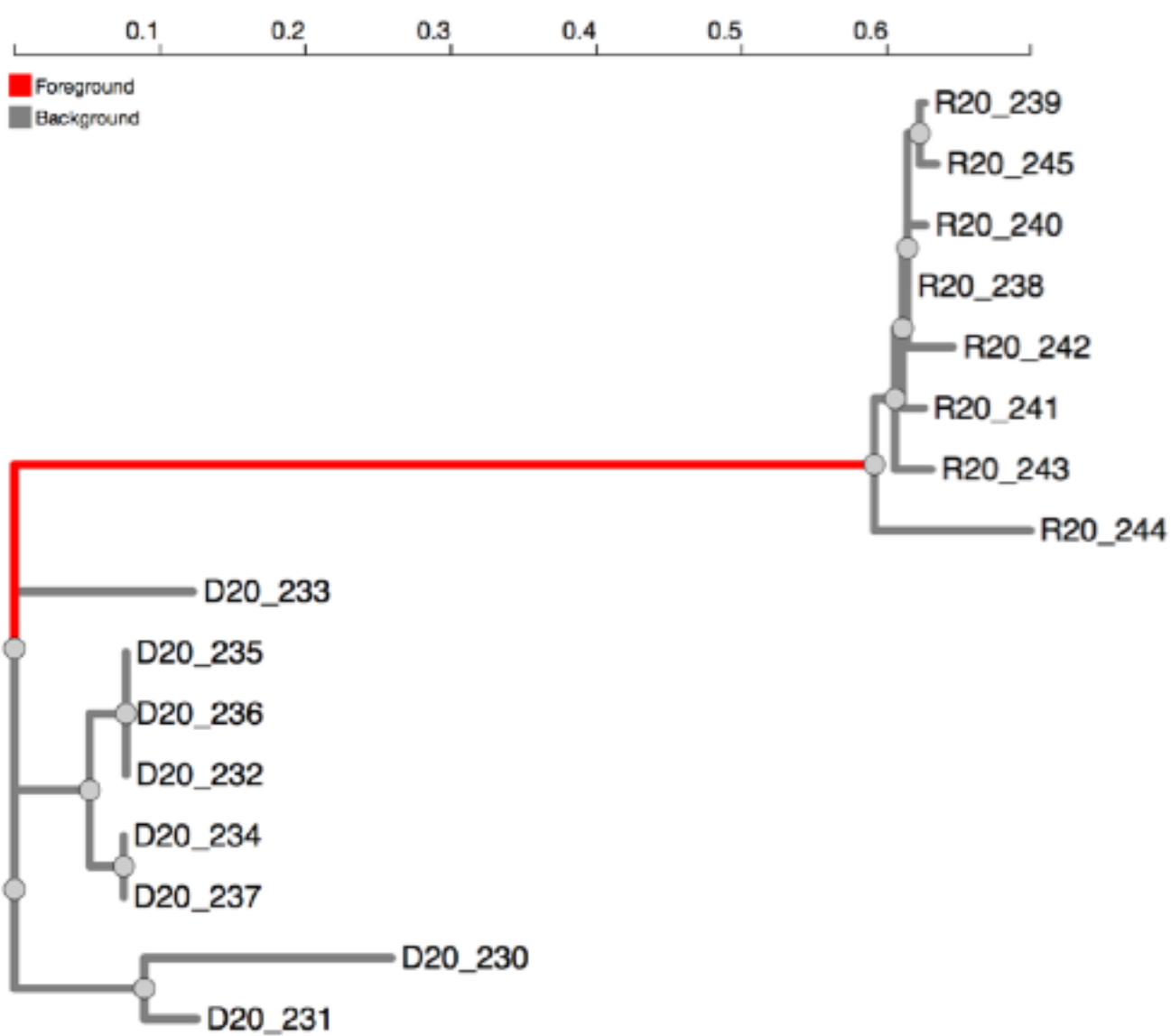


Branch testing; exploratory vs *a priori*

- aBSREL and BUSTED can test all branches for selection (exploratory), or apply the test to a set of branches defined *a priori* (e.g. defining a particular biological hypothesis).
- For BUSTED, *a priori* partitioning of branches can increase power, especially if selective regimes are markedly different on different parts of the tree.
- For example, BUSTED applied to the HIV dataset where the transmission branch is designated as foreground, found a greater proportion sites under stronger selection on this branch than the rest of the tree (8% vs 1%), and a lower **p-value**.



	Background	Foreground
Class 1	$\omega = 0.51$ $p = 0.08$	$\omega = 0.00$ $p = 0.92$
Class 2	$\omega = 0.72$ $p = 0.91$	
Class 3	$\omega = 116$ $p = 0.01$	$\omega = 510$ $p = 0.08$

<u>Task</u>	<u>Test</u>	<u>Site strategy</u>	<u>Branch strategy</u>	<u>Complexity</u>	<u>Effective sample size</u>	<u>Parallelization</u>	<u>Practical # sequences limit</u>
Gene-wide selection	BUSTED	Random Effects	Random Effects	Fixed	~sites x taxa	SMP	~2,000
Site-level selection / episodic	MEME	Fixed Effects	Random Effects	Fixed	~ taxa	SMP/MPI	~25000 (cluster)
Site-level selection / pervasive	FEL	Fixed Effects	Fixed Effects	Fixed	~ taxa	SMP/MPI	~25000 (cluster)
Branch-level selection	aBSREL	Random Effects	Fixed Effects	Adaptive	~ sites	SMP/MPI	~ 1,000
Compare selective regimes between sets of branches	RELAX	Random Effects	Mixed Effects	Fixed	~sites x (branch set size)	SMP	~ 1,000
Compare selective pressure between sets of branches on individual sites	Contrast-FEL	Fixed Effects	Fixed Effects	Fixed	~ branch set	SMP/MPI	~25000 (cluster)