Online appendix for the paper

Optimizing Phylogenetic Supertrees Using Answer Set Programming

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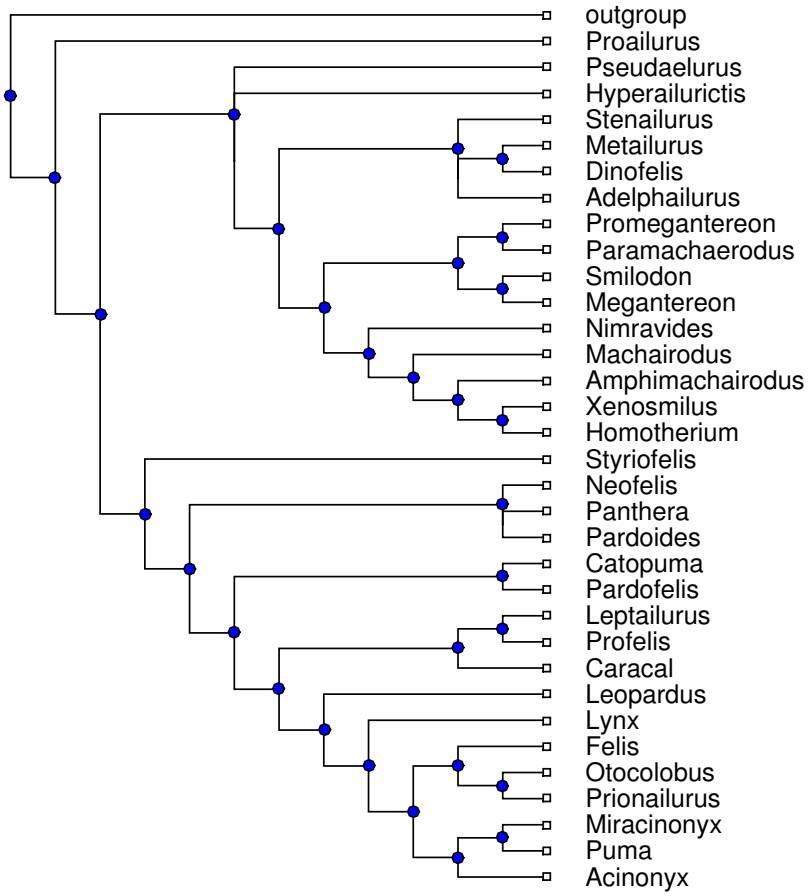
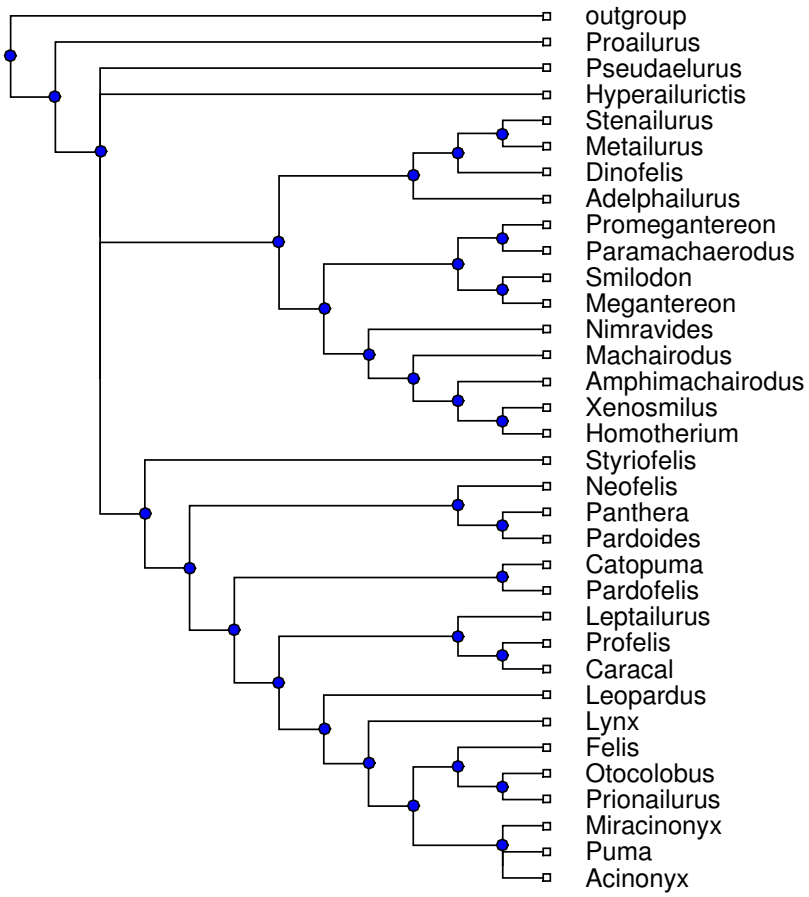
Appendix A

The optimal genus-level supertree of the projection encoding, using Felinae-Machairodontinae backbone constraint and weight 4 for source trees from molecular studies.



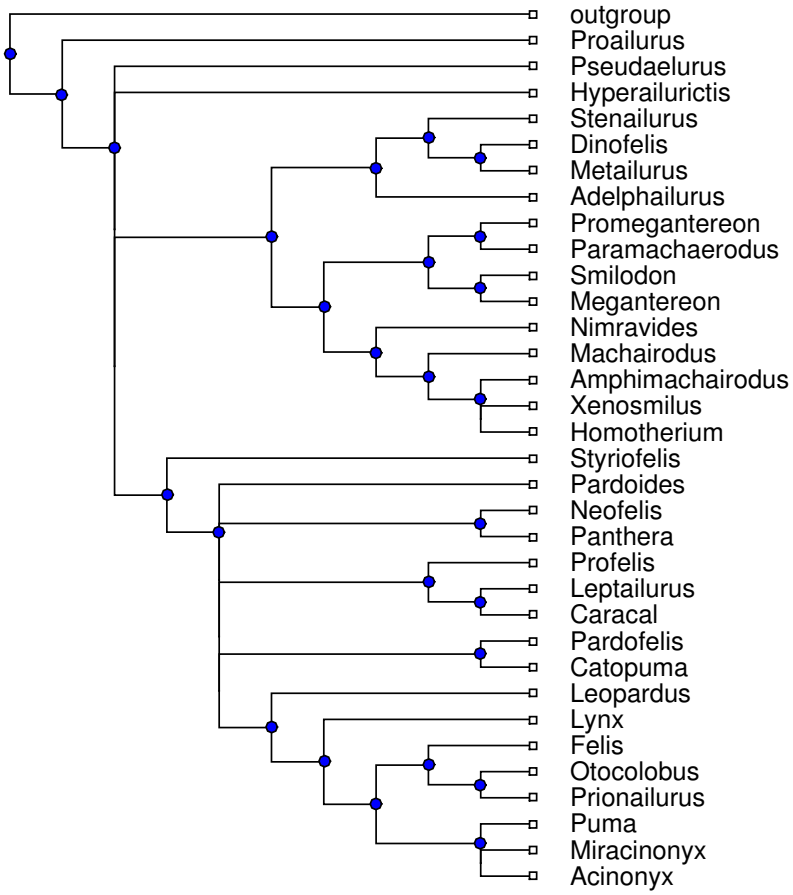
Appendix B

Best-resolution 50% majority consensus MRP genus-level supertree from (Säilä et al. 2011; Säilä et al. 2012) projected to the set of genera considered in this paper. In the computation extant Felinae genus-level backbone from molecular studies constraint is used.



Appendix C

Best-support 50% majority consensus MRP genus-level supertree from (Säilä et al. 2011; Säilä et al. 2012) projected to the set of genera considered in this paper. In the computation Felinae-Machairodontinae backbone constraint and weight 4 for source trees from molecular studies are used and best support is computed according to (Wilkinson et al. 2005).



Appendix D

Below is a listing of the 38 source trees included in the Felidae supertree computation and used in (Säilä et al. 2011; Säilä et al. 2012). Trees marked with an asterisk "*" have been obtained from molecular studies.

***S1** = (Outgroup, (Homotherium_serum, (Puma_yagouaroundi, ((Acinonyx_jubatus, (Miracinonyx_trumani, Puma_concolor)), (((Leopardus_colocolo, (Leopardus_tigrina, (Leopardus_geoffroyi, Leopardus_guigna))), ((Neofelis_nebulosa, Neofelis_diardi), (Panthera_tigris, (Panthera_leo, (Panthera_pardus, (Panthera_onca, Panthera_uncia)))))), ((Lynx_pardina, (Lynx_lynx, Lynx_canadensis)), (((Leopardus_wiedii, Leopardus_pardalis), (Prionailurus_planiceps, (Prionailurus_bengalensis, Prionailurus_viverrina))), (Otocolobus_manul, (Lynx_rufus, ((Catopuma_temmincki, Pardofelis_marmorata), ((Felis_magrita, (Felis_catus, Felis_silvestris, Felis_lybica)), (Felis_chaus, Felis_nigripes))))))))));

***S2** = (Outgroup, ((Felis_bieti, (Felis_silvestris, Felis_catus, Felis_lybica)), (Neofelis_nebulosa, (Panthera_leo, Panthera_uncia, Panthera_tigris))));

S3 = (Outgroup, (Panthera_leo, (Panthera_spelaea, Panthera_atrox)));

***S4** = (Outgroup, ((Homotherium_serum, Smilodon_populator), ((Leopardus_pardalis, (Felis_silvestris, (Acinonyx_jubatus, (Puma_yagouaroundi, (Miracinonyx_trumani, Puma_concolor))))), (Panthera_leo, Panthera_tigris))));

S5 = (Outgroup, (Hyperailurictis_intreepidus, (Nimravides_pediomus, Nimravides_galiani, Nimravides_catacopsis)));

S6 = (Outgroup, (Nimravides_catacopsis, Miomachairodus_pseudailuroides, Machairodus_aphanistus, (Dinobastis_ischyrys, (Homotherium_crenatidens, Homotherium_johnsoni, Homotherium_crusafonti, Homotherium_idahoensis))), (Adelphailurus_kansensis, Stenailurus_teilhardi, Metailurus_parvalus, (Dinofelis_barlowi, Dinofelis_christata), (Paramachaerodus_orientalis, Promegantereon_ogygia)), ((Smilodon_fatalis, Smilodon_populator, Smilodon_gracilis), (Megantereon_hesperus, (Megantereon_whitei, Megantereon_cultridens, Megantereon_falconeri))));

***S7** = (Outgroup, (((((Leopardus_geoffroyi, Leopardus_pardalis), (Otocolobus_manul, Felis_magrita)), (Prionailurus_bengalensis, Leptailurus_serval)), (Catopuma_temmincki, (Caracal_caracal, Lynx_rufus))), ((Acinonyx_jubatus, (Puma_concolor, (Panthera_tigris, Panthera_uncia))), (Panthera_onca, (Panthera_leo, Panthera_pardus)))));

***S8** = (Outgroup, (Felis_catus, ((Neofelis_nebulosa, Neofelis_diardi), (Panthera_leo, (Panthera_uncia, (Panthera_pardus, (Panthera_onca, Panthera_tigris)))))));

***S9** = (Outgroup, (Felis_catus, (Neofelis_nebulosa, (Panthera_tigris, (Panthera_pardus, (Panthera_leo, Panthera_spelaea))))));

S10 = (Outgroup, (Leopardus_pardalis, (Puma_pardoides, (Puma_concolor, (Miracinonyx_inexpectatus, (Miracinonyx_trumani, (Acinonyx_pardinensis, Acinonyx_jubatus)))))));

***S11** = (Outgroup, (Neofelis_nebulosa, ((Panthera_onca, (Panthera_leo, Panthera_pardus)), (Panthera_tigris, Panthera_uncia))));

***S12** = (Outgroup, (Felis_magrita, (Felis_silvestris, (Felis_bieti, (Felis_catus, Felis_lybica)))));

***S13** = (Outgroup, (Panthera_onca, (Lynx_lynx, (Leopardus_pardalis, (Felis_catus, Acinonyx_jubatus)))));

***S14** = (Outgroup, ((((Puma_concolor, (Felis_catus, Felis_silvestris)), Lynx_rufus),

Acinonyx_jubatus), (Leopardus_pardalis, (Panthera_tigris, (Panthera_uncia, Panthera_leo)))));

***S15** = (Outgroup, (Felis_catus, ((Lynx_lynx, Lynx_rufus), (Puma_concolor, (Panthera_tigris, Panthera_leo)))));

***S16** = (Outgroup, (((((((Felis_chaus, (Felis_nigripes, (Felis_magrita, ((Felis_catus, Felis_silvestris), (Felis_lybica, Felis_bieti))))), (Otocolobus_manul, (Prionailurus_rubiginosa, (Prionailurus_bengalensis, (Prionailurus_viverrina, Prionailurus_planiceps))))), (Acinonyx_jubatus, (Puma_yagouaroundi, Puma_concolor))), (Lynx_rufus, (Lynx_canadensis, (Lynx_lynx, Lynx_pardina)))), ((Leopardus_wiedii, Leopardus_pardalis), ((Leopardus_jacobitus, Leopardus_colocolo), (Leopardus_tigrina, (Leopardus_geoffroyi, Leopardus_guigna))))), (Caracal_caracal, (Leptailurus_serval, Profelis_aurata))), (Pardofelis_marmorata, (Catopuma_temmincki, Catopuma_badia))), (Neofelis_nebulosa, ((Panthera_pardus, (Panthera_leo, Panthera_onca)), (Panthera_tigris, Panthera_uncia)))));

***S17** = (Outgroup, (Neofelis_nebulosa, (Pardofelis_marmorata, (Lynx_rufus, (Lynx_canadensis, (Lynx_lynx, Lynx_pardina))))));

***S18** = (Outgroup, (Panthera_tigris, Panthera_uncia, ((Neofelis_nebulosa, ((((((Felis_chaus, (Felis_nigripes, (Felis_magrita, (Felis_catus, Felis_bieti, (Felis_lybica, Felis_silvestris))))), (Otocolobus_manul, (Prionailurus_rubiginosa, (Prionailurus_viverrina, (Prionailurus_planiceps, Prionailurus_bengalensis))))), (Puma_yagouaroundi, Puma_concolor, Acinonyx_jubatus)), (Lynx_rufus, (Lynx_lynx, Lynx_pardina, Lynx_canadensis))), ((Leopardus_wiedii, Leopardus_pardalis), (Leopardus_colocolo, (Leopardus_tigrina, (Leopardus_geoffroyi, Leopardus_guigna)))), (Leptailurus_serval, (Caracal_caracal, Profelis_aurata))), (Catopuma_temmincki, Pardofelis_marmorata))), (Panthera_pardus, (Panthera_leo, Panthera_onca)))));

S19 = (Outgroup, ((Pratifelis_martini, (Pseudaelurus_quadridentatus, Hyperailurictis_intreepidus, Hyperailurictis_marshi, Hyperailurictis_stouti)), ((Nimravides_galiani, (Nimravides_catacopsis, Nimravides_pediomus)), (((Felis_proterolyncis, (Lynx_lynx, Felis_rexroadensis)), (Miracinonyx_trumani, (Puma_concolor, Felis_lacustris))), (Adelphailurus_kansensis, ((Dinofelis_christata, Dinofelis_palaeoonca), (((Machairodus_aphanistus, Machairodus_coloradensis), (Homotherium_crenatidens, Dinobastis_ischyrys, Homotherium_johnsoni, Homotherium_crusafonti, Homotherium_idahoensis)), (Megantereon_cultridens, Megantereon_hesperus))))))));

S20 = (Outgroup, (Megantereon_cultridens, (Megantereon_whitei, Megantereon_falconeri)));

S21 = (Outgroup, ((((Pardofelis_marmorata, (((Leptailurus_serval, (Profelis_aurata, Caracal_caracal)), (Prionailurus_viverrina, (Prionailurus_bengalensis, Prionailurus_planiceps))), ((Felis_nigripes, (Felis_chaus, ((Felis_catus, Felis_lybica), (Felis_magrita, Felis_silvestris)))), (Otocolobus_manul, Prionailurus_rubiginosa))), (Catopuma_badia, Catopuma_temmincki)), ((Lynx_rufus, (Lynx_canadensis, Lynx_lynx)), (Acinonyx_jubatus, (Puma_concolor, Puma_yagouaroundi)))), (((Leopardus_colocolo, Leopardus_tigrina), (Leopardus_geoffroyi, Leopardus_guigna)), (Leopardus_pardalis, Leopardus_wiedii))), (Neofelis_nebulosa, (Panthera_uncia, (Panthera_pardus, (Panthera_leo, (Panthera_onca, Panthera_tigris)))))));

S22 = (Outgroup, (Panthera_uncia, (Neofelis_nebulosa, (Panthera_onca, ((Panthera_pardus, Panthera_palaeosinensis), (Panthera_tigris, (Panthera_leo, Panthera_spelaea)))))));

S23 = (Outgroup, (Leopardus_pardalis, (Puma_concolor, (Neofelis_nebulosa, (Panthera_uncia, (Panthera_palaeosinensis, ((Panthera_tigris, Panthera_zdanskyi),

(Panthera_onca, (Panthera_atrox, (Panthera_spelaea, (Panthera_leo, Panthera_pardus))))))))));

S24 = (Outgroup, (Neofelis_nebulosa, (Panthera_uncia, (((((Panthera_tigris, Panthera_zdanskyi), Panthera_onca), Panthera_pardus), Panthera_palaeosinensis), (Panthera_spelaea, (Panthera_atrox, Panthera_leo))))));

***S25** = (Outgroup, (Panthera_onca, Panthera_uncia, (Panthera_pardus, Panthera_leo)));

***S26** = (Outgroup, (((((Felis_chaus, (Felis_nigripes, (Felis_magrita, ((Felis_catus, Felis_silvestris), (Felis_lybica, Felis_bieti))))), (Otocolobus_manul, (Prionailurus_rubiginosa, (Prionailurus_viverrina, (Prionailurus_planiceps, Prionailurus_bengalensis))))), (Acinonyx_jubatus, (Puma_yagouaroundi, Puma_concolor)), (Lynx_rufus, (Lynx_lynx, Lynx_pardina, Lynx_canadensis))), (Leopardus_wiedii, Leopardus_pardalis, (Leopardus_colocolo, (Leopardus_tigrina, Leopardus_geoffroyi, Leopardus_guigna))), (Leptailurus_serval, (Caracal_caracal, Profelis_aurata))), ((Catopuma_temmincki, Pardofelis_marmorata), (Neofelis_nebulosa, (Panthera_tigris, (Panthera_uncia, (Panthera_leo, Panthera_pardus, Panthera_onca)))))));

S27 = (Outgroup, (Proailurus_lemanensis, (Hyperailurictis_validus, (Hyperailurictis_skinneri, (Hyperailurictis_marshi, (Hyperailurictis_intreepidus, Hyperailurictis_stouti, (Puma_concolor, Lynx_canadensis)))))));

S28 = (Outgroup, (Proailurus_lemanensis, (Pseudaelurus_quadridentatus, (Promegantereon_ogygia, (Paramachaerodus_orientalis, Paramachaerodus_maximiliani)))));

S29 = (((Styriofelis_turnauensis, (Styriofelis_vallesiensis, (Pristifelis_attica, ((Felis_magrita, (Profelis_aurata, Felis_chaus)), (Felis_silvestris, (Felis_lybica, ((Panthera_pardus, Panthera_leo), (Caracal_caracal, Prionailurus_bengalensis, Lynx_pardina, Lynx_rufus, Leptailurus_serval)))))))), Proailurus_lemanensis), Outgroup);

S30 = (Outgroup, ((Prionailurus_planiceps, Prionailurus_viverrina), (Profelis_aurata, (Leopardus_geoffroyi, (Leopardus_tigrina, Leopardus_guigna, (Leopardus_pardalis, Leopardus_wiedii), (Prionailurus_bengalensis, Leptailurus_serval), (Leopardus_colocolo, Leopardus_jacobitus, Prionailurus_rubiginosa), (Puma_yagouaroundi, (Puma_concolor, (Acinonyx_jubatus, (Panthera_uncia, (Neofelis_nebulosa, (Panthera_tigris, (Panthera_onca, Panthera_leo, Panthera_pardus)))))))), (Catopuma_temmincki, (Catopuma_badia, (Pardofelis_marmorata, ((Caracal_caracal, (Lynx_rufus, (Lynx_lynx, (Lynx_canadensis, Lynx_pardina)))), (Felis_chaus, (Felis_lybica, (Felis_silvestris, (Felis_bieti, (Felis_nigripes, (Felis_magrita, Otocolobus_manul))))))))))))));

S31 = (Outgroup, (Proailurus_lemanensis, (((Styriofelis_turnauensis, Styriofelis_lorteti), ((Puma_pardoides, (Panthera_gombaszoegensis, Panthera_onca), (Panthera_tigris, Panthera_uncia, Panthera_pardus, (Panthera_atrox, Panthera_leo, Panthera_spelaea))), (Puma_concolor, ((Miracinonyx_trumani, Miracinonyx_inexpectatus), (Acinonyx_jubatus,Acinonyx_pardinensis))))), (Pseudaelurus_quadridentatus, ((Adelphailurus_kansensis, Stenailurus_teilhardi, ((Metailurus_parvalus, Metailurus_major), (Dinofelis_christata, Dinofelis_diastema, Dinofelis_piveteaui, Dinofelis_barlowi, Dinofelis_abeli, Dinofelis_palaeoonca))), (((Nimravides_galiani, (Nimravides_catacopsis, Nimravides_pediomus)), (Machairodus_aphanistus, (Amphimachairodus_giganteus, (Amphimachairodus_kurteni, (Xenosmilus_hodsonae, (Homotherium_johnsoni, Homotherium_crusafonti, Homotherium_idahoensis, Homotherium_hadarensis, Homotherium_serum, (Homotherium_crenatidens, Homotherium_latidens, Homotherium_ultimus)))))))), ((Paramachaerodus_orientalis, Promegantereon_ogygia), ((Megantereon_whitei, Megantereon_cultridens,

Megantereon_falconeri), (Smilodon_gracilis, Smilodon_populator, Smilodon_fatalis)))))))));

S32 = (Outgroup, (Leopardus_pardalis, (Puma_concolor, (Miracinonyx_inexpectatus, (Miracinonyx_trumani, (Acinonyx_pardinensis, Acinonyx_jubatus))))));

***S33** = (Outgroup, (Neofelis_nebulosa, (Panthera_tigris, (Panthera_onca, (Panthera_pardus, (Panthera_leo, Panthera_uncia))))), (Felis_catus, (Lynx_lynx, (Puma_concolor, Acinonyx_jubatus))));

S34 = (Outgroup, (Dinofelis_christata, Dinofelis_diastema, Dinofelis_barlowi, Dinofelis_palaeoonca, Dinofelis_petteri, (Dinofelis_piveteaui, Dinofelis_aranoki)));

S35 = (Outgroup, (Lynx_issiodorensis, (Lynx_pardina, Lynx_rufus, (Lynx_lynx, Lynx_canadensis))));

***S36** = (Outgroup, (Felis_catus, ((Neofelis_diardi, Neofelis_nebulosa), (Panthera_pardus, ((Panthera_uncia, Panthera_leo), (Panthera_onca, Panthera_tigris))))));

***S37** = (Outgroup, (Lynx_lynx, (Catopuma_temmincki, Prionailurus_bengalensis, Otocolobus_manul, ((Panthera_tigris, (Neofelis_nebulosa, (Panthera_leo, (Panthera_pardus, Panthera_uncia)))), (Felis_bieti, (Felis_silvestris, Felis_catus))))));

***S38** = (Outgroup, (Lynx_lynx, (((((Felis_bieti, Otocolobus_manul), (Felis_chaus, Felis_lybica)), (Prionailurus_bengalensis, Prionailurus_viverrina)), (Catopuma_temmincki, Pardofelis_marmorata)), (Panthera_pardus, (Panthera_tigris, (Panthera_uncia, Neofelis_nebulosa))))));

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