Re-analysis of all data usin R linear mixed models (lme4)

Acute stress project:

**Mortality from cages**

– seems good; n=79 total cages; 20 from each treatment except 1 ‘starved control’ cage where the sugar leaked and killed everyone

-using lme4, the date of the experiment as the random factor (this was done in 2 separate pulses), testing of the normality of the residuals looks good

-ANOVA + Tukey on the model shows that the 2 controls (no virus) groups are the same but all others are different. Very nice clean result

**Virus data –** Using same model as for the mortality, and seeing similar residual normalities, we see that Starved and Normal diet controls are the same and the 2 virus groups are the same. All others are different. Again a very clean result

**Gene expression (Alex has this)**

**Bee mass –** For this, we compared 16 starved and 20 control bees that were sampled at emergence (so there are no virus groups). This just tells us if the starvation did anything. It did. The data is normal and equal variance; just doing a t-test shows sig. difs between the groups with the starved group lighter in weight by around 12%

**Lipids –** I can only find a limited sample size for this; n=5 per group just looking at emergent bees (similar to the bee mass analysis). There aren’t differences but theres a trend for starved to have a higher % lipid…..need to think about these data more.

Chronic stress

**Mortality from cages** This is messier, as the sample sizes are unbalanced. Chestnut control =11; chestnut treatment = 11; cistus control = 21, cistus treatment = 20.

Using basically the same model system as for the acute – still 4 treatments with a date for random effect. The distribution is a little bit skewed by not too horrible.

With this model, we see a little less cleaner result than in the acute, with Cistus virus being higher than the cistus and castanea controls, but the castanea + virus is not higher than controls. Basically the castanea + virus did not differe significantly than the controls.

**Virus titers:**  The NPP is a bit funky here…but maybe still ok. Looking at the resulst, we see that the Cistus+ virus is sig. higher than both cistus and castanea controls – but castanea virus are NOT different than castanea controls. Castanea virus and cistus virus are also not different. So the cistus + virus is highest, the 2 controls are lowest, and the Castanea virus is intermediate. This suggests that the castanea treated bees are less likely to get lethal doses of virus.

**Does the gene expression data suggest why?**

**Bee Mass: Unlike with the acute treatment, there is no difference in mass**

**Bee lipids: Like the acute, no dif in lipids**