

OrNV Transmission Experiment

James Grasela and Aubrey Moore

March 15, 2020

This experiment was performed to determine if OrNV isolate V23B can be transmitted from a dosed CRB adult to an undosed CRB adult.

```
@misc{grasela_guam_2020,
  title = {Guam {{CRB Biocontrol Project Technical Report}}: {{OrNV Transmission Experiment}}},
  author = {Grasela, James and Moore, Aubrey},
  date = {2020},
  url = {https://github.com/aubreymoore/OrNV-Transmission/blob/master/ornv-transmission.pdf}
}
```

1. Materials and Methods

1.1. Beetles

Beetles were field collected from pheromone sites and kept individually in moist peat moss in Mason jars. The jars were held under standard rearing conditions in an environmental chamber: 30 deg C; 80% RH; 12h photoperiod.

1.2. Virus and Dosing Method

Beetles were dosed per os with ca. 30 microlitre V23B virus preparation of unknown concentration (AgResearch, New Zealand).

1.3. Experimental design

To test for virus transmission, beetles were selected at random and assigned to 45 pairs with a male and a female in each pair. These pairs were housed in Mason jars half filled with moist peat moss. The jars were held under standard rearing conditions. At the start of the bioassay, the beetle pairs were randomly placed in 3 treatment groups of 15 jars each. Beetles were observed every other day.

1.4. Post-mortems

Dead beetles were dissected and images were made of guts using a cellphone camera. Note on pathology were recorded.

2. Analysis

Data were saved in a comma separated values text file, **OrNV-transmission.csv**. Analysis was performed using a Jupyter notebook, **OrNV-transmission.ipynb**.

Table 1: Treatment groups.

Treatment group	Treatment
Jars labeled C1 through C15	Experimental control; neither beetle was dosed
Jars labeled TF1 through TF15	Female was dosed with virus; male was not dosed
Jars labeled MF1 through MF15	Female was dosed with virus; male was not dosed

3. Results

Results from this experiment are inconclusive because of high control mortality (Fig. 1).

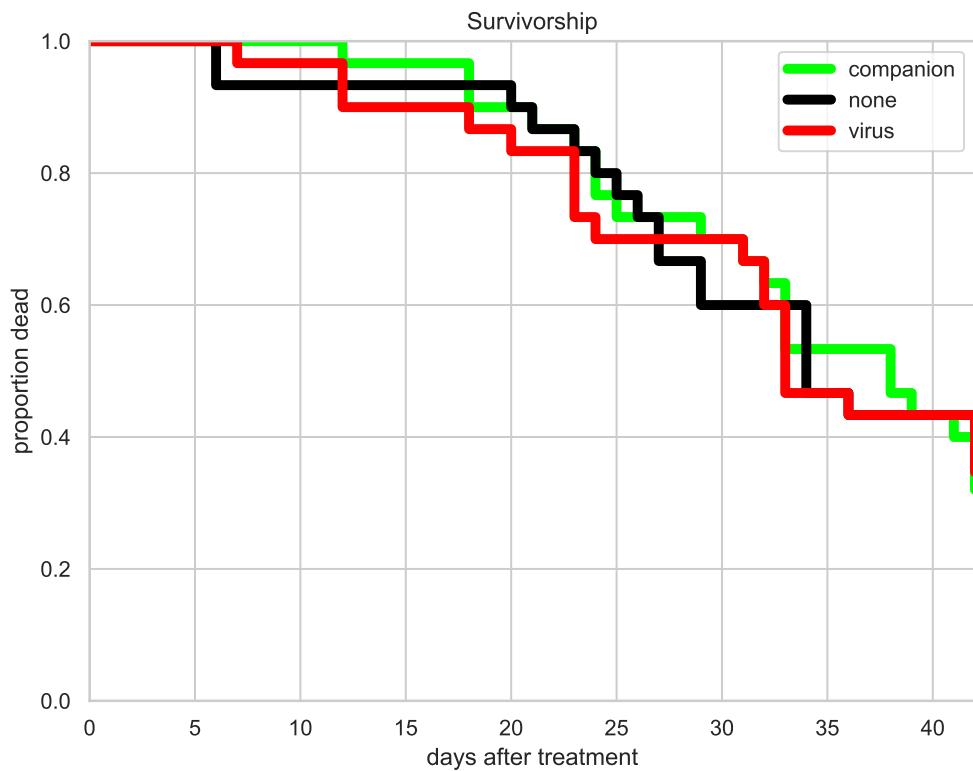


Figure 1: Survival of beetles after treatment.

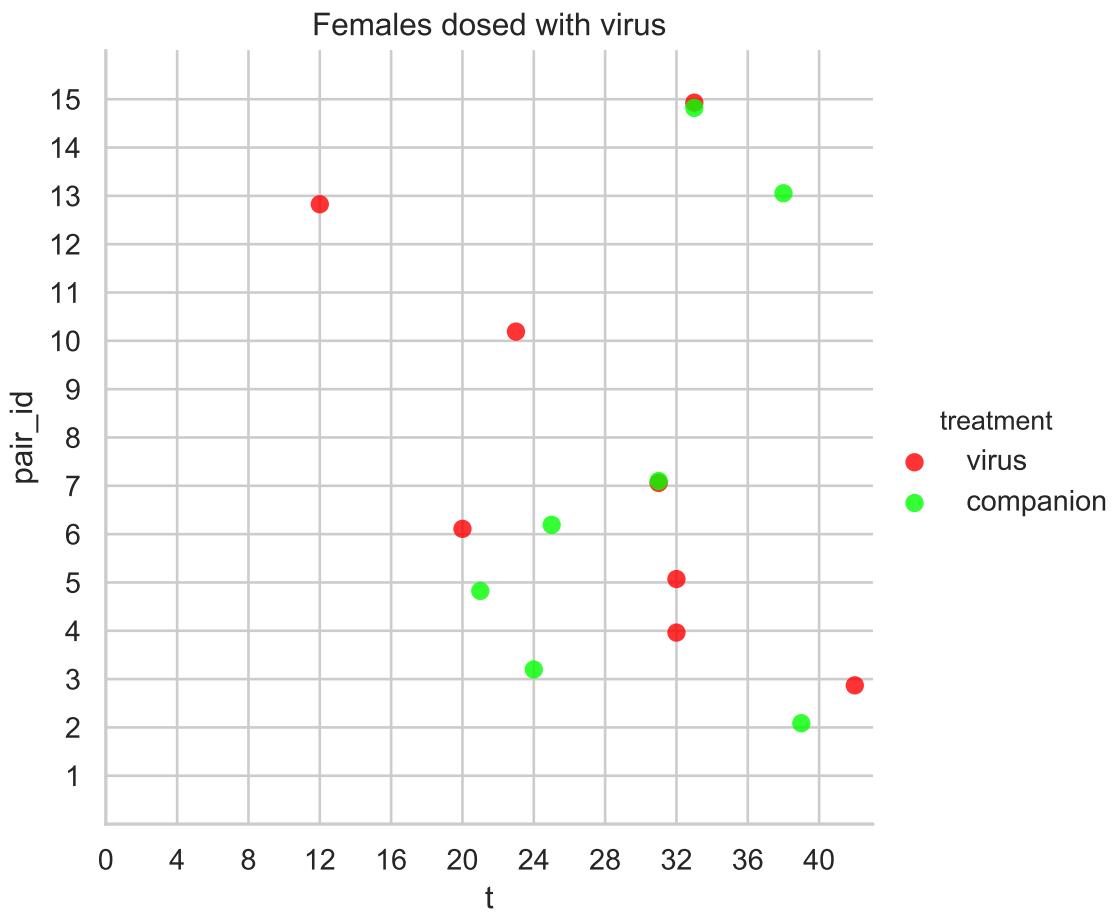


Figure 2: Mortality of beetles in jars where the female was dosed with virus. Points indicate time of death, in days after treatment, for dosed (red points) and undosed beetles (green points).

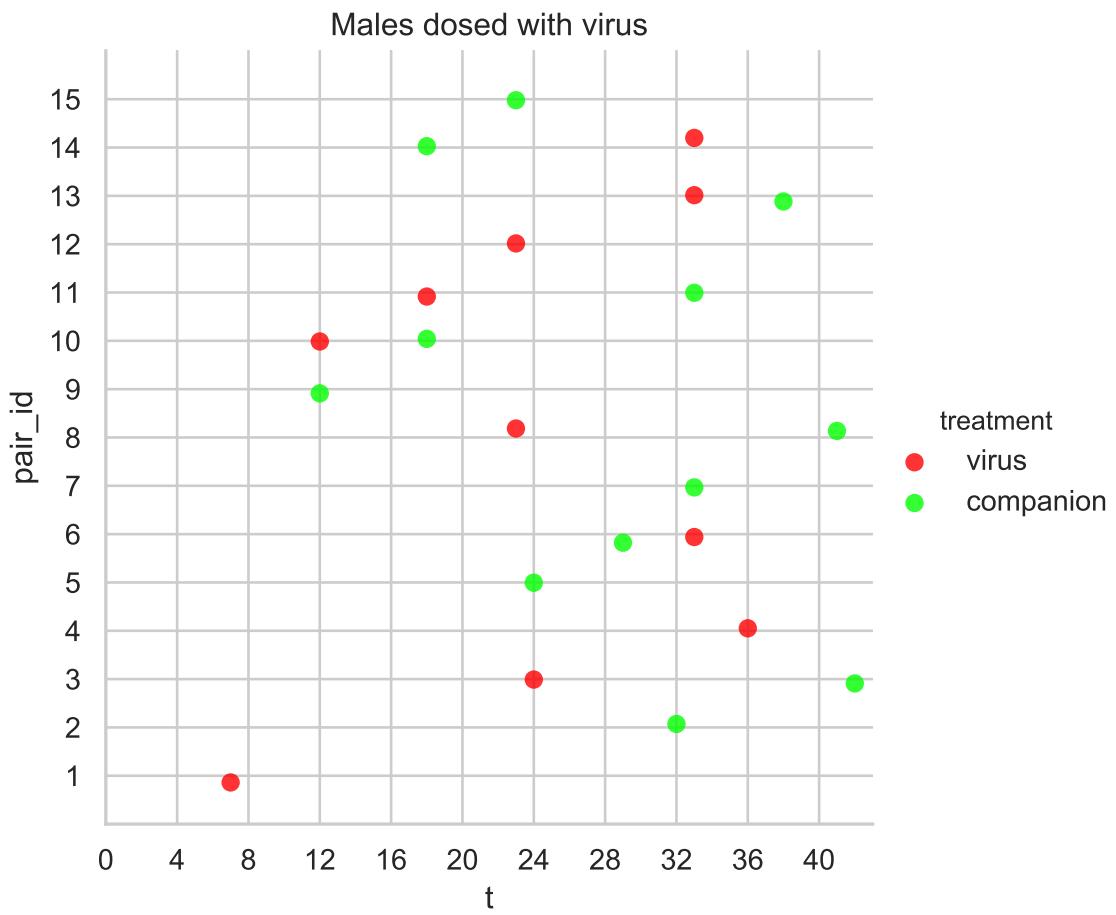


Figure 3: Mortality of beetles in jars where the male was dosed with virus. Points indicate time of death, in days after treatment, for dosed (red points) and undosed beetles (green points).

A. Data file: ornv-transmission-1.csv

```
jar_id,sex,treatment,date_treated,date_died,postmortem_virus,postmortem_bacteria,pm_image_filename
C1,m,none,2019-12-26,2020-01-16,,,20200116_110145_001.jpg
C2,m,none,2019-12-26,2020-01-29,,,20200129_145244.jpg
C3,m,none,2019-12-26,2020-01-19,,,20200119_121343.jpg
C4,m,none,2019-12-26,2020-01-21,,,20200121_112302.jpg
C5,m,none,2019-12-26,2020-01-29,,,
C6,m,none,2019-12-27,,,20200210_150730.jpg
C7,m,none,2019-12-27,2020-01-02,,,20200102_112827.jpg
C8,m,none,2019-12-27,2020-01-23,,1.0,20200123_163747.jpg
C9,m,none,2019-12-27,2020-01-25,,,
C10,m,none,2019-12-27,,,
C11,m,none,2019-12-27,2020-01-25,,,20200125_122409.jpg
C12,m,none,2019-12-27,,,20200211_095032.jpg
C13,m,none,2019-12-27,,,20200210_151921.jpg
C14,m,none,2019-12-27,,,
C15,m,none,2019-12-27,,,
C1,f,none,2019-12-26,2020-01-29,,,20200129_151721.jpg
C2,f,none,2019-12-26,,,20200210_145205.jpg
C3,f,none,2019-12-26,2020-01-29,,,20200129_161111.jpg
C4,f,none,2019-12-26,2020-01-31,,,20200131_113389.jpg
C5,f,none,2019-12-26,,,20200129_143353.jpg
C6,f,none,2019-12-27,2020-01-16,,1.0,20200116_110642.jpg
C7,f,none,2019-12-27,2020-01-02,,,20200102_112130.jpg
C8,f,none,2019-12-27,2020-01-23,,,20200123_163225.jpg
C9,f,none,2019-12-27,,,20200125_121834.jpg
C10,f,none,2019-12-27,2020-01-19,,,20200119_121825.jpg
C11,f,none,2019-12-27,,,20200210_151339.jpg
C12,f,none,2019-12-27,2020-01-21,,,20200121_113027.jpg
C13,f,none,2019-12-27,,,20200210_152419.jpg
C14,f,none,2019-12-27,,,20200210_145811.jpg
C15,f,none,2019-12-27,,,
TF1,m,companion,2019-12-26,,,
TF2,m,companion,2019-12-26,2020-02-03,,,20200203_114327.jpg
TF3,m,companion,2019-12-26,2020-01-19,,1.0,20200114_104530.jpg
TF4,m,companion,2019-12-26,,,
TF5,m,companion,2019-12-26,2020-01-16,,,20200116_111311.jpg
TF6,m,companion,2019-12-27,2020-01-21,,1.0,20200121_111727.jpg
TF7,m,companion,2019-12-27,2020-01-27,,1.0,20191229_120148.jpg
TF8,m,companion,2019-12-27,,,
TF9,m,companion,2019-12-27,,,
TF10,m,companion,2019-12-27,,,
TF11,m,companion,2019-12-27,,,
TF12,m,companion,2019-12-27,,,
TF13,m,companion,2019-12-27,2020-02-03,,,
TF14,m,companion,2019-12-27,,,
TF15,m,companion,2019-12-27,2020-01-29,,1.0,20200129_153950.jpg
TF1,f,virus,2019-12-26,,,
TF2,f,virus,2019-12-26,,,20200127_151015.jpg
TF3,f,virus,2019-12-26,2020-02-06,,,20200206_113817.jpg
TF4,f,virus,2019-12-26,2020-01-27,,,20200127_145553.jpg
TF5,f,virus,2019-12-26,2020-01-27,,,
TF6,f,virus,2019-12-27,2020-01-16,,1.0,20200116_112000.jpg
TF7,f,virus,2019-12-27,2020-01-27,,1.0,20200127_144326.jpg
TF8,f,virus,2019-12-27,,,
TF9,f,virus,2019-12-27,,,
TF10,f,virus,2019-12-27,2020-01-19,,,20200119_123529.jpg
TF11,f,virus,2019-12-27,,,
TF12,f,virus,2019-12-27,,,
TF13,f,virus,2019-12-27,2020-01-08,,1.0,20200108_101434.jpg
TF14,f,virus,2019-12-27,,,
TF15,f,virus,2019-12-27,2020-01-29,,1.0,20200129_153605.jpg
TM1,m,virus,2019-12-26,2020-01-02,,,20200102_111008.jpg
TM2,m,virus,2019-12-26,,,20200211_114845_001.jpg
TM3,m,virus,2019-12-26,2020-01-19,,,20200119_122916.jpg
TM4,m,virus,2019-12-26,2020-01-31,,,20200131_115718.jpg
TM5,m,virus,2019-12-26,,,
TM6,m,virus,2019-12-27,2020-01-29,,,
TM7,m,virus,2019-12-27,,,
TM8,m,virus,2019-12-27,2020-01-19,,,20200119_115644.jpg
TM9,m,virus,2019-12-27,,,
TM10,m,virus,2019-12-27,2020-01-08,1.0,1.0,20200108_102337.jpg
TM11,m,virus,2019-12-27,2020-01-14,,,20200114_105113.jpg
TM12,m,virus,2019-12-27,2020-01-19,,,20200119_122428.jpg
TM13,m,virus,2019-12-27,2020-01-29,,,20200129_152333.jpg
TM14,m,virus,2019-12-27,2020-01-29,,,20200129_154608.jpg
TM15,m,virus,2019-12-27,,,
TM1,f,companion,2019-12-26,,,
TM2,f,companion,2019-12-26,2020-01-27,,,20200127_150141.jpg
```

TM3,f,companion,2019-12-26,2020-02-06,,,20200206_113320.jpg
TM4,f,companion,2019-12-26,,,
TM5,f,companion,2019-12-26,2020-01-19,,,20200119_124629.jpg
TM6,f,companion,2019-12-27,2020-01-25,,1.0,
TM7,f,companion,2019-12-27,2020-01-29,,,
TM8,f,companion,2019-12-27,2020-02-06,,,20200108_103227.jpg
TM9,f,companion,2019-12-27,2020-01-08,1.0,,
TM10,f,companion,2019-12-27,2020-01-14,,1.0,20200114_105656.jpg
TM11,f,companion,2019-12-27,2020-01-29,,,20200129_152948.jpg
TM12,f,companion,2019-12-27,,,
TM13,f,companion,2019-12-27,2020-02-03,,,20200203_113806.jpg
TM14,f,companion,2019-12-27,2020-01-14,,20200114_104047.jpg
TM15,f,companion,2019-12-27,2020-01-19,,,20200119_120121.jpg

B. Post-mortem images



Figure 4: **C1m** jar_id C1 sex m treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-16 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200116_110145_001.jpg date_end_bioassay 2020-02-06
00:00:00 t 21 e True Name: 0, dtype: object



Figure 5: **C2m** jar_id C2 sex m treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria NaN
pm_image_filename 20200129_145244.jpg date_end_bioassay 2020-02-06 00:00:00
t 34 e True Name: 1, dtype: object



Figure 6: **C3m** jar_id C3 sex m treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria NaN
pm_image_filename 20200119_121343.jpg date_end_bioassay 2020-02-06 00:00:00
t 24 e True Name: 2, dtype: object



Figure 7: **C4m** jar_id C4 sex m treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-21 00:00:00 postmortem_virus NaN postmortem_bacteria NaN
pm_image_filename 20200121_112302.jpg date_end_bioassay 2020-02-06 00:00:00
t 26 e True Name: 3, dtype: object



Figure 8: **C6m** jar_id C6 sex m treatment none date_treated 2019-12-27 00:00:00 date_died
NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename
20200210_150730.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name:
5, dtype: object



Figure 9: **C7m** jar_id C7 sex m treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-02 00:00:00 postmortem_virus NaN postmortem_bacteria NaN
pm_image_filename 20200102_112827.jpg date_end_bioassay 2020-02-06 00:00:00
t 6 e True Name: 6, dtype: object



Figure 10: **C8m** jar_id C8 sex m treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-23 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200123_163747.jpg date_end_bioassay 2020-02-06 00:00:00
t 27 e True Name: 7, dtype: object



Figure 11: **C11m** jar_id C11 sex m treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-25 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200125_122409.jpg date_end_bioassay 2020-02-06
00:00:00 t 29 e True Name: 10, dtype: object



Figure 12: **C12m** jar_id C12 sex m treatment none date_treated 2019-12-27 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200211_095032.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name: 11, dtype: object



Figure 13: **C13m** jar_id C13 sex m treatment none date_treated 2019-12-27 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200210_151921.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name: 12, dtype: object



Figure 14: **C1f** jar_id C1 sex f treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200129_151721.jpg date_end_bioassay 2020-02-06
00:00:00 t 34 e True Name: 15, dtype: object

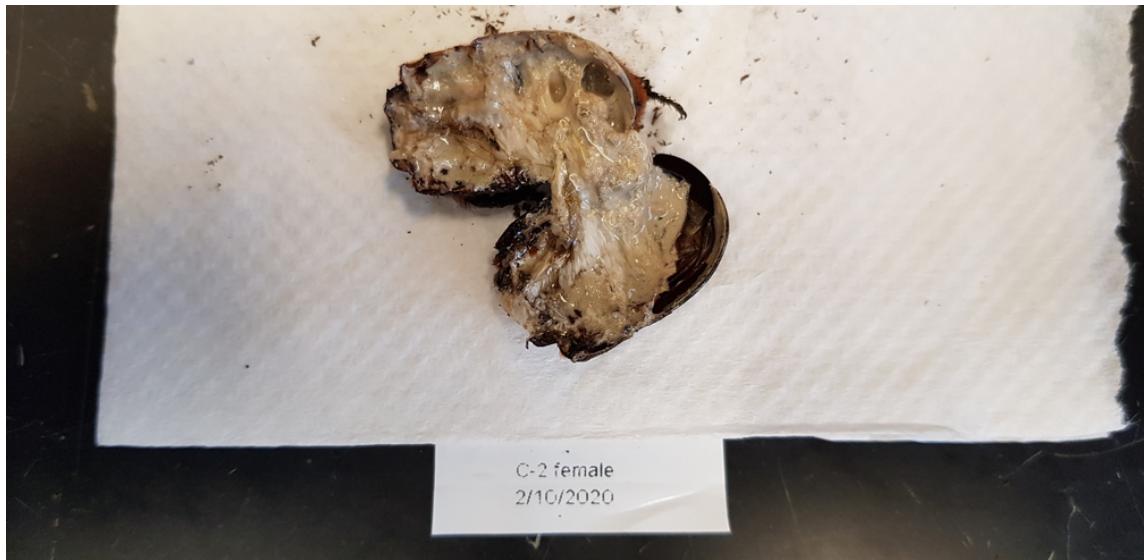


Figure 15: **C2f** jar_id C2 sex f treatment none date_treated 2019-12-26 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200210_145205.jpg date_end_bioassay 2020-02-06 00:00:00 t 42 e False Name: 16, dtype: object



Figure 16: **C3f** jar_id C3 sex f treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200129_161111.jpg date_end_bioassay 2020-02-06
00:00:00 t 34 e True Name: 17, dtype: object



Figure 17: **C4f** jar_id C4 sex f treatment none date_treated 2019-12-26 00:00:00
date_died 2020-01-31 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200131_113359.jpg date_end_bioassay 2020-02-06
00:00:00 t 36 e True Name: 18, dtype: object



Figure 18: **C5f** jar_id C5 sex f treatment none date_treated 2019-12-26 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200129_143353.jpg date_end_bioassay 2020-02-06 00:00:00 t 42 e False Name: 19, dtype: object



Figure 19: **C6f** jar_id C6 sex f treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-16 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200116_110642.jpg date_end_bioassay 2020-02-06 00:00:00
t 20 e True Name: 20, dtype: object



Figure 20: **C7f** jar_id C7 sex f treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-02 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200102_112130.jpg date_end_bioassay 2020-02-06
00:00:00 t 6 e True Name: 21, dtype: object

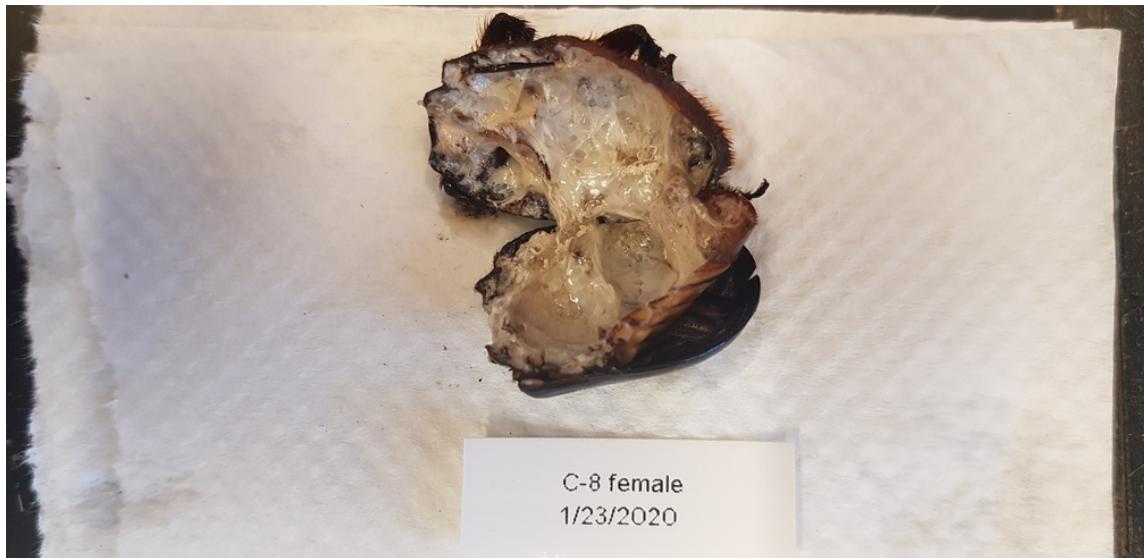


Figure 21: **C8f** jar_id C8 sex f treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-23 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200123_163225.jpg date_end_bioassay 2020-02-06
00:00:00 t 27 e True Name: 22, dtype: object



Figure 22: **C9f** jar_id C9 sex f treatment none date_treated 2019-12-27 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200125_121834.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name: 23, dtype: object



Figure 23: **C10f** jar_id C10 sex f treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200119_121825.jpg date_end_bioassay 2020-02-06
00:00:00 t 23 e True Name: 24, dtype: object



Figure 24: **C11f** jar_id C11 sex f treatment none date_treated 2019-12-27 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200210_151339.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name: 25, dtype: object



Figure 25: **C12f** jar_id C12 sex f treatment none date_treated 2019-12-27 00:00:00
date_died 2020-01-21 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200121_113027.jpg date_end_bioassay 2020-02-06
00:00:00 t 25 e True Name: 26, dtype: object



Figure 26: **C13f** jar_id C13 sex f treatment none date_treated 2019-12-27 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200210_152419.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name: 27, dtype: object



Figure 27: **C14f** jar_id C14 sex f treatment none date_treated 2019-12-27 00:00:00 date_died
NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename
20200210_145811.jpg date_end_bioassay 2020-02-06 00:00:00 t 41 e False Name:
28, dtype: object



Figure 28: **TF2m** jar_id TF2 sex m treatment companion date_treated 2019-12-26 00:00:00
date_died 2020-02-03 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200203_114327.jpg date_end_bioassay 2020-02-06
00:00:00 t 39 e True Name: 31, dtype: object



Figure 29: **TF3m** jar_id TF3 sex m treatment companion date_treated 2019-12-26 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200114_104530.jpg date_end_bioassay 2020-02-06 00:00:00
t 24 e True Name: 32, dtype: object



Figure 30: **TF5m** jar_id TF5 sex m treatment companion date_treated 2019-12-26 00:00:00
date_died 2020-01-16 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200116_111311.jpg date_end_bioassay 2020-02-06
00:00:00 t 21 e True Name: 34, dtype: object



T-6 IF/UM
male 1/21/2020

Figure 31: **TF6m** jar_id TF6 sex m treatment companion date_treated 2019-12-27 00:00:00
date_died 2020-01-21 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200121_111727.jpg date_end_bioassay 2020-02-06 00:00:00
t 25 e True Name: 35, dtype: object



Figure 32: **TF7m** jar_id TF7 sex m treatment companion date_treated 2019-12-27 00:00:00
date_died 2020-01-27 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20191229_120148.jpg date_end_bioassay 2020-02-06 00:00:00
t 31 e True Name: 36, dtype: object

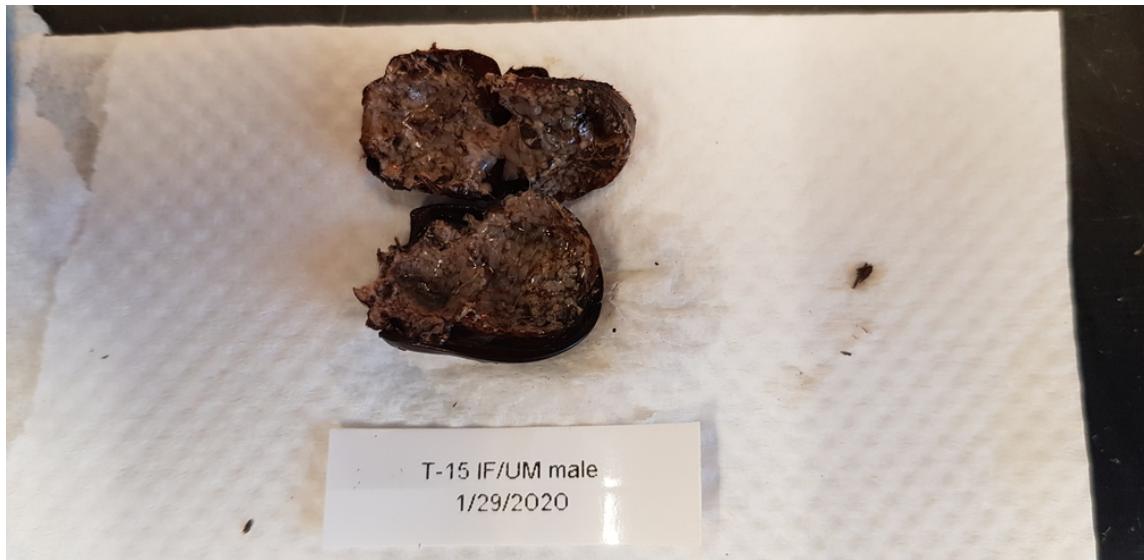


Figure 33: **TF15m** jar_id TF15 sex m treatment companion date_treated 2019-12-27 00:00:00 date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria 1 pm_image_filename 20200129_153950.jpg date_end_bioassay 2020-02-06 00:00:00 t 33 e True Name: 44, dtype: object



Figure 34: **TF2f** jar_id TF2 sex f treatment virus date_treated 2019-12-26 00:00:00
date_died NaT postmortem_virus NaN postmortem_bacteria NaN
pm_image_filename 20200127_151015.jpg date_end_bioassay 2020-02-06 00:00:00
t 42 e False Name: 46, dtype: object



Figure 35: **TF3f** jar_id TF3 sex f treatment virus date_treated 2019-12-26 00:00:00
date_died 2020-02-06 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200206_113817.jpg date_end_bioassay 2020-02-06
00:00:00 t 42 e True Name: 47, dtype: object



Figure 36: **TF4f** jar_id TF4 sex f treatment virus date_treated 2019-12-26 00:00:00
date_died 2020-01-27 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200127_145553.jpg date_end_bioassay 2020-02-06
00:00:00 t 32 e True Name: 48, dtype: object

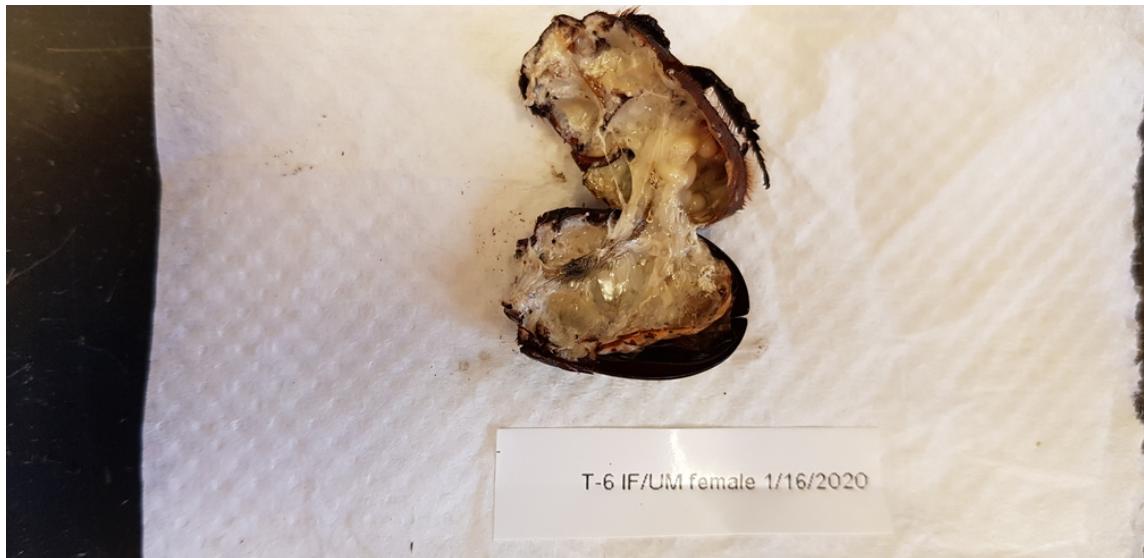


Figure 37: **TF6f** jar_id TF6 sex f treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-16 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200116_112000.jpg date_end_bioassay 2020-02-06 00:00:00
t 20 e True Name: 50, dtype: object

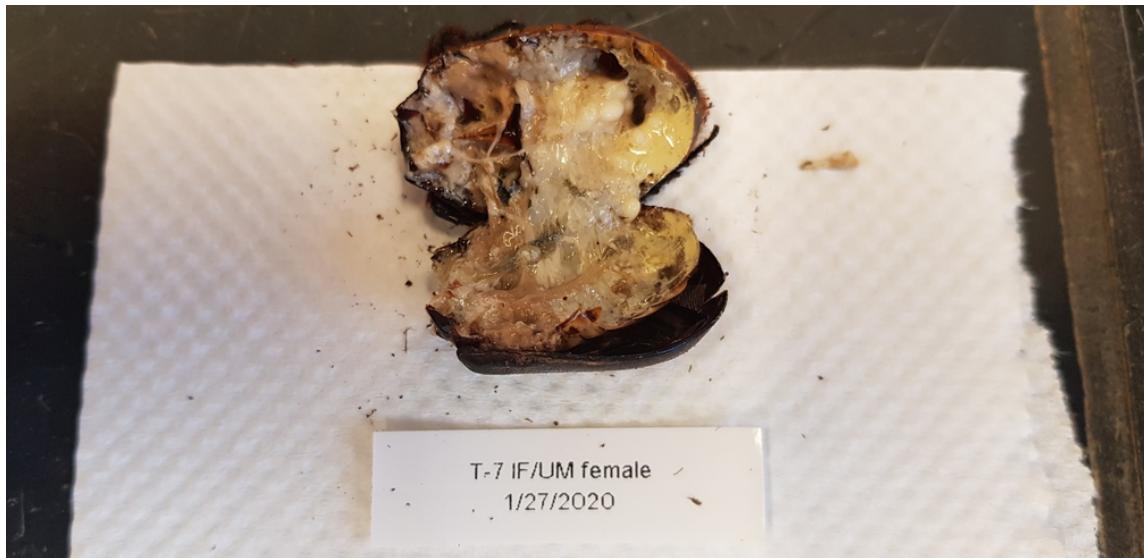


Figure 38: **TF7f** jar_id TF7 sex f treatment virus date_treated 2019-12-27 00:00:00 date_died 2020-01-27 00:00:00 postmortem_virus NaN postmortem_bacteria 1 pm_image_filename 20200127_144326.jpg date_end_bioassay 2020-02-06 00:00:00 t 31 e True Name: 51, dtype: object



Figure 39: **TF10f** jar_id TF10 sex f treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200119_123529.jpg date_end_bioassay 2020-02-06
00:00:00 t 23 e True Name: 54, dtype: object



Figure 40: **TF13f** jar_id TF13 sex f treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-08 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200108_101434.jpg date_end_bioassay 2020-02-06 00:00:00
t 12 e True Name: 57, dtype: object



Figure 41: **TF15f** jar_id TF15 sex f treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria 1
pm_image_filename 20200129_153605.jpg date_end_bioassay 2020-02-06 00:00:00
t 33 e True Name: 59, dtype: object



Figure 42: **TM1m** jar_id TM1 sex m treatment virus date_treated 2019-12-26 00:00:00
date_died 2020-01-02 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200102_111008.jpg date_end_bioassay 2020-02-06
00:00:00 t 7 e True Name: 60, dtype: object



Figure 43: **TM2m** jar_id TM2 sex m treatment virus date_treated 2019-12-26 00:00:00 date_died NaT postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200211_114845_001.jpg date_end_bioassay 2020-02-06 00:00:00 t 42 e False Name: 61, dtype: object



Figure 44: **TM3m** jar_id TM3 sex m treatment virus date_treated 2019-12-26 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200119_122916.jpg date_end_bioassay 2020-02-06
00:00:00 t 24 e True Name: 62, dtype: object



Figure 45: **TM4m** jar_id TM4 sex m treatment virus date_treated 2019-12-26 00:00:00
date_died 2020-01-31 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200131_115718.jpg date_end_bioassay 2020-02-06
00:00:00 t 36 e True Name: 63, dtype: object



Figure 46: **TM8m** jar_id TM8 sex m treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200119_115644.jpg date_end_bioassay 2020-02-06
00:00:00 t 23 e True Name: 67, dtype: object



Figure 47: **TM10m** jar_id TM10 sex m treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-08 00:00:00 postmortem_virus 1 postmortem_bacteria 1
pm_image_filename 20200108_102337.jpg date_end_bioassay 2020-02-06 00:00:00
t 12 e True Name: 69, dtype: object



Figure 48: **TM11m** jar_id TM11 sex m treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-14 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200114_105113.jpg date_end_bioassay 2020-02-06
00:00:00 t 18 e True Name: 70, dtype: object



Figure 49: **TM12m** jar_id TM12 sex m treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200119_122428.jpg date_end_bioassay 2020-02-06
00:00:00 t 23 e True Name: 71, dtype: object



Figure 50: **TM13m** jar_id TM13 sex m treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200129_152333.jpg date_end_bioassay 2020-02-06
00:00:00 t 33 e True Name: 72, dtype: object

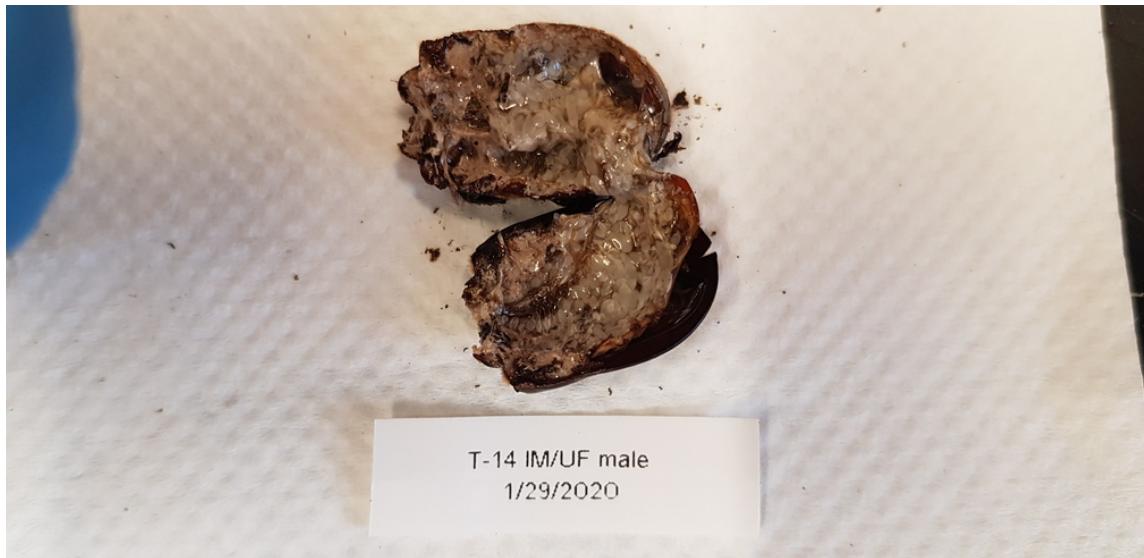


Figure 51: **TM14m** jar_id TM14 sex m treatment virus date_treated 2019-12-27 00:00:00
date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200129_154608.jpg date_end_bioassay 2020-02-06
00:00:00 t 33 e True Name: 73, dtype: object



Figure 52: **TM2f** jar_id TM2 sex f treatment companion date_treated 2019-12-26 00:00:00
date_died 2020-01-27 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200127_150141.jpg date_end_bioassay 2020-02-06
00:00:00 t 32 e True Name: 76, dtype: object



Figure 53: **TM3f** jar_id TM3 sex f treatment companion date_treated 2019-12-26 00:00:00
date_died 2020-02-06 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200206_113320.jpg date_end_bioassay 2020-02-06
00:00:00 t 42 e True Name: 77, dtype: object



Figure 54: **TM5f** jar_id TM5 sex f treatment companion date_treated 2019-12-26 00:00:00
date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200119_124629.jpg date_end_bioassay 2020-02-06
00:00:00 t 24 e True Name: 79, dtype: object



Figure 55: **TM8f** jar_id TM8 sex f treatment companion date_treated 2019-12-27 00:00:00
date_died 2020-02-06 00:00:00 postmortem_virus NaN postmortem_bacteria
NaN pm_image_filename 20200108_103227.jpg date_end_bioassay 2020-02-06
00:00:00 t 41 e True Name: 82, dtype: object



Figure 56: **TM10f** jar_id TM10 sex f treatment companion date_treated 2019-12-27 00:00:00 date_died 2020-01-14 00:00:00 postmortem_virus NaN postmortem_bacteria 1 pm_image_filename 20200114_105656.jpg date_end_bioassay 2020-02-06 00:00:00 t 18 e True Name: 84, dtype: object



Figure 57: **TM11f** jar_id TM11 sex f treatment companion date_treated 2019-12-27 00:00:00 date_died 2020-01-29 00:00:00 postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200129_152948.jpg date_end_bioassay 2020-02-06 00:00:00 t 33 e True Name: 85, dtype: object



Figure 58: **TM13f** jar_id TM13 sex f treatment companion date_treated 2019-12-27 00:00:00 date_died 2020-02-03 00:00:00 postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200203_113806.jpg date_end_bioassay 2020-02-06 00:00:00 t 38 e True Name: 87, dtype: object



Figure 59: **TM14f** jar_id TM14 sex f treatment companion date_treated 2019-12-27 00:00:00 date_died 2020-01-14 00:00:00 postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200114_104047.jpg date_end_bioassay 2020-02-06 00:00:00 t 18 e True Name: 88, dtype: object



Figure 60: **TM15f** jar_id TM15 sex f treatment companion date_treated 2019-12-27 00:00:00 date_died 2020-01-19 00:00:00 postmortem_virus NaN postmortem_bacteria NaN pm_image_filename 20200119_120121.jpg date_end_bioassay 2020-02-06 00:00:00 t 23 e True Name: 89, dtype: object