

Documentation of the R package EpiPhylo

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July 14, 2015

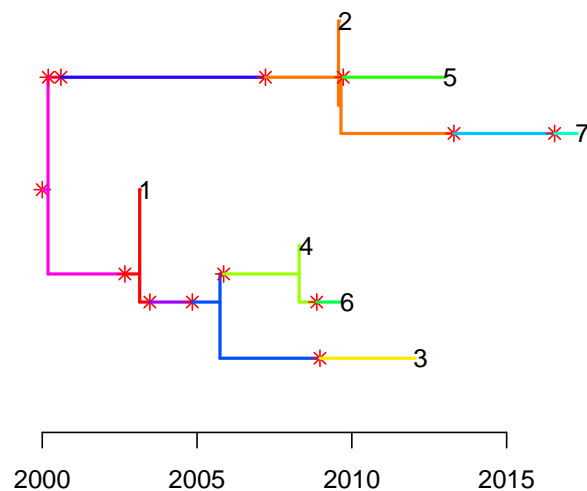
1 Simulation

A pathogen has an effective within-host population size of $N_e = 100$ and a generation time $g = 1$ day, so that $N_e g = 100/365$ years. The basic reproduction number is $R = 1$. The following command simulates an outbreak of this pathogen:

```
simu <- simulateOutbreak(R=1,neg=100/365,pi=0.2)
```

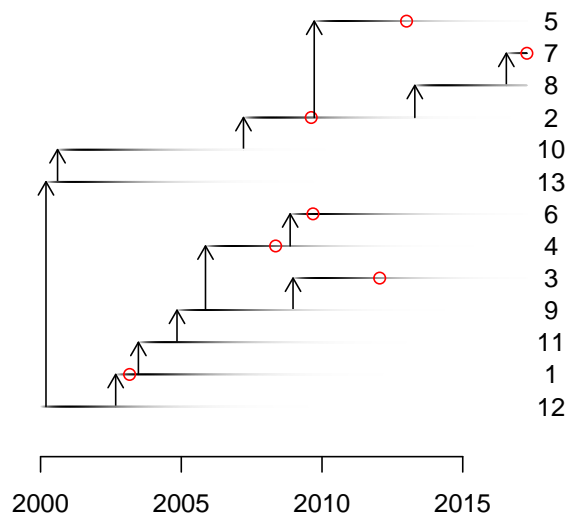
This simulation contains both the transmission tree between infected hosts and the within-host phlogenetic tree of each host. This can be visualised as a colored phlogenetic tree, where each host is represented by a unique color:

```
plotBothTree(simu)
```



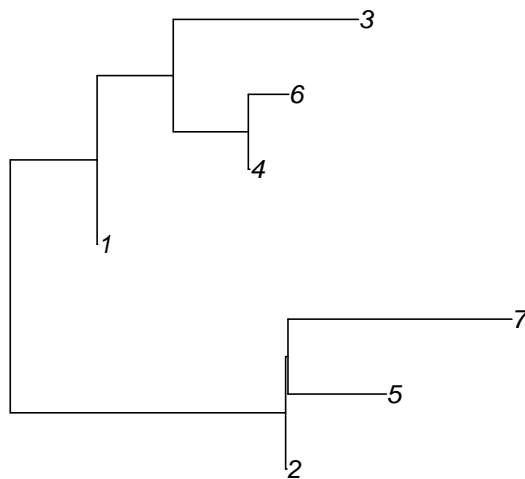
The transmission tree can be extracted and plotted separately from the phylogeny:

```
ttree<-ttreeFromFullTree(simu)  
plotTTree(ttree)
```



The phylogenetic tree can be extracted and converted into a phylo object from the ape package:

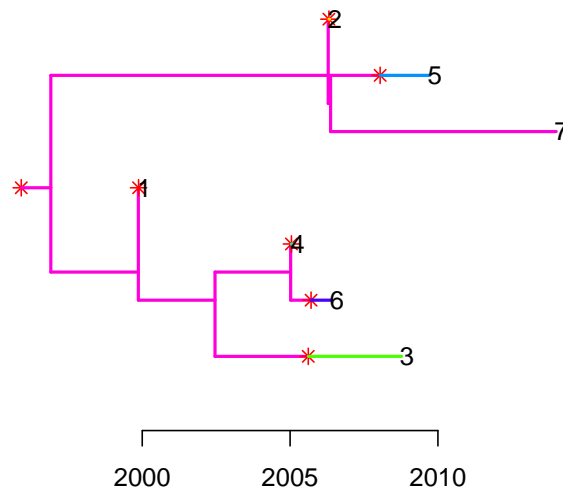
```
library(ape)
ptree<-ptreeFromFullTree(simu)
p<-phyloFromPtree(ptree)
plot(p)
```



2 Inference of transmission tree given a phylogeny

A phylo object can be turned into a phylogenetic tree and complemented with a wild guess at the transmission tree in order to provide the starting point of the MCMC procedure:

```
ptree<-ptreeFromPhylo(p,dateLastSample=max(simu[,1]))  
full<-makeFullTreeFromPTree(ptree)  
plotBothTree(full)
```

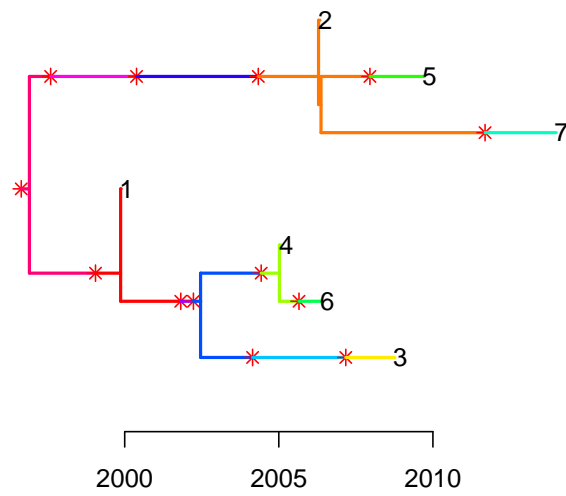


The MCMC procedure to infer the transmission tree given the phylogenetic tree can be run as follows:

```
record<-inferTTree(ptree,mcmcIterations=1000)
```

This returns a record of all MCMC iterations. This is what the transmission tree looks like at the end of the MCMC:

```
lastIteration<-record[[length(record)]]  
plotBothTree(lastIteration$tree)
```



Traces of the MCMC:

