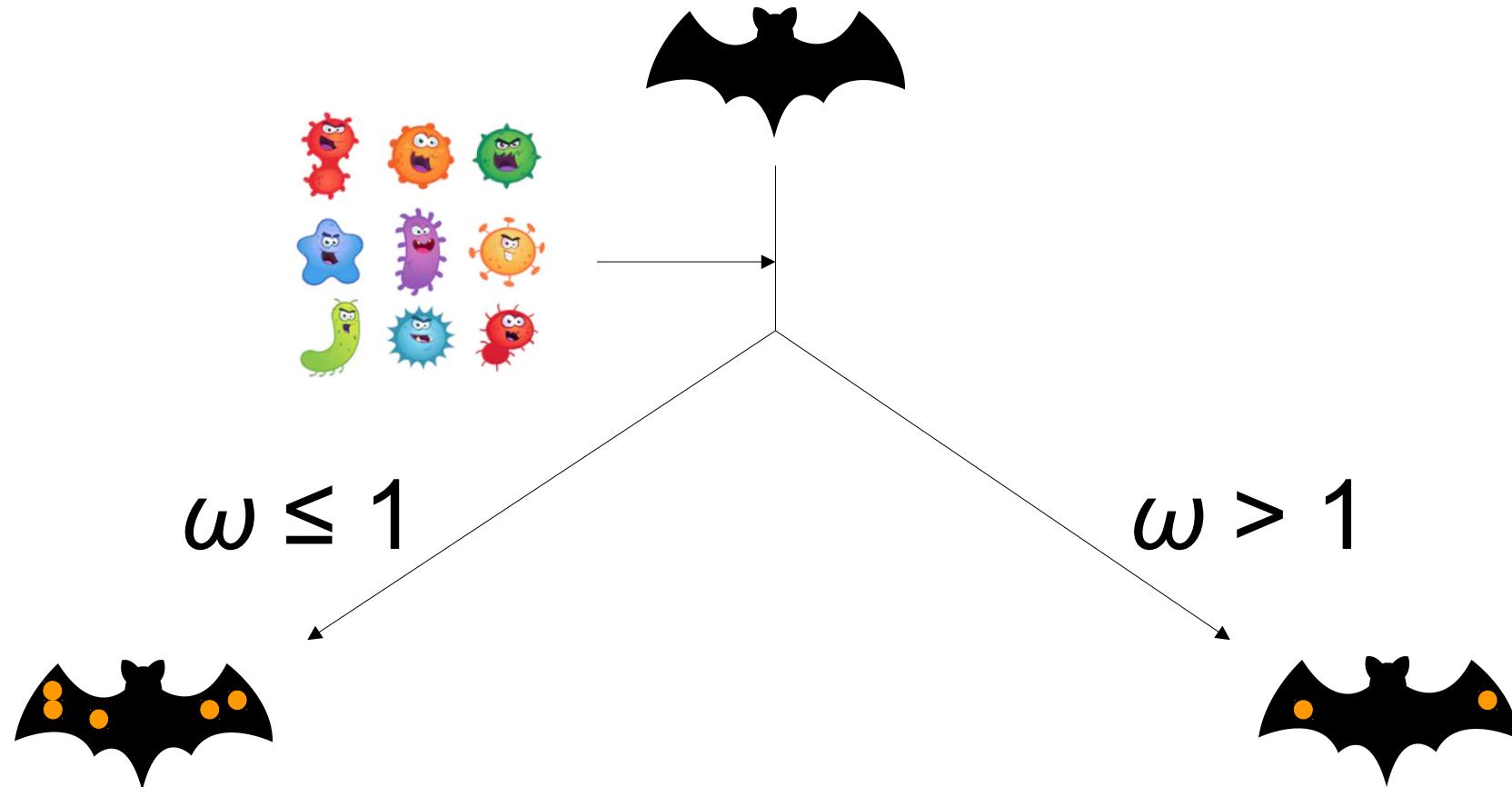


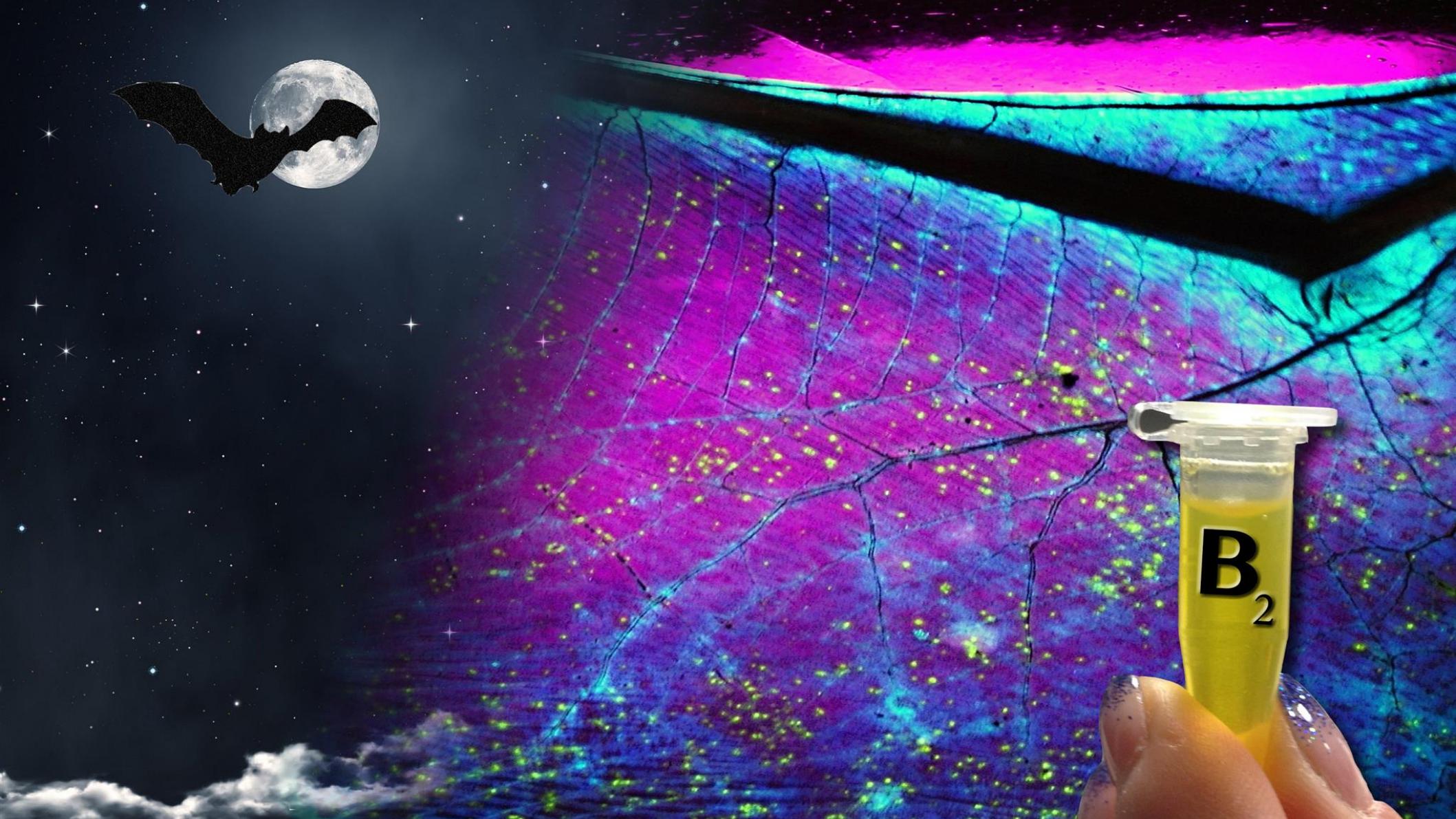
Detecting natural selection signal in bat DNA sequences after exposure to white-nose syndrome

Markéta Harazim and Natália Martíková



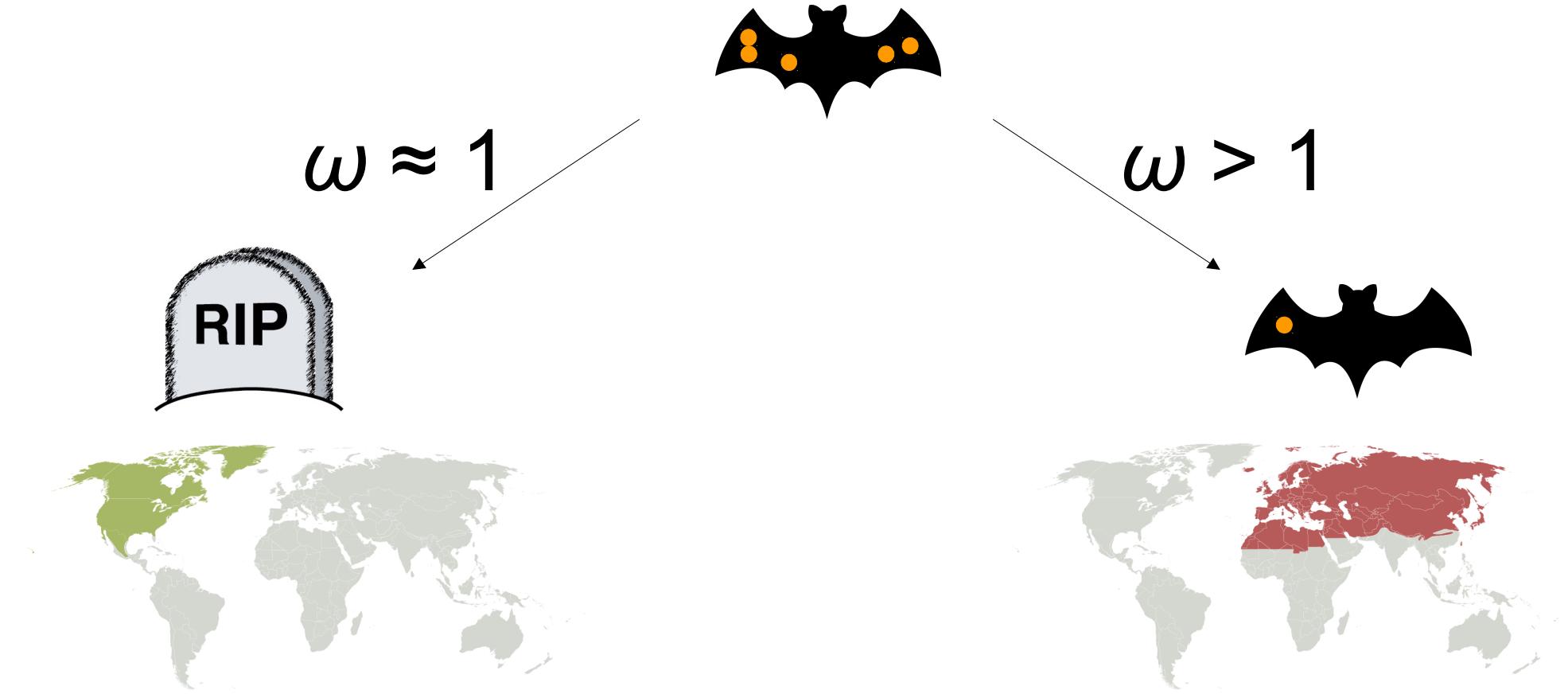
Positive selection - $\omega = d_N/d_s > 1$





B₂

- $\omega = d_N/d_S$



GO terms Water, Epidermis for *Rattus* - 223 genes



UniProtKB - Vespertilionidae

Water and Epidermis genes in vespertilionids - 50 genes



Myotis myotis RNA-seq

Water and Epidermis genes expressed in *M. myotis* - 30 genes



Primer design

26 primer pairs for target genes



Amplification and sequencing test

14 selected genes

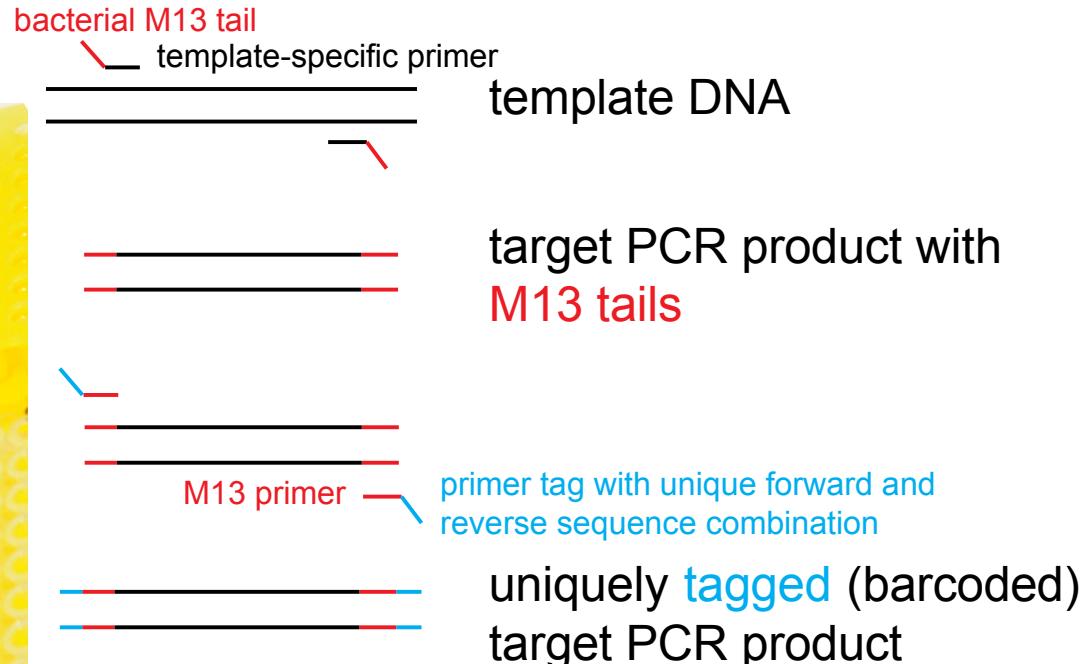


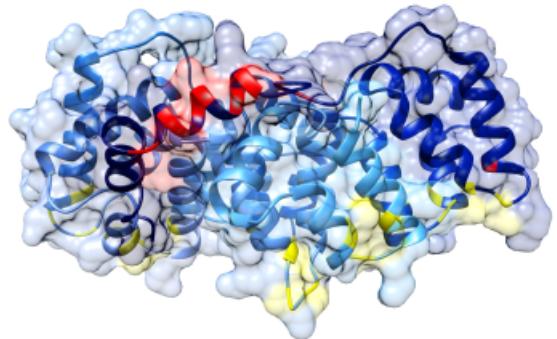
PacBio sequencing

Natural selection testing

PacBio sequencing

Nested
PCRs :
PCR1
yellow

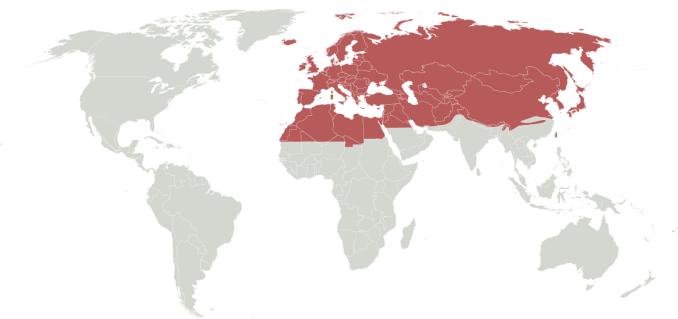
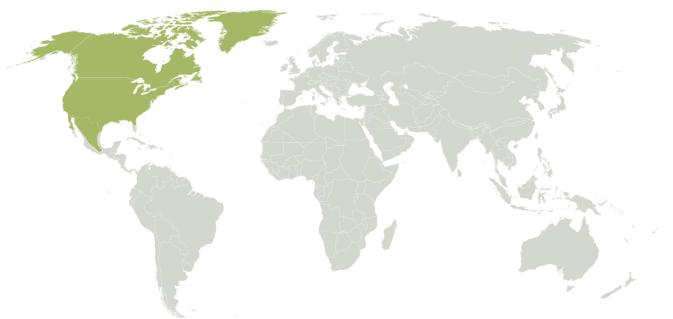




Site models

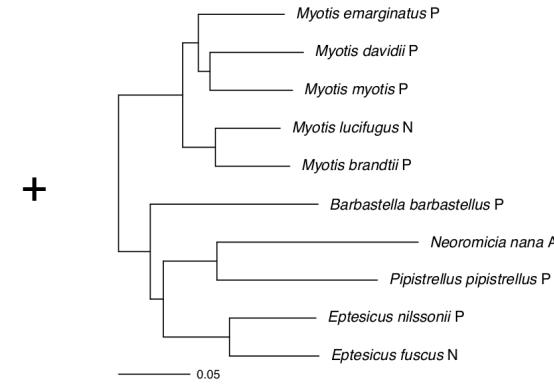


Branch-site models



Clade model

Positive selection by Maximum Likelihood



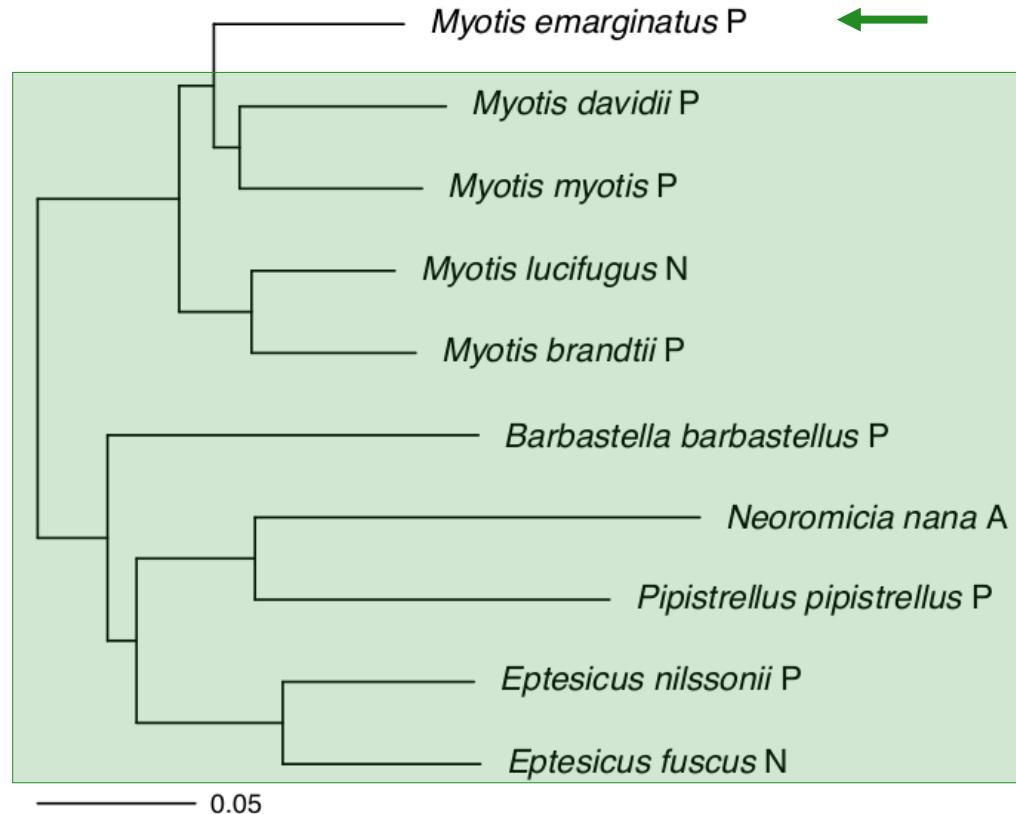
Control file -model parameters

InLs :
alternative model – null
model

Site models of positive selection

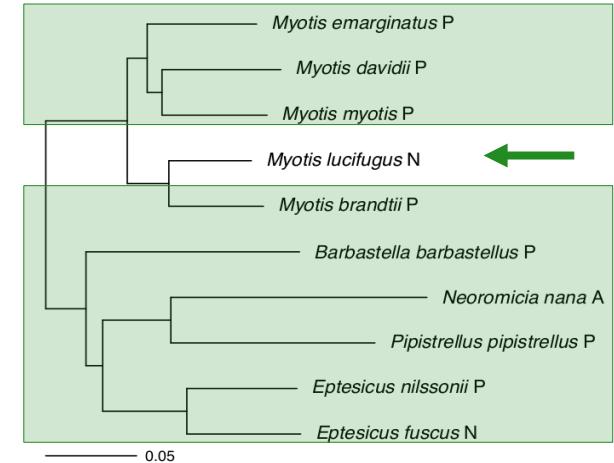
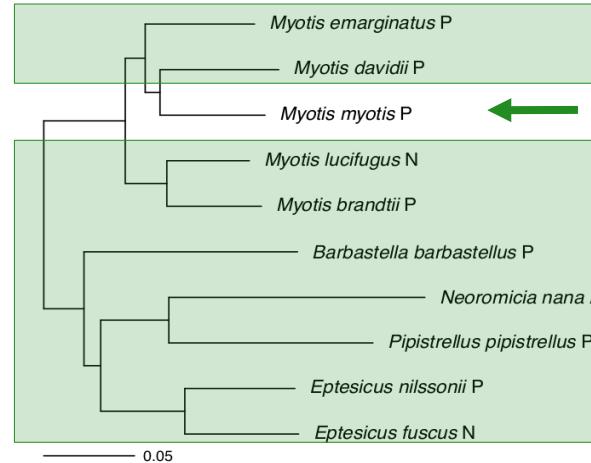
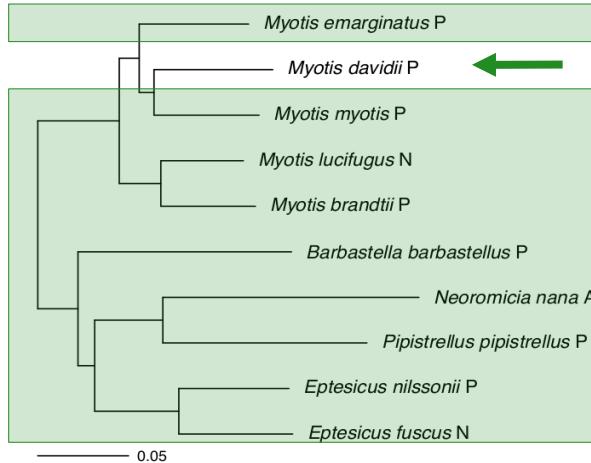
- M0 (one ratio) - M3 (discrete)
 - M1 (Neutral) - M2 (Positive selection)
 - M7 (beta) - M8 (beta& ω)

Branch-site test of positive selection

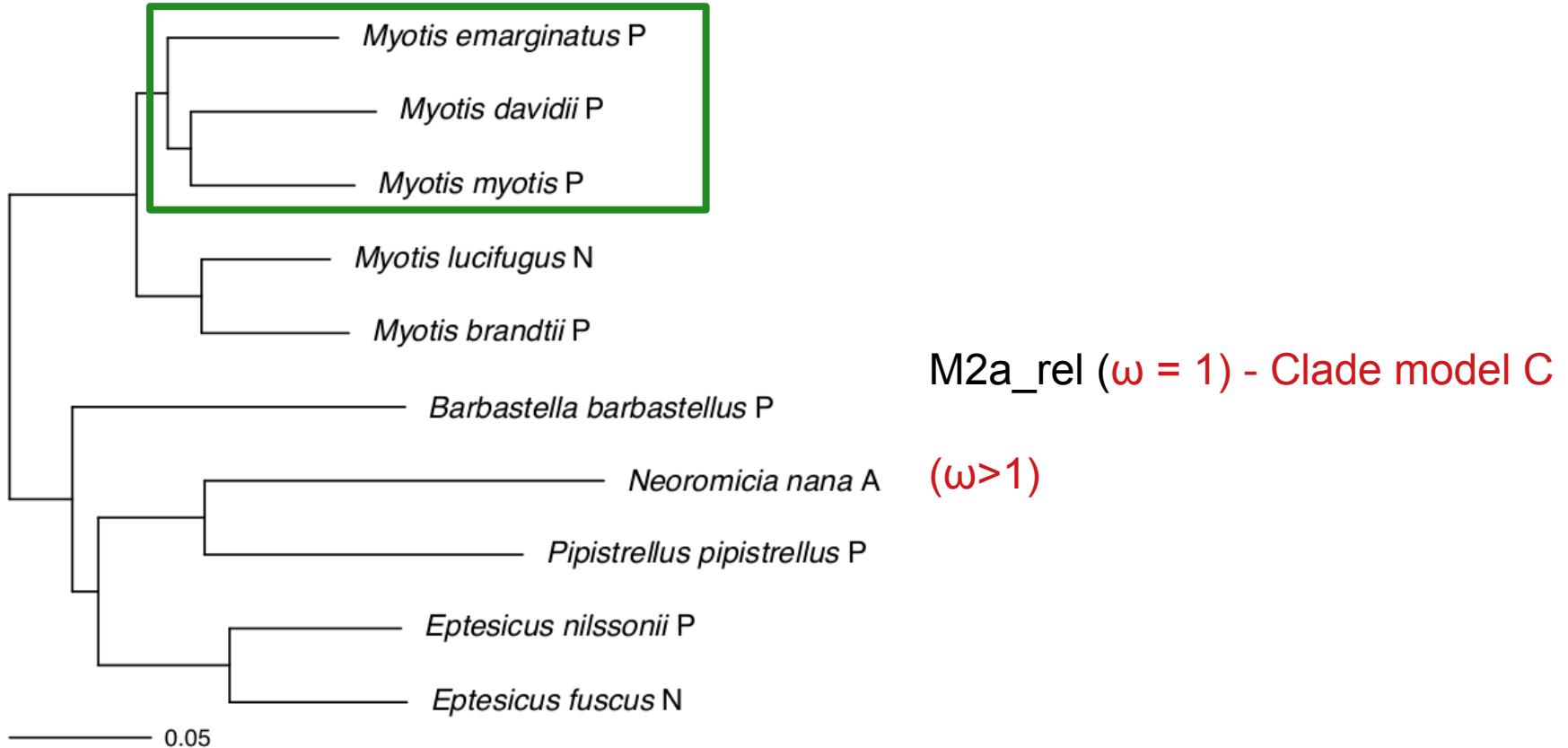


A1 model ($\omega = 1$) - branch site model A ($\omega > 1$)

Branch-site test of positive selection

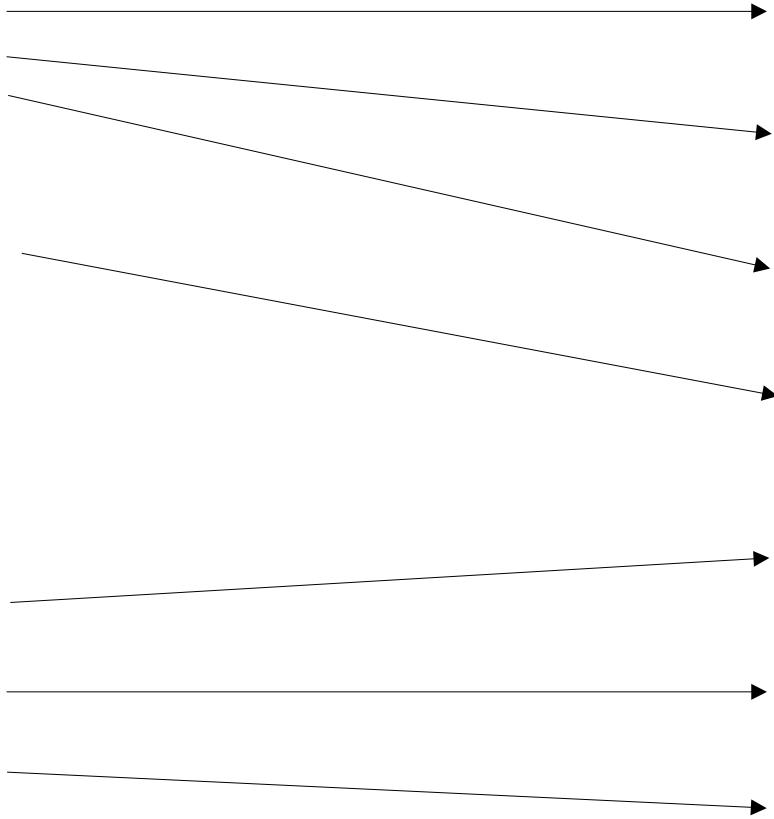


Clade model of positive selection



Genes under positive selection

- *acad10*
- *acp5*
- *anxa1*
- *aqp3*
- *aqp4*
- *aqp7*
- *aqp9*
- *bcam*
- *ctnnb1*
- *fads1*
- *fgf10*
- *guca2b*
- *has2*
- *hyal2*
- *hyal3*
- *krt8*
- *lrp4*
- *psen2*
- *ptch2*
- *pxn*
- *sncg*
- *tgm1*
- *tnfsf13*



acp5

anxa1

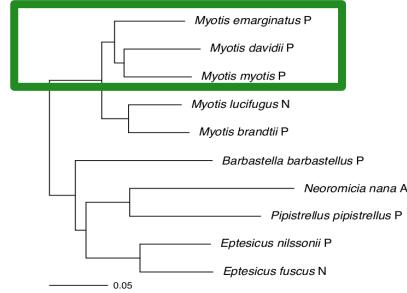
aqp3

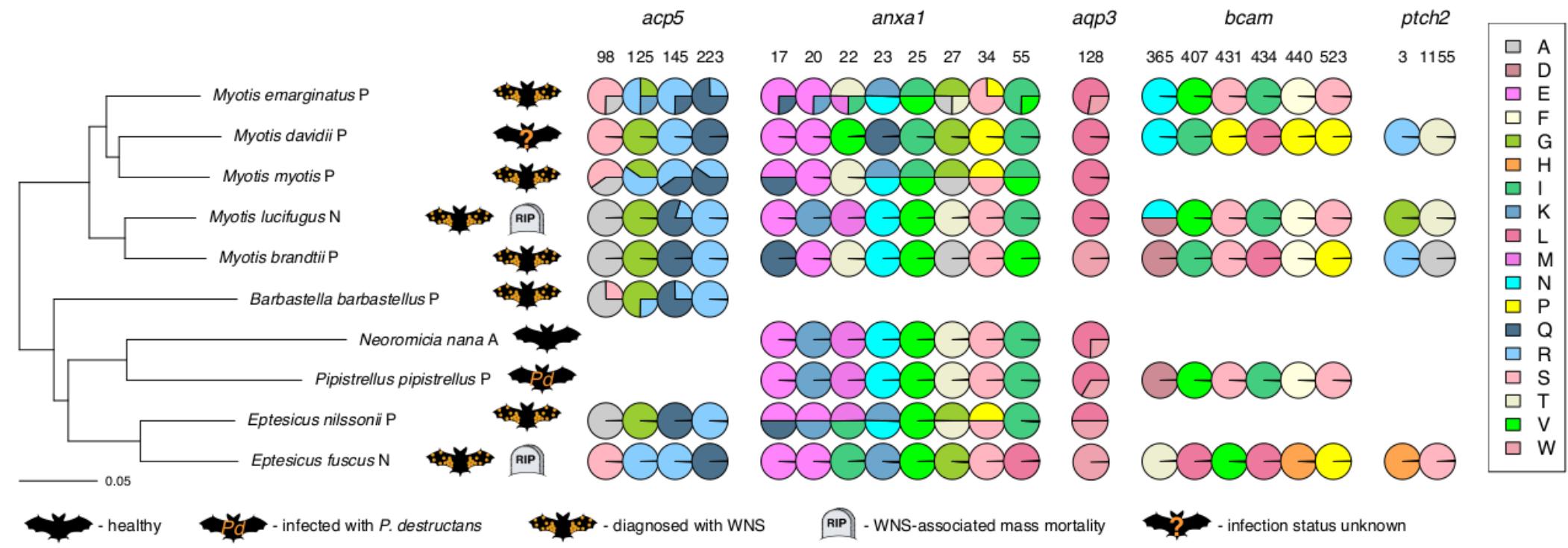
bcam

lrp4

ptch2

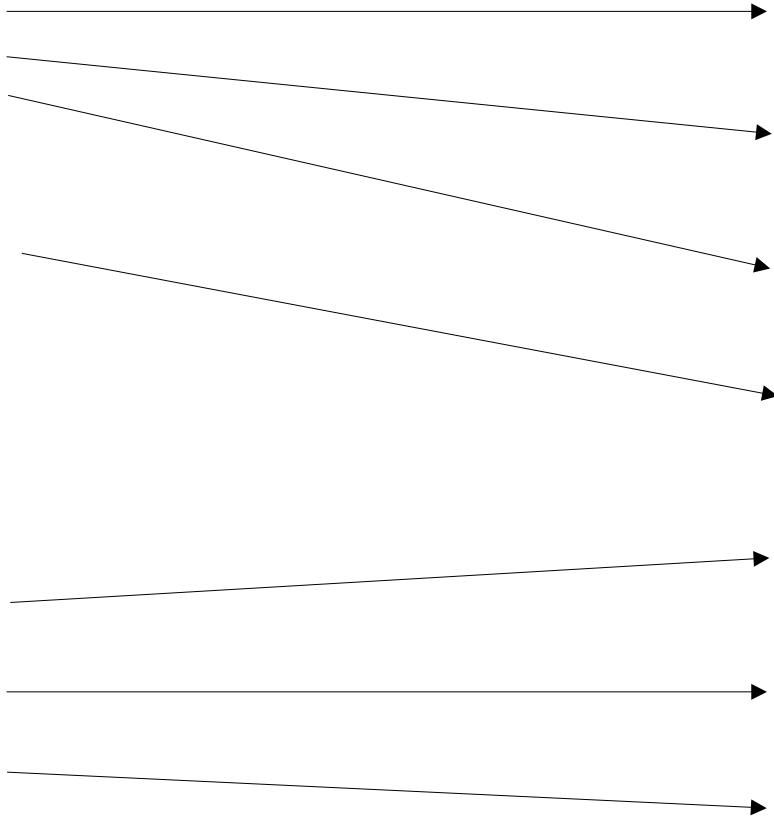
sncg





Genes under positive selection

- *acad10*
- *acp5*
- *anxa1*
- *aqp3*
- *aqp4*
- *aqp7*
- *aqp9*
- *bcam*
- *ctnnb1*
- *fads1*
- *fgf10*
- *guca2b*
- *has2*
- *hyal2*
- *hyal3*
- *krt8*
- *lrp4*
- *psen2*
- *ptch2*
- *pxn*
- *sncg*
- *tgm1*
- *tnfsf13*



acp5

anxa1

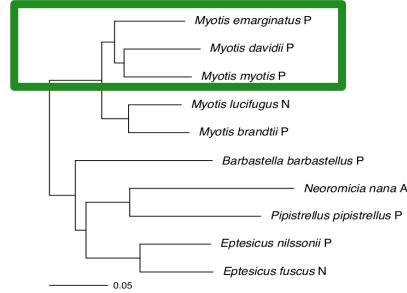
aqp3

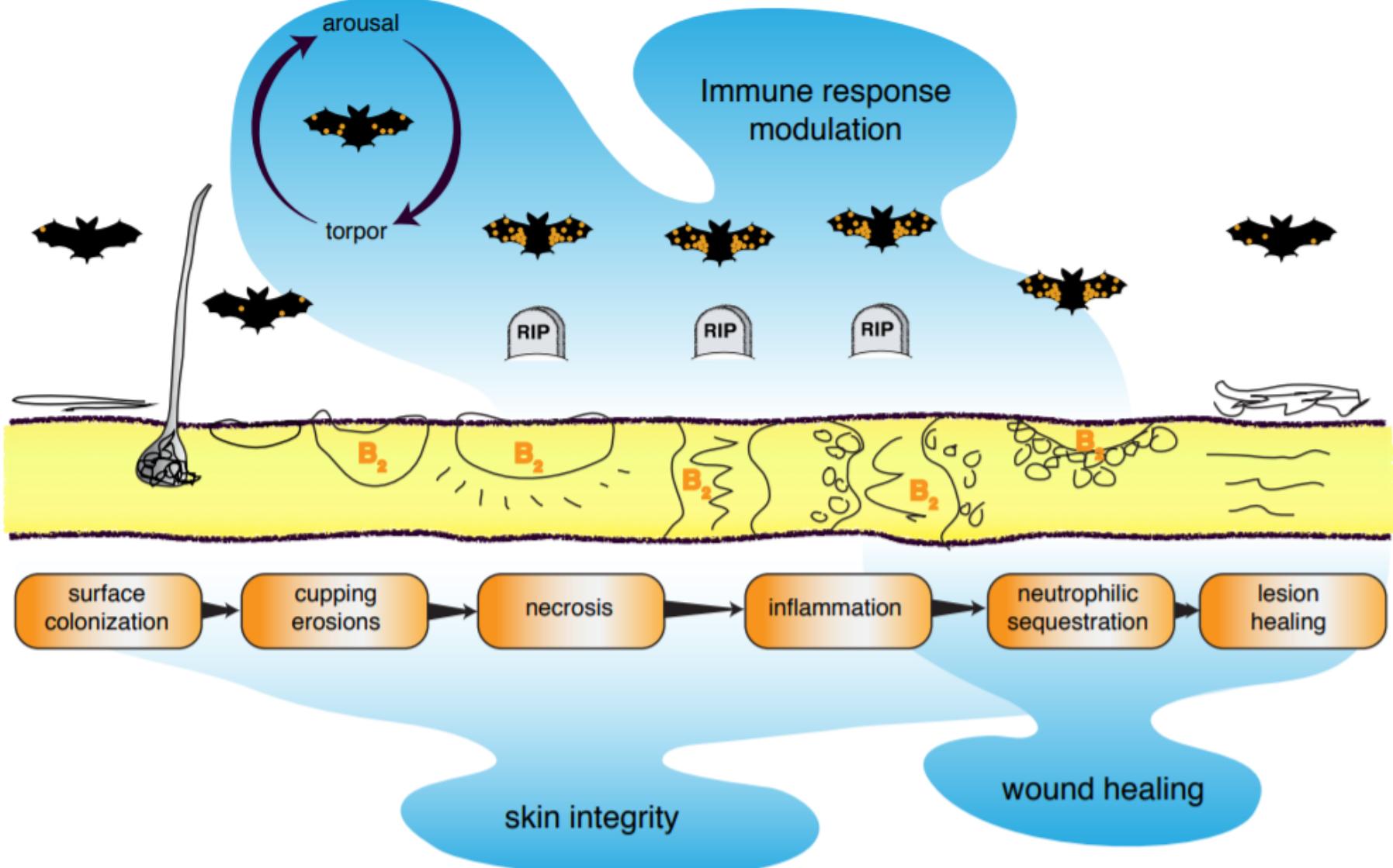
bcam

lrp4

ptch2

sncg





Acknowledgement

Ivan Horáček, Lucie Jakešová, Kristína Luermann, Jiří C. Moravec, Shannon Morgan, Jiri Pikula,
Petr Sosík, Zuzana Vavrušová, Alexandra Zahradníková, jr., Jan Zukal and Natália Martínková



Thank you for your attention