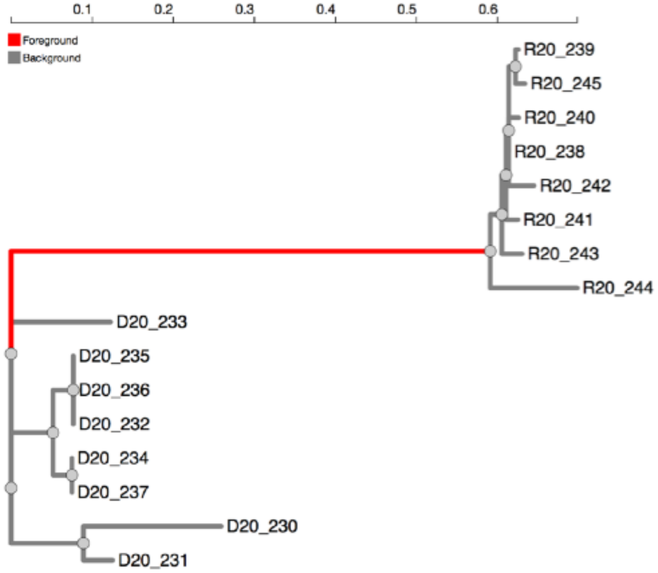
Branch testing; exploratory vs *a priori*

- 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 that the rest of the tree (8% vs 1%), and a lower **`p-value`**.



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

Task	Test	Site strategy	Branch strategy	Complexity	Effective sample size	Parallelization	Pratical # sequences limit
Gene-wide selection	BUSTED	Random Effects	Random Effects	Fixed	~sites x taxa	SMP	~1,000
Site-level selection / episodic	MEME	Fixed Effects	Random Effects	Fixed	~ taxa	SMP/MPI	~5000 (cluster)
Site-level selection / pervasive	FEL	Fixed Effects	Fixed Effects	Fixed	~ taxa	SMP/MPI	~20000 (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	~5000 (cluster)