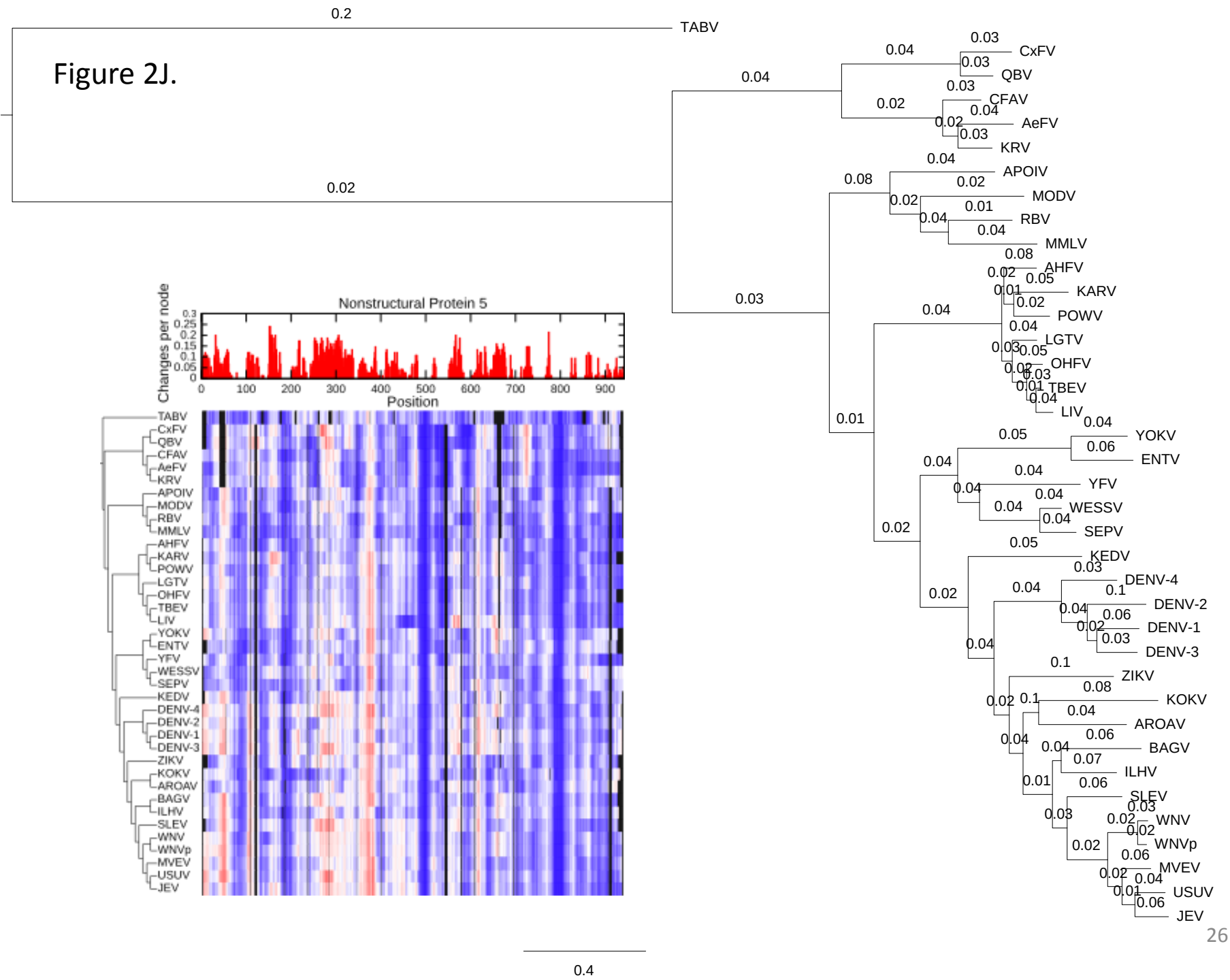
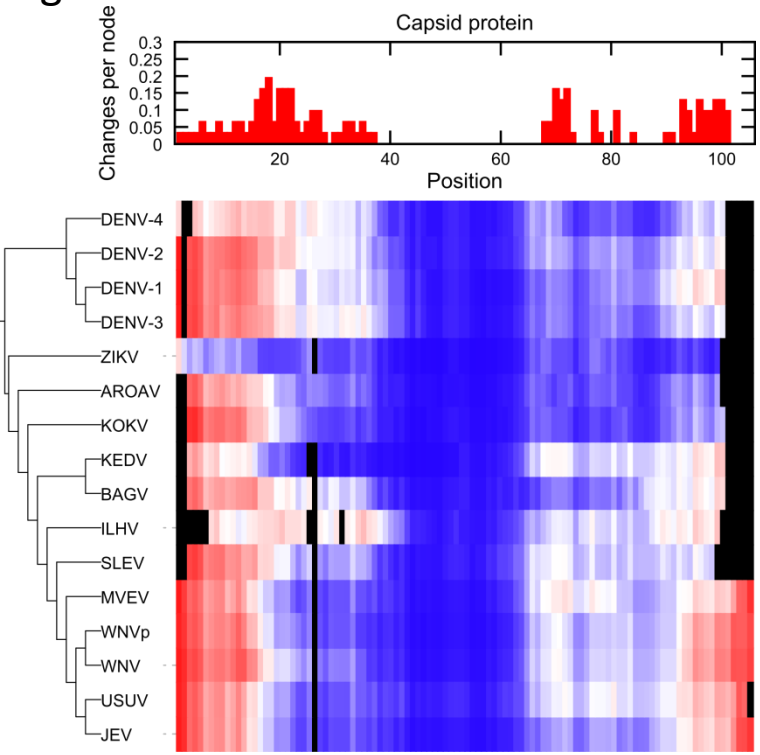
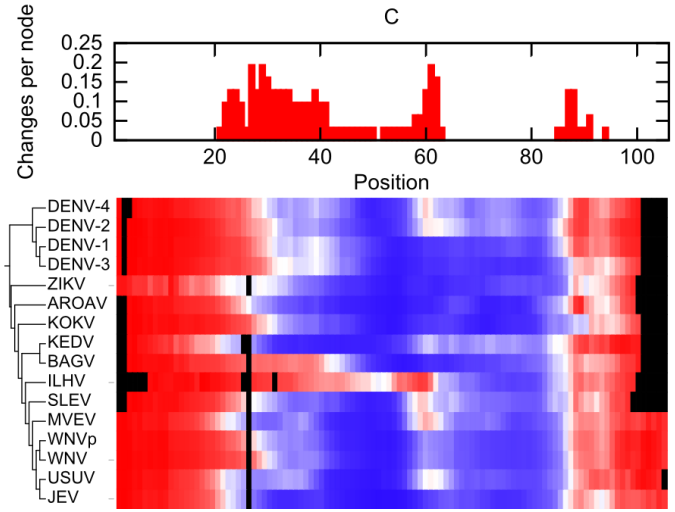

0.2
TABV
0.02
0.04
0.03
CxFV
QBV
CFAV
AeFV
KRV
0.02
APOIV
MODV
RBV
MMLV
0.08
AHFV
KARV
POWV
LGTV
OHFV
TBEV
LIV
0.01
YOKV
ENTV
YFV
WESSV
SEPV
KEDV
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
KOKV
AROAV
BAGV
ILHV
SLEV
WNV
WNVp
MVEV
USUV
JEV
Nonstructural Protein 5
Changes per node
Position
0.4

Figure 3.

The heatmap shows the continuous Iupred predictions. Dark blue means more ordered, light blue means less order, but not disorder. White is the 0.4 cutoff between order and disorder. Light pink means little disorder and red means more disorder. The sequences are shown according to where they fall in the phylogeny. Simplifying the continuous data in the heatmap to two discrete states: order and order, using the 0.4 cut off and analyzing the sites across the phylogeny using parsimony as implemented in GLOOME gives the disorder to order transition (DOT) per site and node in the bar graph on top of the heatmap. IUPred (left), PONDR-FIT (right), and the error associated with the meta predictor PONDR-FIT (bottom).

Figure 3A.


Capsid protein
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
Position
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
AROAV
KOKV
KEDV
BAGV
ILHV
SLEV
MVEV
WNVp
WNV
USUV
JEV


C
Changes per node
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
Position
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
AROAV
KOKV
KEDV
BAGV
ILHV
SLEV
MVEV
WNVp
WNV
USUV
JEV

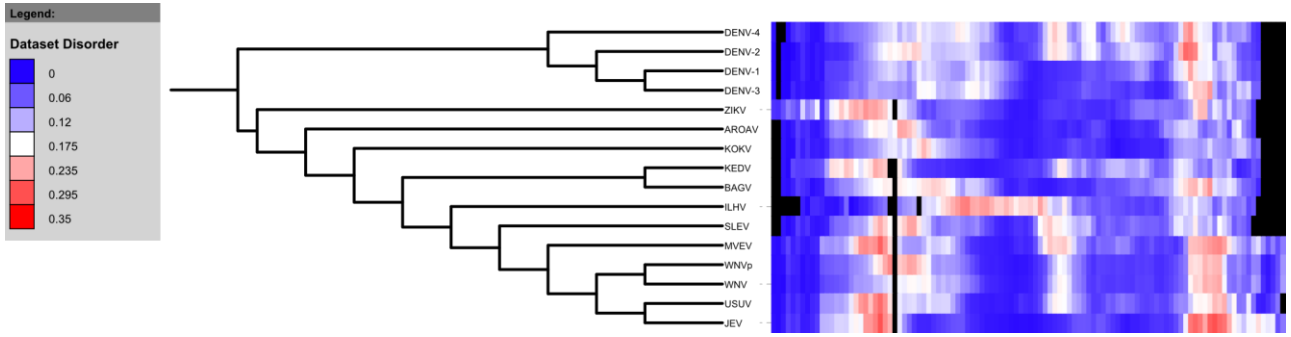
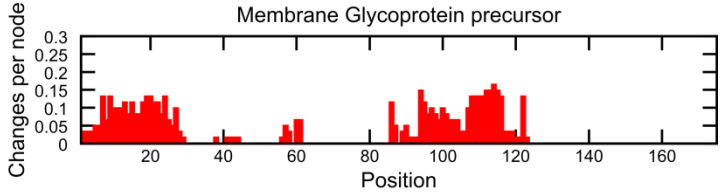
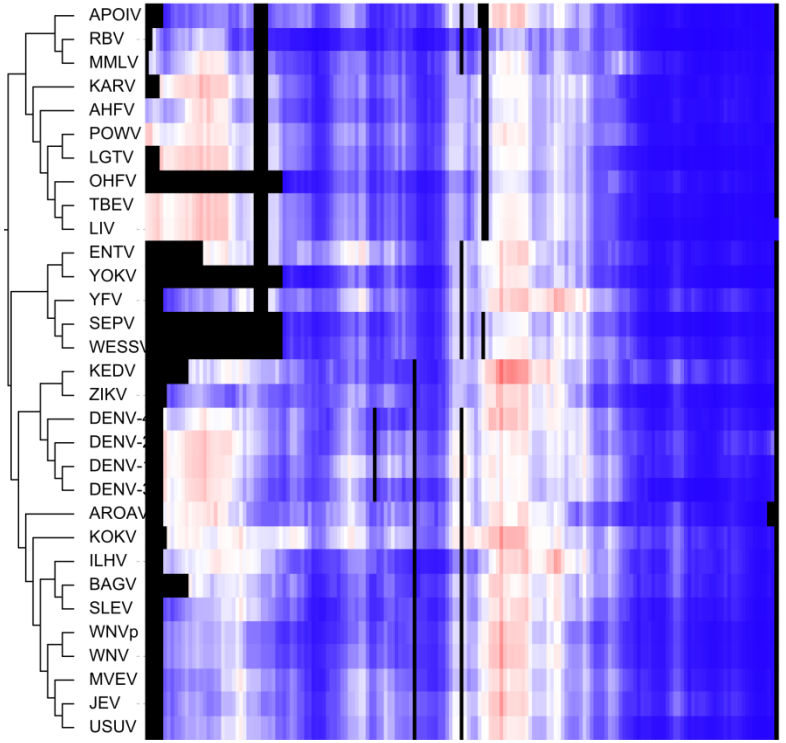
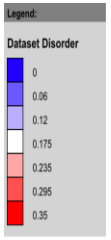
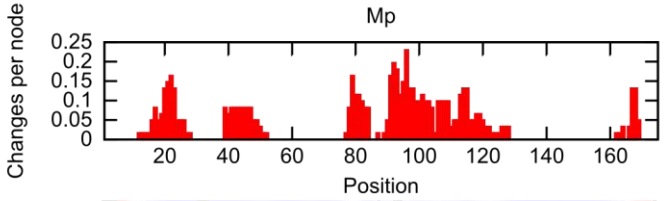

Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
AROAV
KOKV
KEDV
BAGV
ILHV
SLEV
MVEV
WNVp
WNV
USUV
JEV

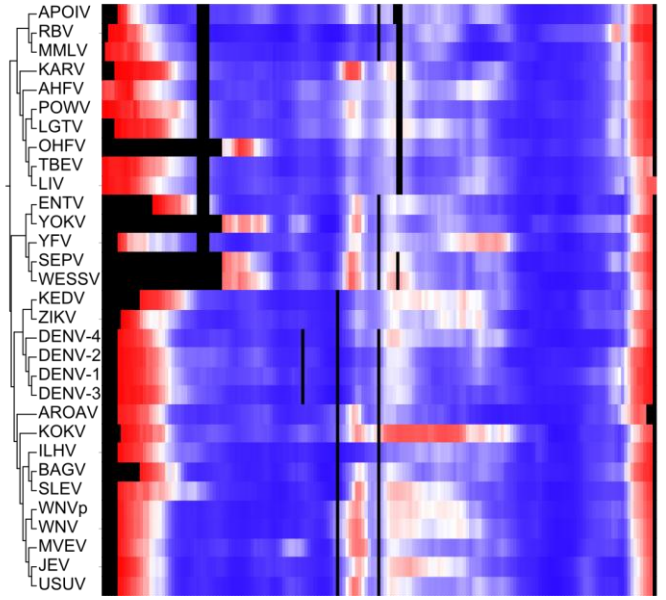
Figure 3B.


Membrane Glycoprotein precursor
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
120
140
160
Position


APOIV
RBV
MMLV
KARV
AHFV
POWV
LGTV
OHFV
TBEV
LIV
ENTV
YOKV
YFV
SEPV
WESSV
KEDV
ZIKV
DENV-4
DENV-2
DENV-1
DENV-3
AROAV
KOKV
ILHV
BAGV
SLEV
WNVp
WNV
MVEV
JEV
USUV


Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35


Mp
Changes per node
0.25
0.2
0.15
0.1
0.05
0
20
40
60
80
100
120
140
160
Position


APOIV
RBV
MMLV
KARV
AHFV
POWV
LGTV
OHFV
TBEV
LIV
ENTV
YOKV
YFV
SEPV
WESSV
KEDV
ZIKV
DENV-4
DENV-2
DENV-1
DENV-3
AROAV
KOKV
ILHV
BAGV
SLEV
WNVp
WNV
MVEV
JEV
USUV

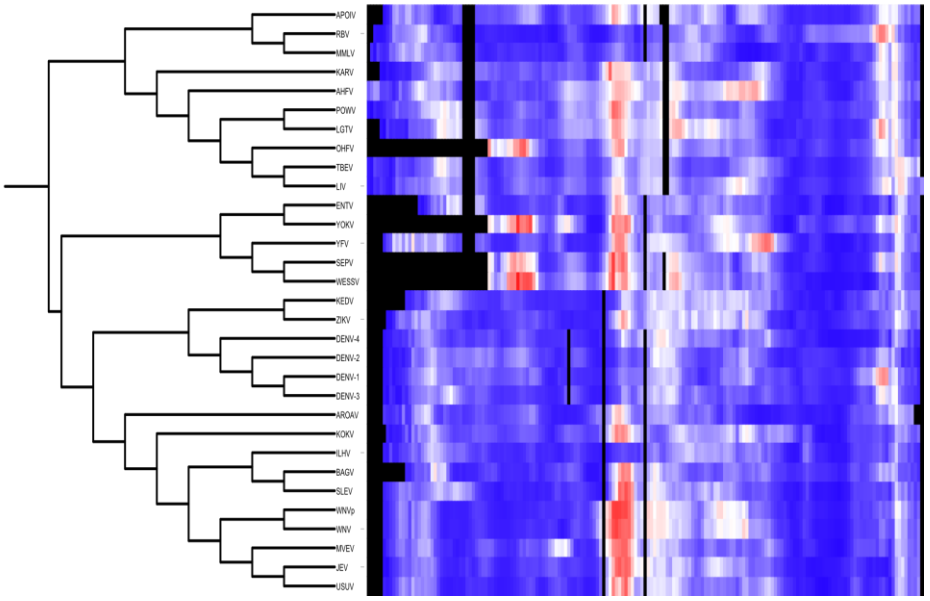
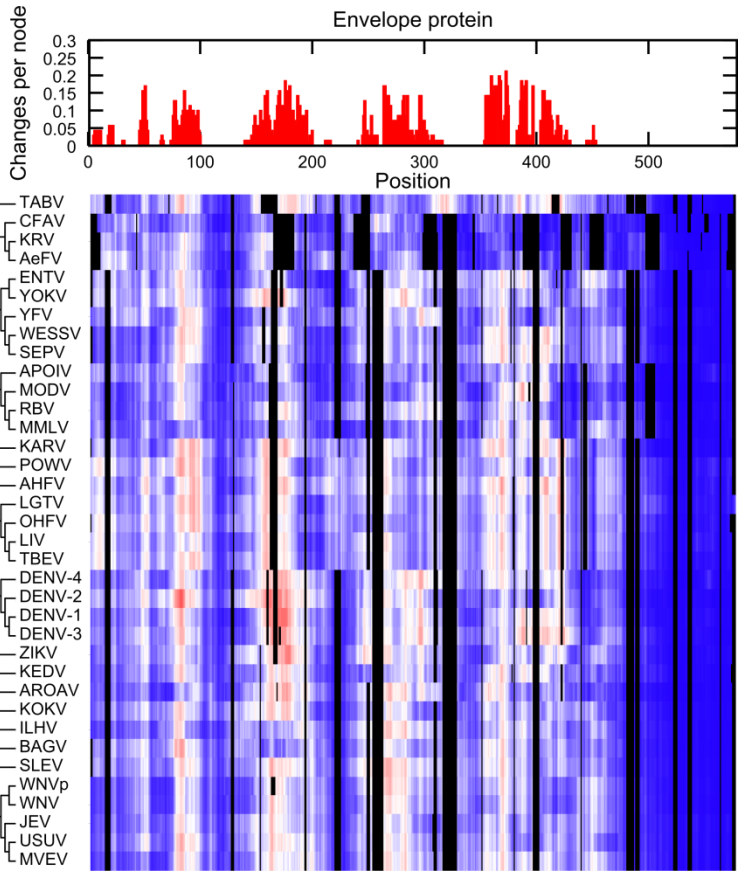
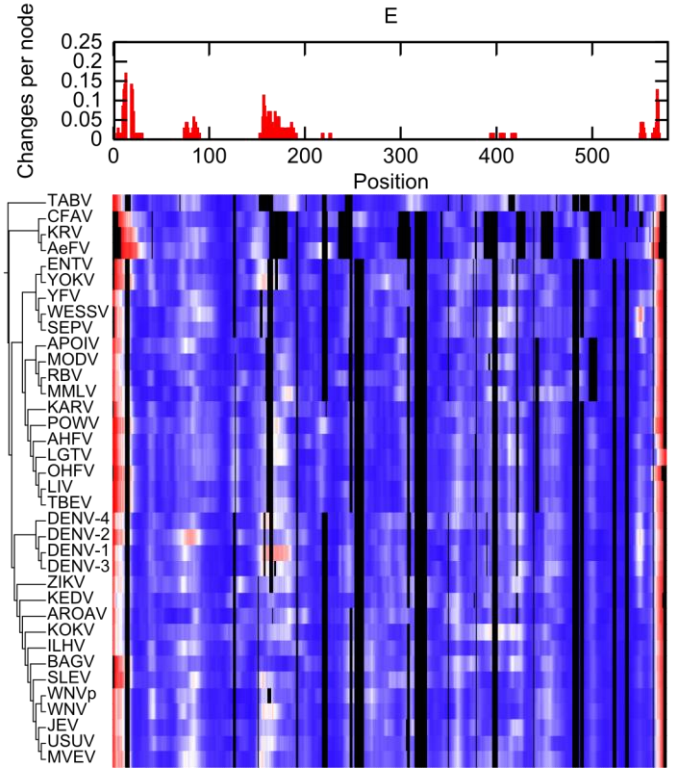


Figure 3C.


Envelope protein
Changes per node
Position
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
TABV
CFAV
KRV
AeFV
ENTV
YOKV
YFV
WESSV
SEPV
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
KEDV
AROAV
KOKV
ILHV
BAGV
SLEV
WNVp
WNV
JEV
USUV
MVEV


E
Changes per node
Position
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
TABV
CFAV
KRV
AeFV
ENTV
YOKV
YFV
WESSV
SEPV
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
KEDV
AROAV
KOKV
ILHV
BAGV
SLEV
WNVp
WNV
JEV
USUV
MVEV

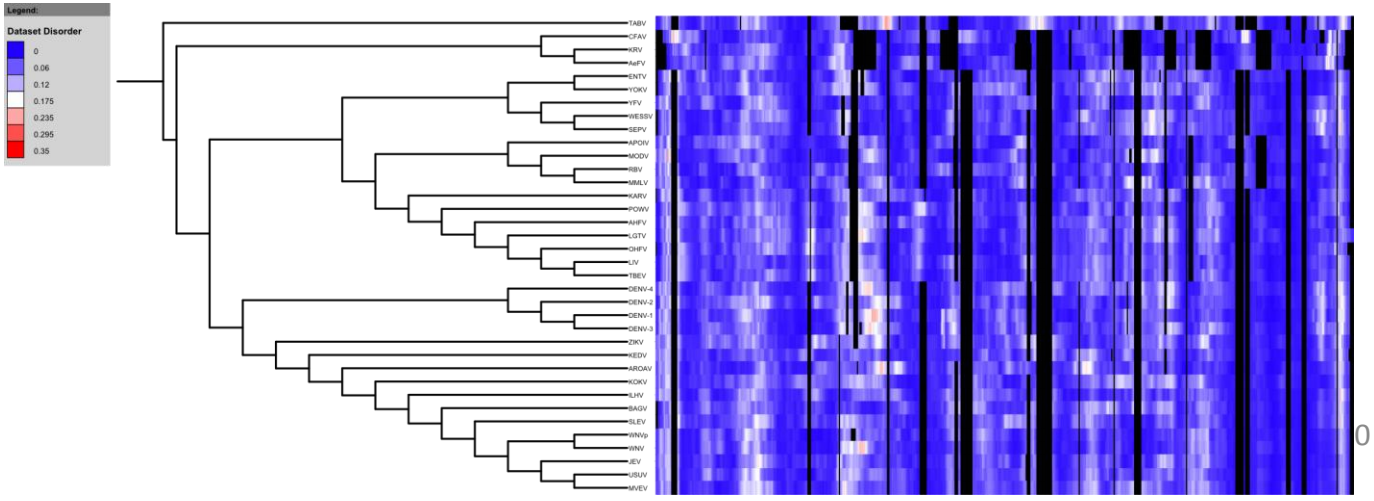

Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35

Figure 3D.

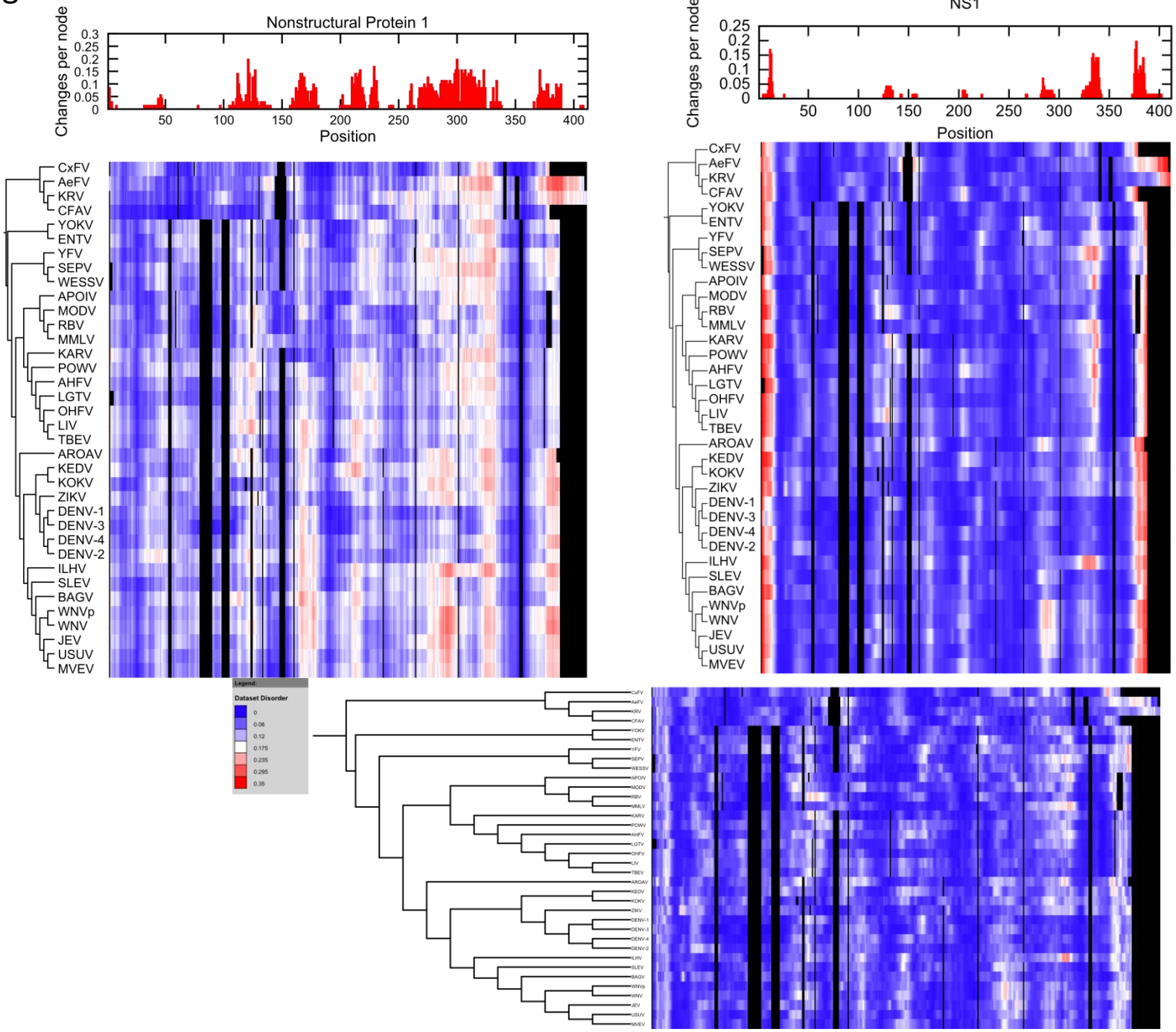
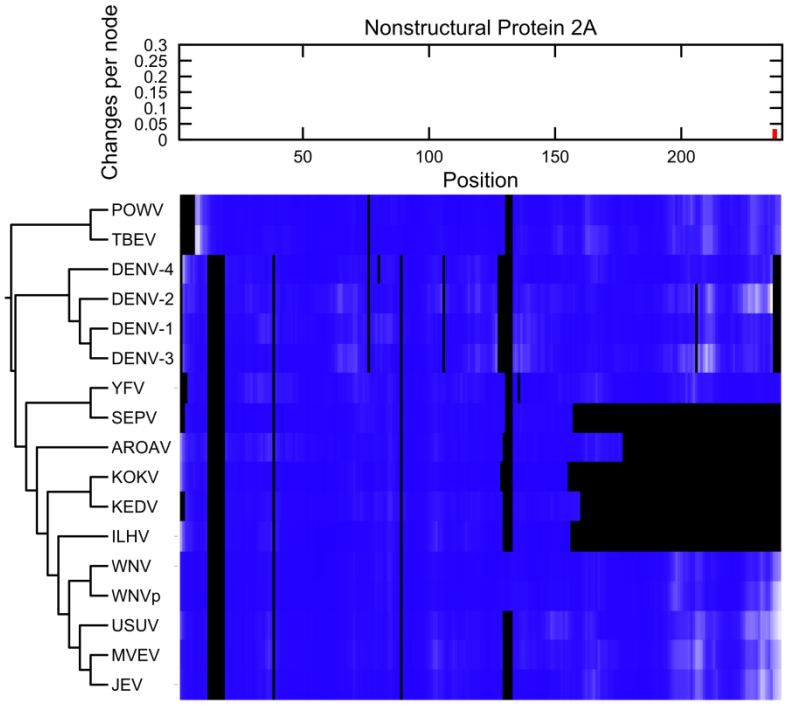
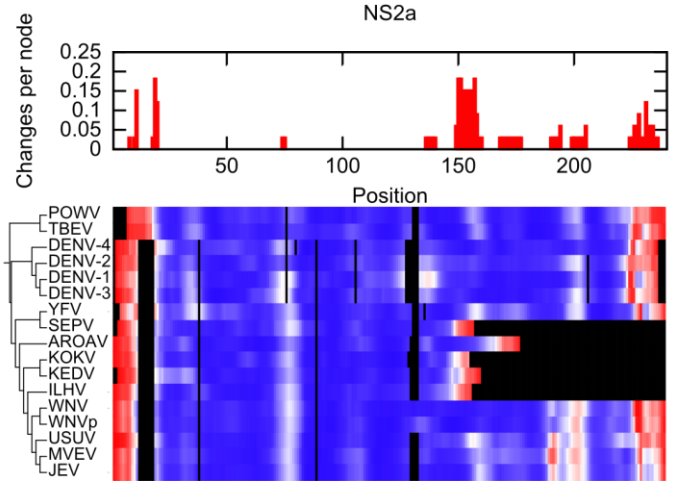

Nonstructural Protein 1
Changes per node
Position
NS1
Changes per node
Position
CxFV
AeFV
KRV
CFAV
YOKV
ENTV
YFV
SEPV
WESSV
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
AROAV
KEDV
KOKV
ZIKV
DENV-1
DENV-3
DENV-4
DENV-2
ILHV
SLEV
BAGV
WNVp
WNV
JEV
USUV
MVEV
Legend:
Dataset Disorder

Figure 3E.


Nonstructural Protein 2A
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
50
100
150
200
Position
POWV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
YFV
SEPV
AROAV
KOKV
KEDV
ILHV
WNV
WNVp
USUV
MVEV
JEV


NS2a
Changes per node
0.25
0.2
0.15
0.1
0.05
0
50
100
150
200
Position
POWV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
YFV
SEPV
AROAV
KOKV
KEDV
ILHV
WNV
WNVp
USUV
MVEV
JEV

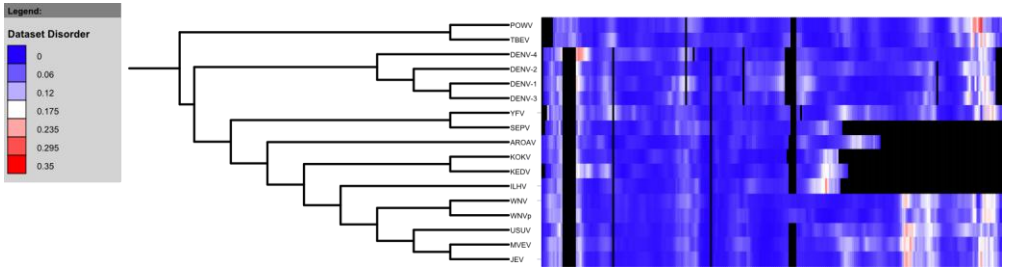
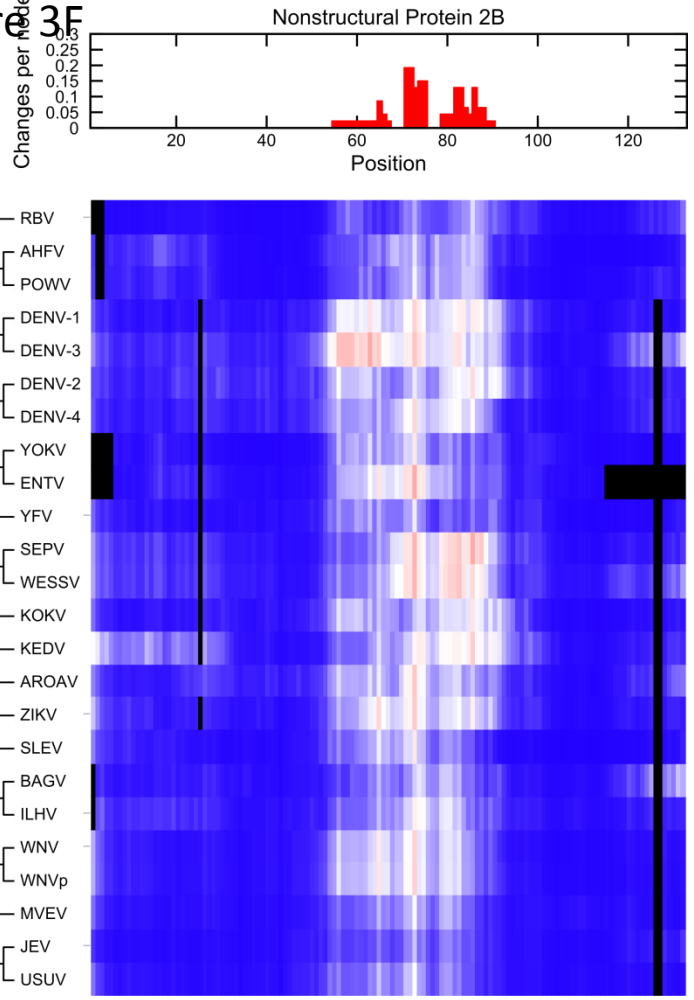
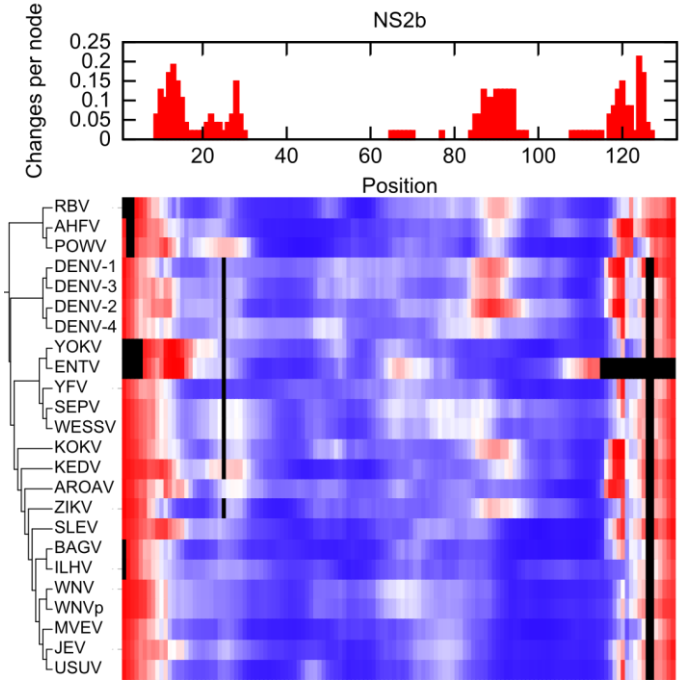

Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35

Figure 3F


Nonstructural Protein 2B
Changes per node
Position
RBV
AHFV
POWV
DENV-1
DENV-3
DENV-2
DENV-4
YOKV
ENTV
YFV
SEPV
WESSV
KOKV
KEDV
AROAV
ZIKV
SLEV
BAGV
ILHV
WNV
WNVp
MVEV
JEV
USUV


NS2b
Changes per node
Position
RBV
AHFV
POWV
DENV-1
DENV-3
DENV-2
DENV-4
YOKV
ENTV
YFV
SEPV
WESSV
KOKV
KEDV
AROAV
ZIKV
SLEV
BAGV
ILHV
WNV
WNVp
MVEV
JEV
USUV

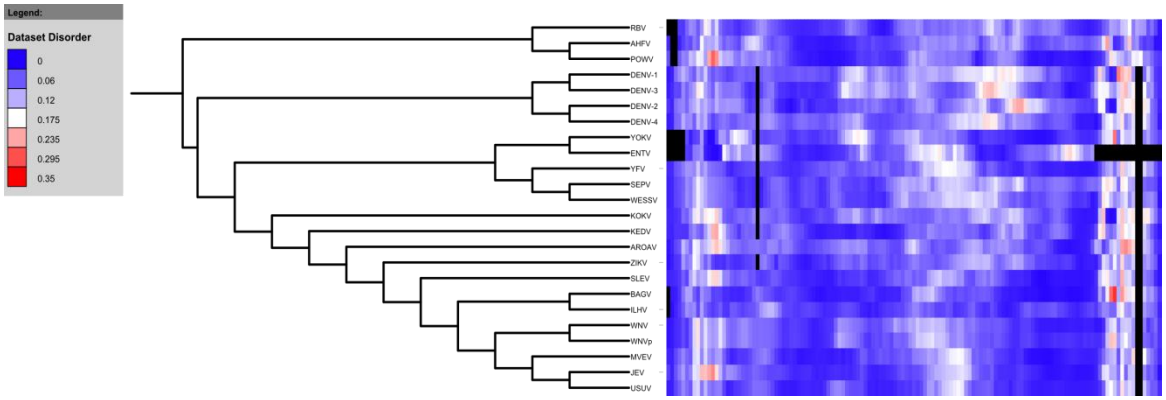
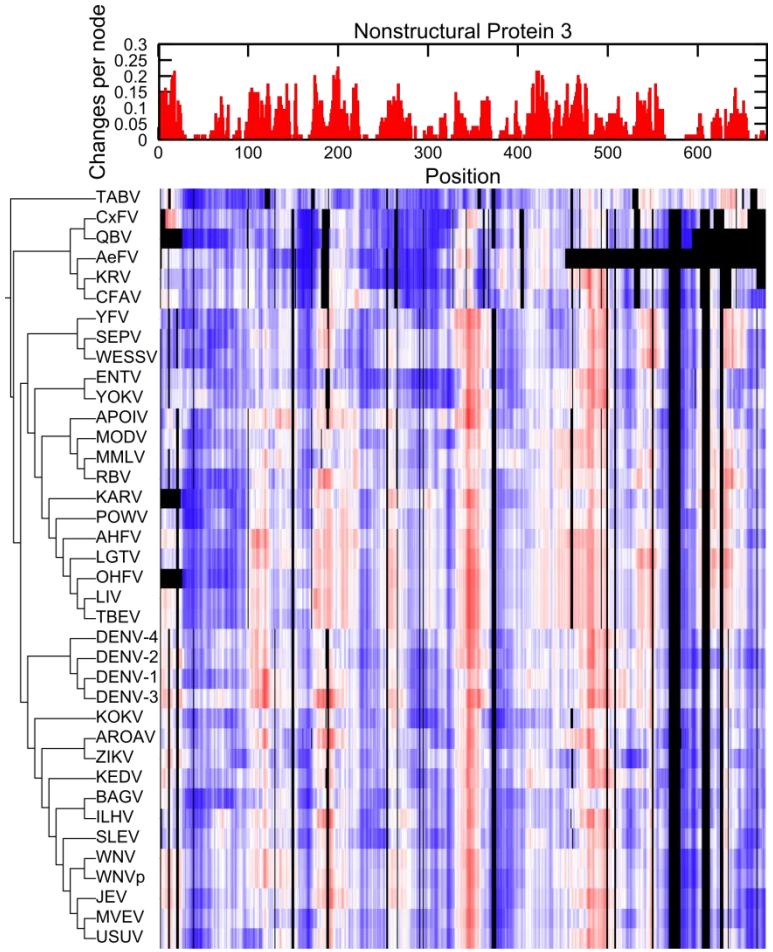
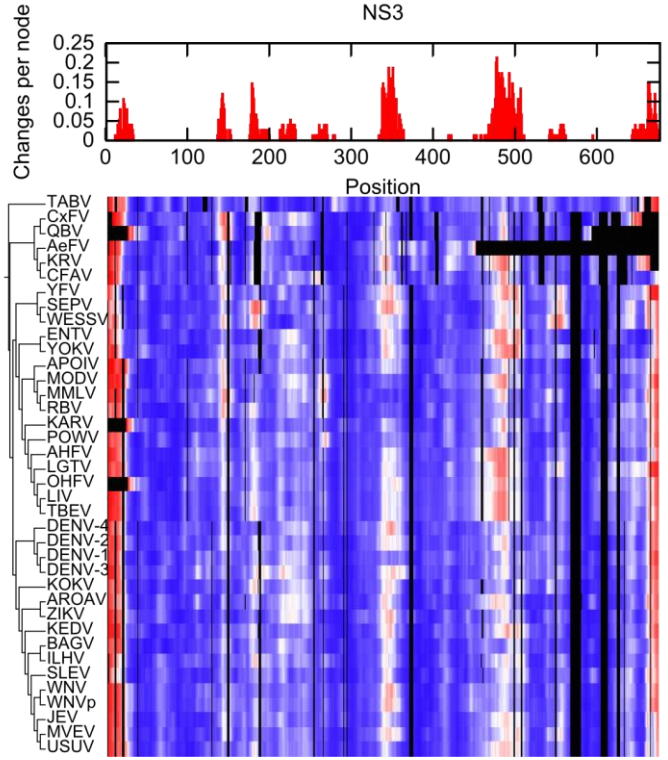

Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35

Figure 3G.


Nonstructural Protein 3
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
Position
TABV
CxFV
QBV
AeFV
KRV
CFAV
YFV
SEPV
WESSV
ENTV
YOKV
APOIV
MODV
MMLV
RBV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
KOKV
AROAV
ZIKV
KEDV
BAGV
ILHV
SLEV
WNV
WNVp
JEV
MVEV
USUV


NS3
Changes per node
0.25
0.2
0.15
0.1
0.05
0
0
100
200
300
400
500
600
Position
TABV
CxFV
QBV
AeFV
KRV
CFAV
YFV
SEPV
WESSV
ENTV
YOKV
APOIV
MODV
MMLV
RBV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
DENV-4
DENV-2
DENV-1
DENV-3
KOKV
AROAV
ZIKV
KEDV
BAGV
ILHV
SLEV
WNV
WNVp
JEV
MVEV
USUV

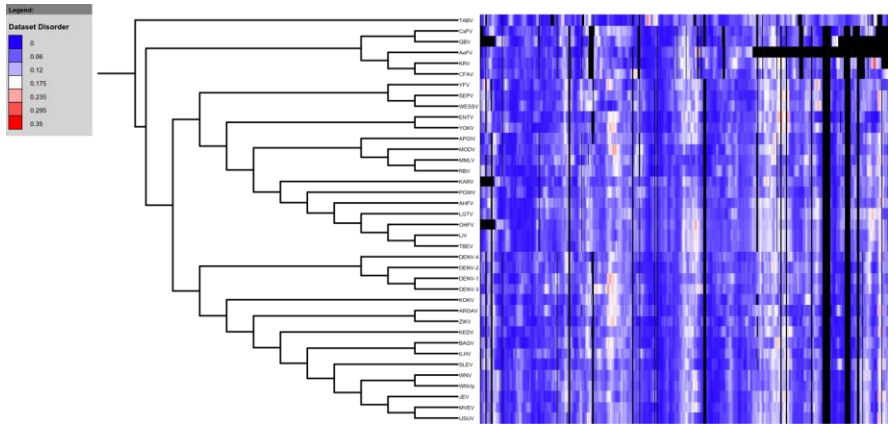

Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35

Figure 3H.

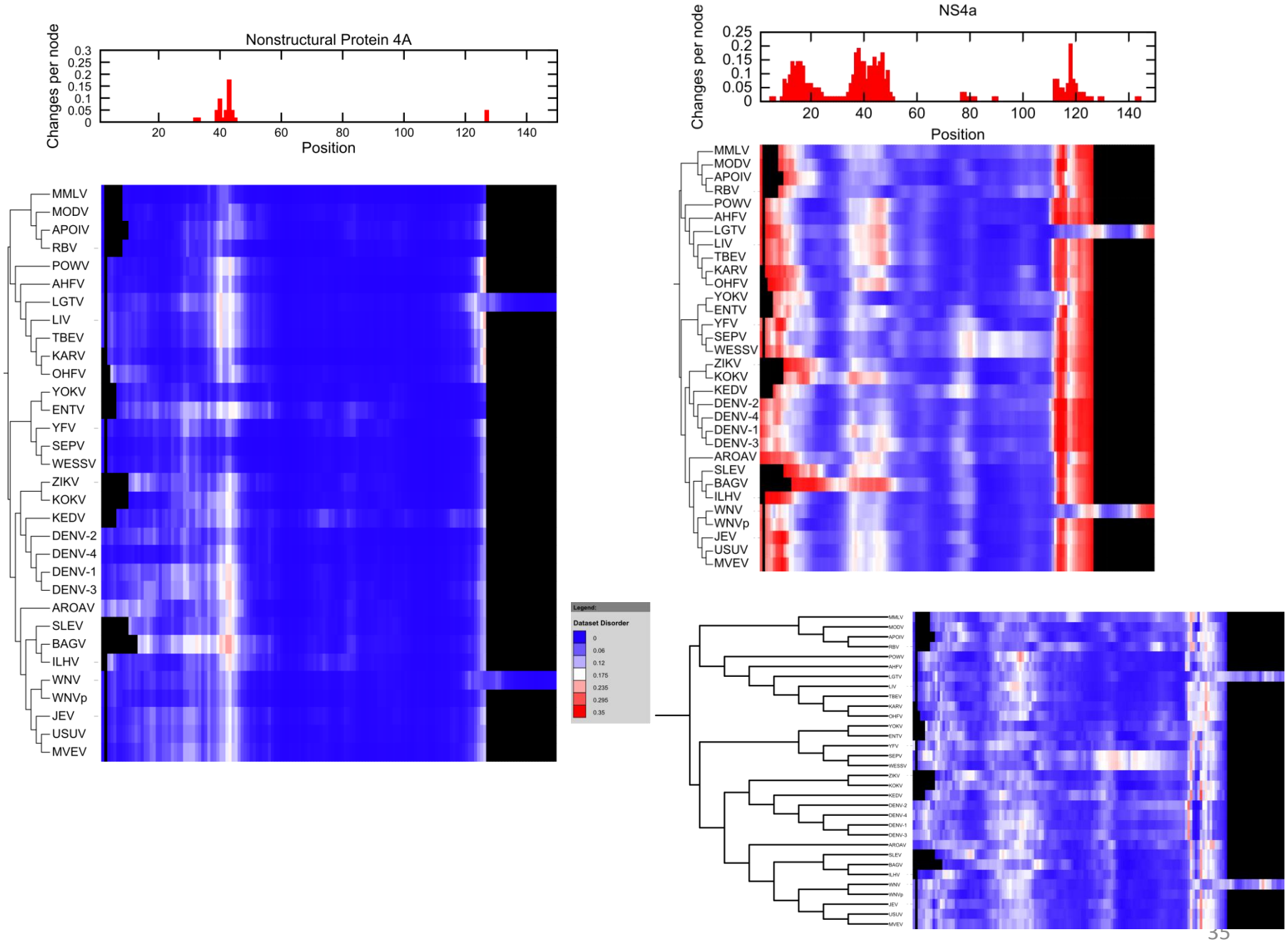
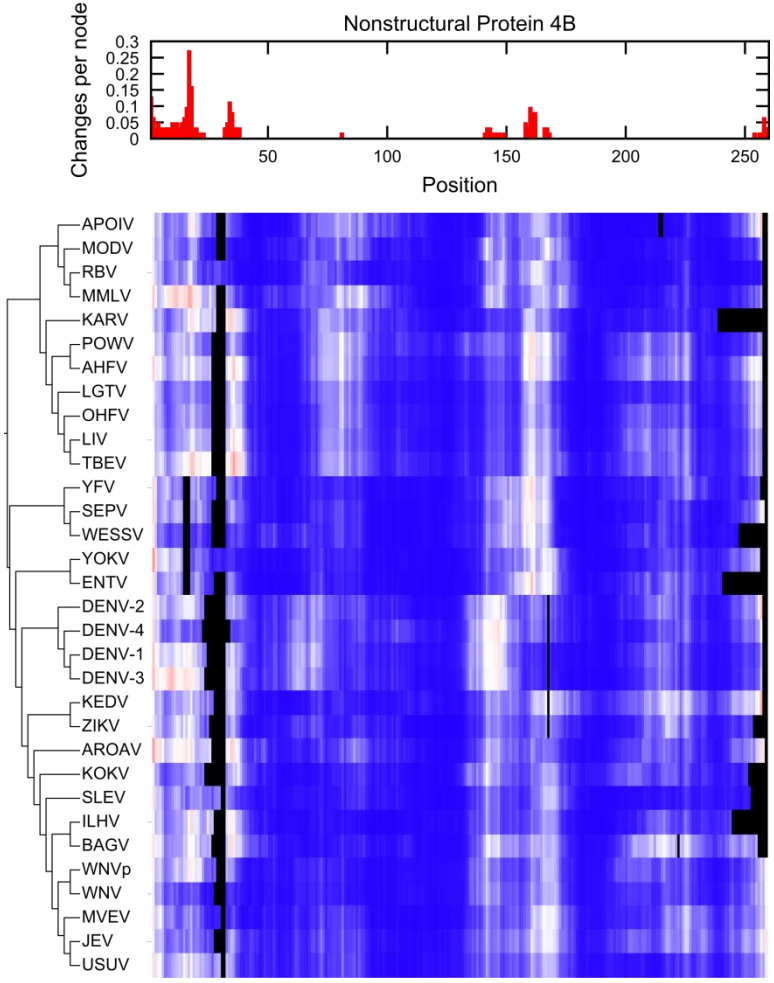
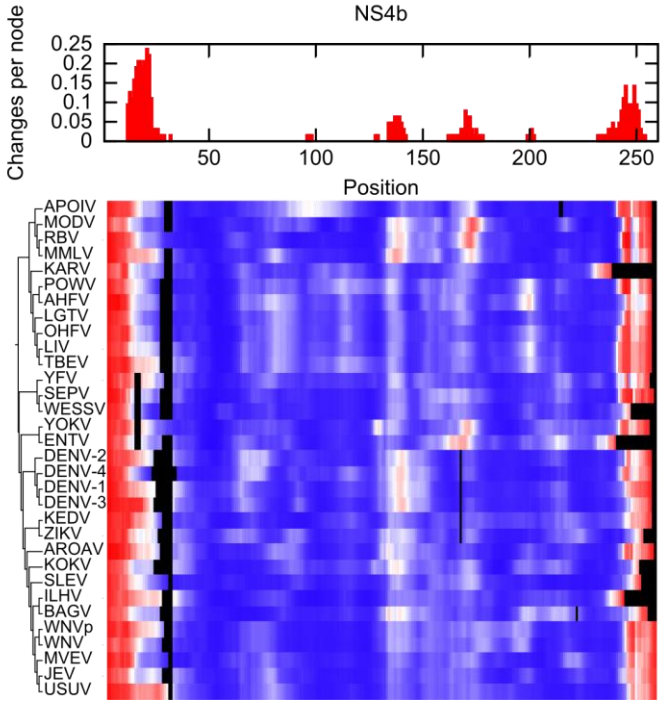

Nonstructural Protein 4A
Changes per node
Position
NS4a
Changes per node
Position
MMLV
MODV
APOIV
RBV
POWV
AHFV
LGTV
LIV
TBEV
KARV
OHFV
YOKV
ENTV
YFV
SEPV
WESSV
ZIKV
KOKV
KEDV
DENV-2
DENV-4
DENV-1
DENV-3
AROAV
SLEV
BAGV
ILHV
WNV
WNVp
JEV
USUV
MVEV
Legend:
Dataset Disorder

Figure 3I.


Nonstructural Protein 4B
Changes per node
0.3
0.25
0.2
0.15
0.1
0.05
0
50
100
150
200
250
Position
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
YFV
SEPV
WESSV
YOKV
ENTV
DENV-2
DENV-4
DENV-1
DENV-3
KEDV
ZIKV
AROAV
KOKV
SLEV
ILHV
BAGV
WNVp
WNV
MVEV
JEV
USUV


NS4b
Changes per node
0.25
0.2
0.15
0.1
0.05
0
50
100
150
200
250
Position
APOIV
MODV
RBV
MMLV
KARV
POWV
AHFV
LGTV
OHFV
LIV
TBEV
YFV
SEPV
WESSV
YOKV
ENTV
DENV-2
DENV-4
DENV-1
DENV-3
KEDV
ZIKV
AROAV
KOKV
SLEV
ILHV
BAGV
WNVp
WNV
MVEV
JEV
USUV

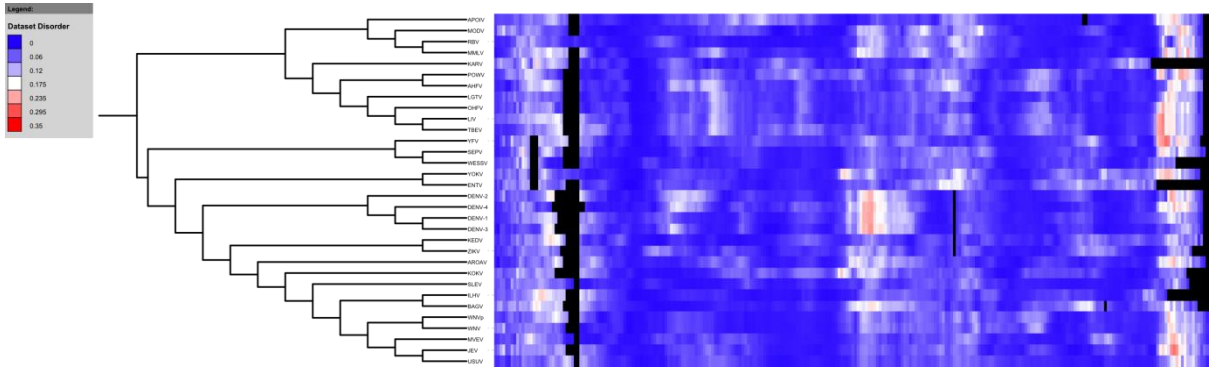
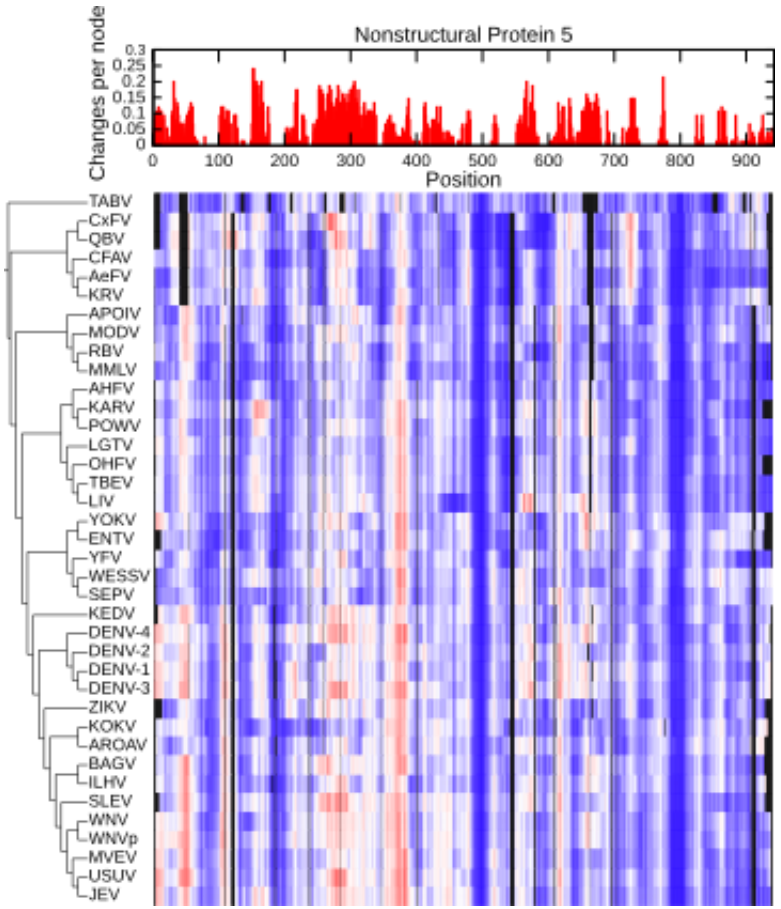
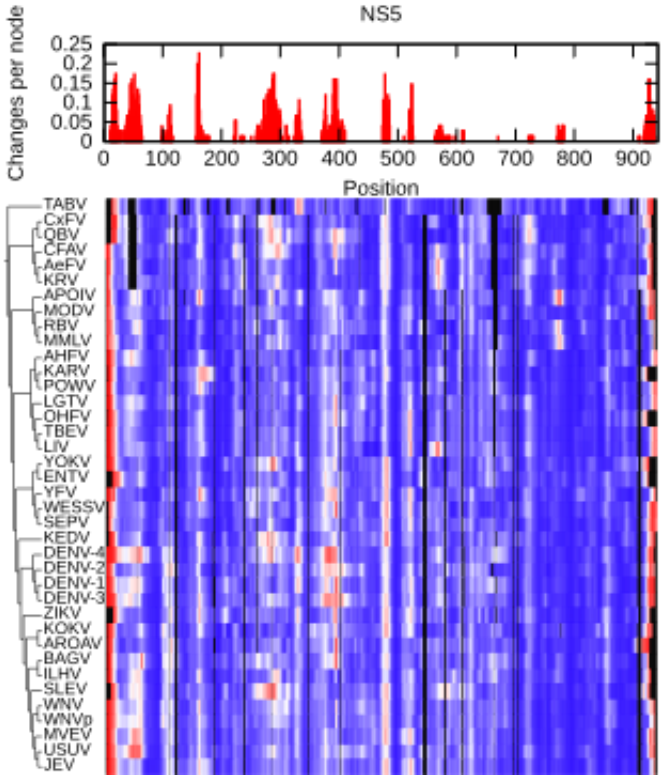

Legend:
Dataset Disorder
0
0.06
0.12
0.175
0.235
0.295
0.35

Figure 3J.


Nonstructural Protein 5
Changes per node
Position
TABV
CxFV
QBV
CFAV
AeFV
KRV
APOIV
MODV
RBV
MMLV
AHFV
KARV
POWV
LGTV
OHFV
TBEV
LIV
YOKV
ENTV
YFV
WESSV
SEPV
KEDV
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
KOKV
AROAV
BAGV
ILHV
SLEV
WNV
WNVp
MVEV
USUV
JEV


NS5
Changes per node
Position
TABV
CxFV
QBV
CFAV
AeFV
KRV
APOIV
MODV
RBV
MMLV
AHFV
KARV
POWV
LGTV
OHFV
TBEV
LIV
YOKV
ENTV
YFV
WESSV
SEPV
KEDV
DENV-4
DENV-2
DENV-1
DENV-3
ZIKV
KOKV
AROAV
BAGV
ILHV
SLEV
WNV
WNVp
MVEV
USUV
JEV

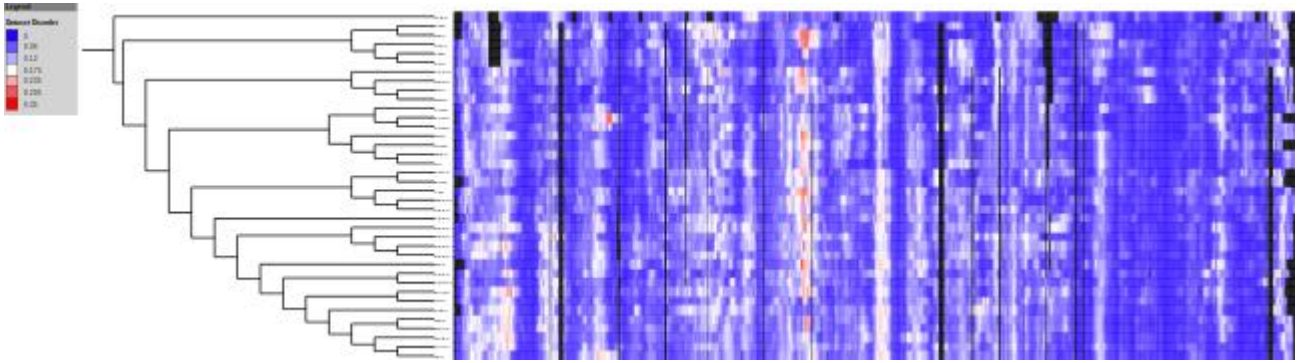


Figure 4.

The correlation between PONDR-FIT and IUPred scores for the entire dataset (All sites), sites excluding first and last 50 sites in each alignment (center sites), and only the first and last 50 sites in each alignment (end sites). Linear regression was drawn for each case.

Figure 4.

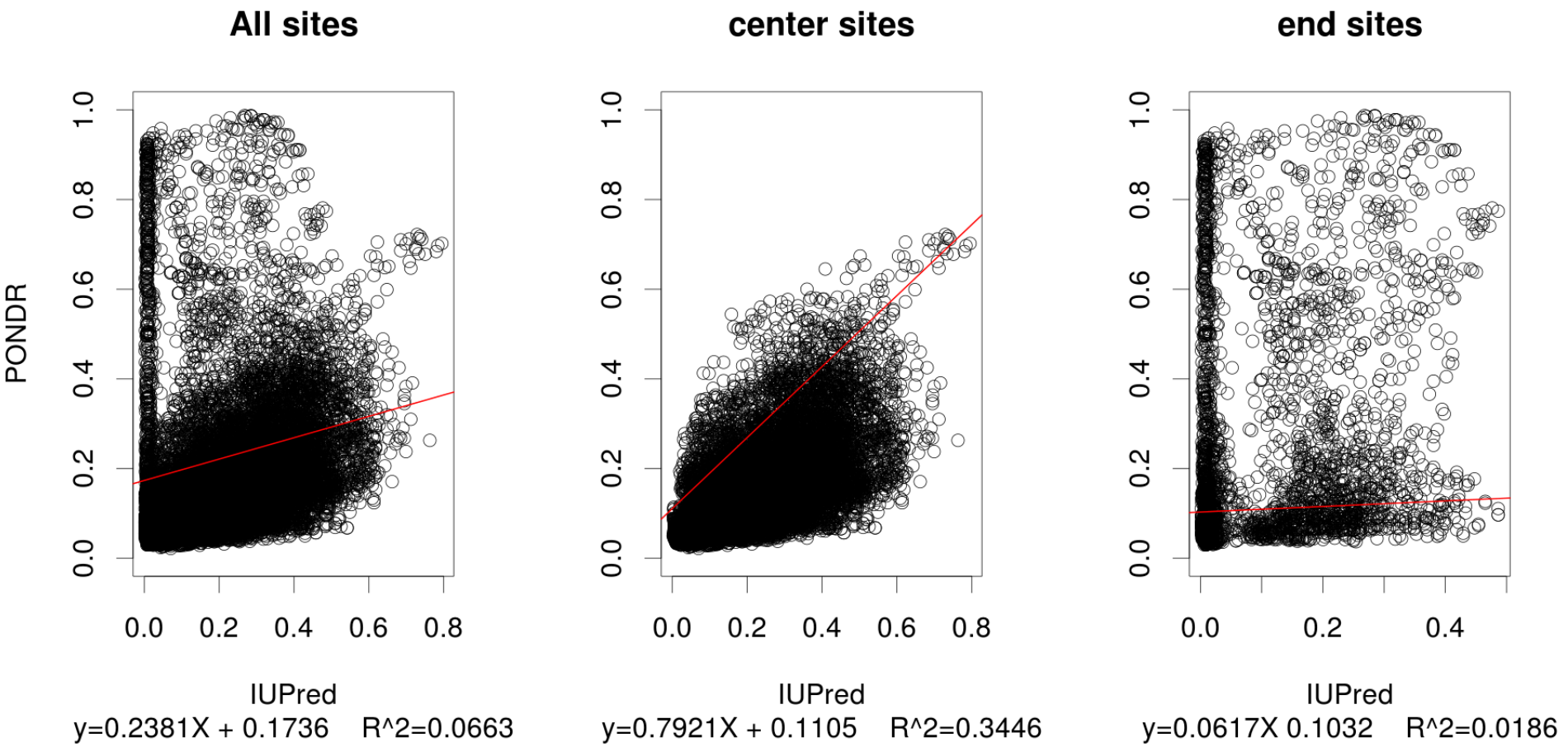

All sites
center sites
end sites
PONDR
IUPred
y=0.2381X + 0.1736 R^2=0.0663
IUPred
y=0.7921X + 0.1105 R^2=0.3446
IUPred
y=0.0617X 0.1032 R^2=0.0186

Figure 5.

A comparison of the structrually differing regions between experimental x-ray crystallography structures of the Envelope protein in DENV-1 and TBEV.

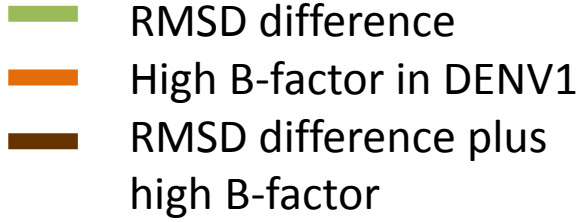
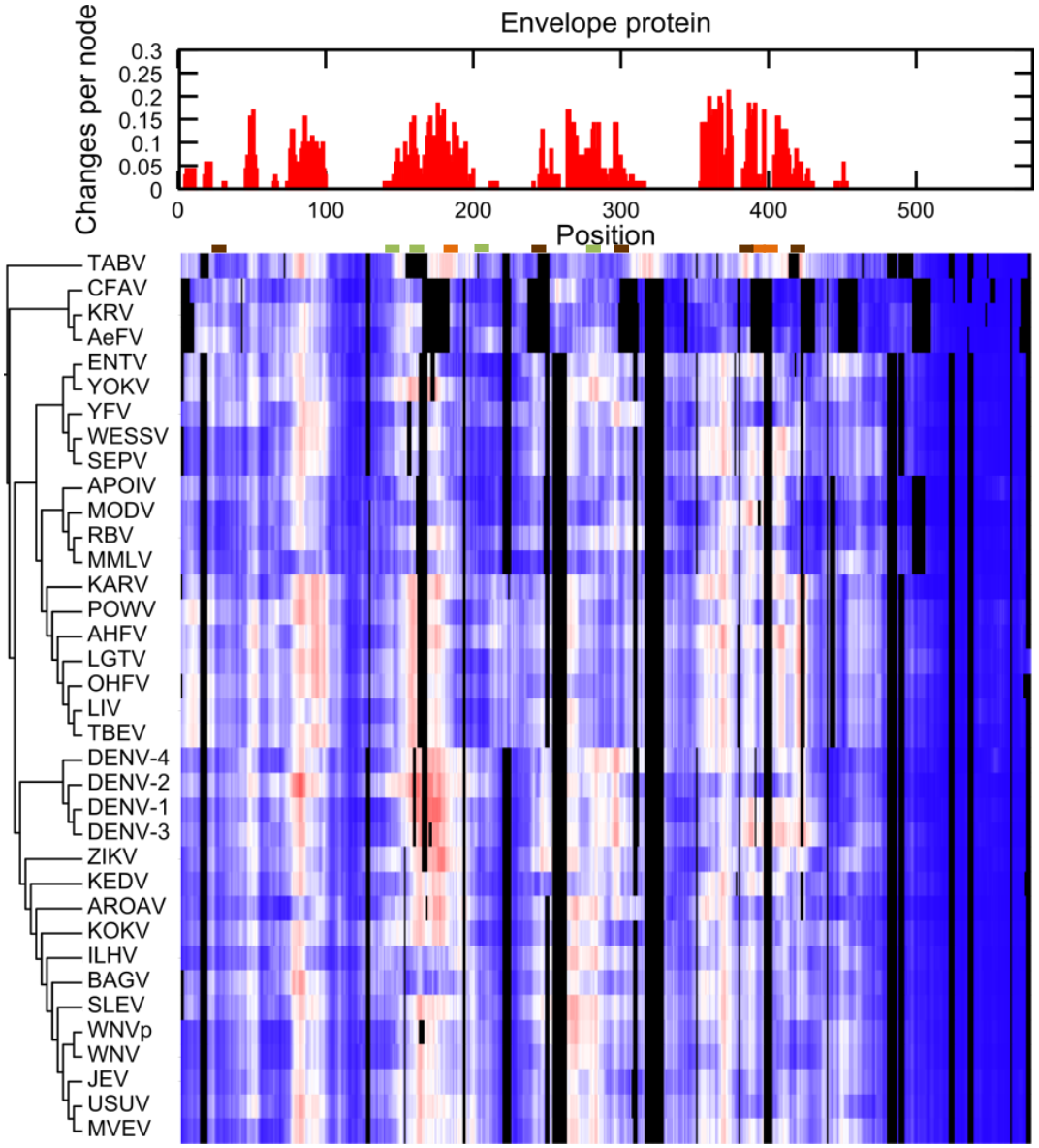
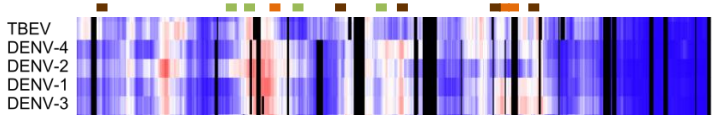


Figure 5.





RMSD difference

High B-factor in DENV1

RMSD difference plus high B-factor