**Identifying compatibility between *Acropora cervicornis* individuals using larvae ratios**

*Introduction:*

Coral reefs play a large role in maintaining the health of marine ecosystems. However, many species of corals are now endangered due to recent human impacts. According to Tom C. L. Bridge, over 80% of coral reefs in Chinese waters have been depleted due to coastal development and overfishing. World-wide, coral reef coverage has decreased roughly 60% (1). To help restore coral reefs, restoration efforts have been made by creating coral nurseries. In these nurseries, coral individuals are grown for a year and then planted in a reef in the wild (2). In order for these corals to perpetuate in the wild, they must be able to reproduce which requires out planting of compatible individuals back into the wild together.

Unfortunately, there has yet to be discovered a genetic feature of compatibility between coral individuals. In humans, MHC alleles have a role in compatibility, and in plants it is the S allele locus (3). However, through making batch cultures of equal amounts of gametes from each coral parent and genotyping the offspring we can determine whether the parents contributed equally to the batch or not. In August 2013 and this past summer, batch cultures for three different crosses of *Acropora cervicornis* colonies. The first cross was performed during August 2013, between four different parents. The second cross was performed this past summer with four different parents, and the third cross was performed this past summer with three different parents. The offspring from each of the crosses were genotyped. The null hypothesis is that there would be equal ratios of parental contribution in each cross, meaning that all parents were equally compatible. Alternatively, some coral colonies will be more compatible than others.

*Materials and Methods:*

The first cross, 2013, was performed last summer from four different *Acropora cervicornis* colonies made for a batch culture. From this batch of larvae, four subsamples were taken at 48 hours post fertilization. The parental DNA had already been extracted and genotyped at four loci. For the second cross, CRF1, and third cross, CRF2 that was performed this past summer, the same procedure was performed and the larvae were taken in two subsamples. However, for the second cross, the parent from Horseshoe was not genotyped. Its DNA was extracted using the Nucleon Phenotype Genomic DNA Extraction method. In regard to the larvae, the DNA was extractedfrom single larva using the Chelex method. In this experiment, 5% Chelex solution was used. From the first cross, the DNA of 96 larvae were extracted, and from the second and third cross, the DNA of 48 larvae from each cross was extracted.

*Table 1.* *A. cervicornis* sample data

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **loci** |  | **loci** |  | **loci** |  | **loci** |  |
| **Cross** | **Parent** | **166** |  | **181** |  | **182** |  | **207** |  |
| 2013 | u4 | 137 | 140 | 171 | 174 | 161 | 167 | 155 | 164 |
|  | u13 | 143 | 143 | 162 | 180 | 164 | 167 | 155 | 155 |
|  | M5 | 140 | 140 | 174 | 177 | 161 | 161 | 158 | 161 |
|  | u28 | 146 | 149 | 174 | 183 | 155 | 167 | 158 | 158 |
| CRF1 | u75 | 143 | 143 | 159 | 171 | 143 | 170 | 158 | 161 |
|  | K3 | 140 | 146 | 147 | 177 | 161 | 167 | 158 | 161 |
|  | u39 | 146 | 146 | 171 | 171 | 158 | 167 | 158 | 167 |
|  | Horseshoe | ? | ? | ? | ? | ? | ? | ? | ? |
| CRF2 | K3 | 140 | 146 | 147 | 177 | 161 | 167 | 158 | 161 |
|  | u75 | 143 | 143 | 159 | 171 | 143 | 170 | 158 | 161 |
|  | M5 | 140 | 143 | 174 | 177 | 161 | 161 | 158 | 161 |

*Table 2*. *A. cervicornis* batch and number samples taken from each subsample

|  |  |
| --- | --- |
| 1. cerivnicornis larvae batch – number of subsample | Number of samples taken |
| 2013 | 96 |
| CRF1 | 48 |
| CRF2 | 48 |

DNA in the samples were selectively amplified using 4 previously published microsatellite primers (4). The four published microsatellite primers used in the PCR were 166 and 181, (added to PCR multiplex I), 182, and 207 (added to PCR multiplex II). PCR products were visualized using an ABI 3730 automated sequencer with an internal size standard for accurate sizing. Electropherograms were analyzed with GeneMapper Software 4.0 (AppliedBiosystems). Then program Cervus was used to compare allele frequencies and identify the most likely parents for each individual larvae.

*Results*

Table 3. Parental Alleles at Primers

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **loci** |  | **loci** |  | **loci** |  | **loci** |  |
| **Cross** | **Parent** | 166 |  | 181 |  | 182 |  | 207 |  |
| CRF1 | Horseshoe | 143 | 143 | 174 | 177 | 143 | 158 | 164 | 173 |

Table 4. Observed Larvae Allele Ratios

|  |  |  |  |
| --- | --- | --- | --- |
| **Cross** | possible parents | combinations | counts |
| **2013** | u4 | M5u28 | 12 |
| **2013** | u13 | M5u4 | 3 |
| **2013** | M5 | M5K3 | 2 |
| **2013** | u28 | u28u39 | 2 |
| **2013** |  | M5u39 | 1 |
| **2013** |  | u4u28 | 0 |
| **2013** |  | M5u13 | 0 |
| **2013** |  | u4u13 | 0 |
| **2013** |  | u28u13 | 0 |
|  |  |  |  |
| **CRF1** | u75 | u75HS | 2 |
| **CRF1** | K3 | M5u75 | 2 |
| **CRF1** | u39 | M5HS | 1 |
| **CRF1** | HS | K3u75 | 0 |
| **CRF1** |  | K3u39 | 0 |
| **CRF1** |  | K3HS | 0 |
| **CRF1** |  | HSu39 | 0 |
| **CRF1** |  | u75u39 | 0 |
|  |  |  |  |
|  |  |  |  |
| **CRF2** | K3 | M5K3 | 2 |
| **CRF2** | u75 | u28u75 | 2 |
| **CRF2** | M5 | u13u75 | 2 |
| **CRF2** |  | u75K3 | 1 |
| **CRF2** |  | u75M5 | 0 |

Table 5. Unidentified Parents Larvae analysis. Comments on far right. Alleles that don’t match parent alleles are copied with loci bolded and underlined. Ex: **181** 183. Loci missing alleles are indicated with “missing alleles” highlighted in yellow. “Doesn’t add up” means the allele combination implies parents that aren’t present at each loci. “NO ALLELES IDed” highlighted in red means no alleles were identified.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Loci | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 183 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
| allele | 140 | K3 | 174 | HS | 143 | u75 | 173 | HS |  |  |  |  |  |  |  |  |  |  |
| allele | 140 | K3 | 183 | ? | 131 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.4 (37987)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 168 | 183 |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **166** | 149 |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 168 | ? | 158 | u39,HS | 158 | u75, K3, u39 | likely K3 is a parent |  |  |  |  |  |  |  |  |  |
|  | 149 | ? | 183 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.4 (37988)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 162 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 171 | u75,u39 | 170 | u75 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.4 (38019)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | could be selfed or cross with K3 & M5 |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 174 | M5 | 161 | K3 | 158 | K3, M5 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 174 | M5 | 167 | M5, K3 | 161 | K3,M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.5(38353)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 168 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75,HS | 168 | ? | 158 | HS, u39 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 149 | ? | 168 | ? | 170 | u75 | 161 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.5 (38354)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be self cross or with u75 and HS |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 143 | u75, HS | 158 | u75, u39, K3 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 161 | u75, HS | 158 | u75, u39, K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.5 (38384)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 174 | HS | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 174 | HS | 167 | K3, u39 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.6 (38719)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 170 | K3 | 161 | u75,K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.7 (39084)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 | 162 |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely K3 selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.8 (39449)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | could be cross of K3 with u75 |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 162 | 183 |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 143 | u75,HS | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75,HS | 183 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.9 (39814)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 161 | K3 | 158 | u75, K3, u39 | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 174 | HS | 173 | ? | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.9 (39815)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 | 171 |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be cross of K3 with u75 |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 143 | u75, HS | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 171 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.9 (39845)** |  |  |  |  |  |  | likely cross of u75 |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | no parent allele at 183 |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 183 |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 171 | u75 | 143 | u75 | 158 | K3,u75,M5 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 183 | ? | 161 | K3,M5 | 158 | K3,u75,M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **40180** |  |  |  |  |  |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.10 (40211)** |  |  |  |  |  |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.11 (40544)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | u75 is likely a parent |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 162 |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 162 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 171 | u75, u39 | 170 | u75 | 161 | K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.11 (40545)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 170 | u75 | 161 | K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.12 (40910)** |  |  |  |  |  |  | **181** | 162 | 168 |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 158 | u39, HS | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 168 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.12(40940)** |  |  |  |  |  |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely cross of u75 with M5 or K3 |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | x |  | 143 | u75 | 158 | K3, u75, M5 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | x |  | 143 | u75 | 158 | K3, u75, M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.13(41275)** |  |  |  |  |  |  | **181** | 183 |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely cross of K3 with u75 |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 171 | u75 | 161 | K3, M5 | 158 | K3, u75, M5 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 183 | ? | 170 | u75 | 158 | K3, u75, M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.13 (41276)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely cross of K3 with u75 |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 143 | u75 | 158 | M5, u75, K3 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 174 | M5 | 161 | K3, M5 | 173 | ? |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.13(41306)** |  |  |  |  |  |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.14(41640)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 183 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 171 | u75, u39 | 143 | u75, HS | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 183 | ? | 161 | K3 | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.15 (42006)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **207** | missing alleles |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 143 | u75, HS | x |  | likely u75 is a parent |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | x |  | 170 | u75 | x |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.15(42036)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 162 | ? | 161 | K3,M5 | 158 | all | likely K3 or M5 is a parent |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 177 | K3, M5 | 161 | K3,M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.15(42037)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely K3-M5 cross or selfcross of K3 or M5 |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 162 | ? | 161 | K3,M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 177 | K3,M5 | 161 | K3,M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.16(42371)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 143 | u75,HS | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 174 | HS | 161 | K3 | 164 | HS |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.17(42736)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | 140 | K3 | x |  | 158 | u39, HS | x |  | **207** | missing alleles |  |  |  |  |  |  |  |  |
|  | 143 | u75,HS | x |  | 158 | u39, HS | x |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.17(42767)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 162 |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 162 | ? | 161 | K3, M5 | 158 | all | likely M5 is a parent and either selfcorssed or crossed with K3 |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 174 | M5 | 161 | K3, M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.17(42768)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | NO ALLELE INFO |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.18(43101)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 | 168 |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **166** | 149 |  |  |  |  |  |  |  |  |
|  | 143 | u75,HS | 162 | ? | 158 | u39, HS | 158 | u75,K3,u39 | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 149 | ? | 168 | ? | 161 | K3 | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.18(43102)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 183 |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 171 | u39,u75 | 143 | u75,HS | 158 | u75,K3,u39 | could be K3 and u75 |  |  |  |  |  |  |  |  |  |
|  | 143 | u75, HS | 183 | ? | 161 | K3 | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.18(43132)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | x |  | 161 | K3,M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | x |  | 161 | K3,M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.19(43466)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 158 | u39, HS | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 177 | K3, HS | 161 | K3 | 173 | HS |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.19(43467)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 171 | u75.u39 | 143 | u75,HS | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 183 | ? | 161 | K3 | 161 | u75,K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.1.19(43497)** |  |  |  |  |  |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.20(43831)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | x |  | 161 | K3 | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | x |  | 170 | u75 | 161 | u75,K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.20(43832)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 162 | ? | 158 | u39, HS | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 174 | HS | 161 | K3 | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.20(43863)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely M5 is a parent and either selfcorssed or crossed with K3 |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 162 | ? | 161 | K3, M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3, M5 | 174 | M5 | 161 | K3, M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.21(44197)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | x |  | 143 | u75, HS | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | x |  | 161 | K3 | 161 | u75,K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.21(44198)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely u75 selfcrossed |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 171 | u75,u39 | 143 | u75, HS | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 171 | u75,u39 | 170 | u75 | 161 | u75,K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.21(44229)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 183 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 171 | u75 | 161 | K3, M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 183 | ? | 170 | u75 | 161 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.22(44562)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.22(44563)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 168 | 183 |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 168 | ? | 161 | K3 | 158 | u75, K3, u39 | likely K3 is a parent |  |  |  |  |  |  |  |  |  |
|  | 149 | ? | 183 | ? | 173 | ? | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.23(44927)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 162 | ? | 158 | u39, HS | 158 | u75, K3, u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 174 | HS | 161 | K3 | 164 | HS |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.23(44959)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 174 | M5 | 143 | u75 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75 | 174 | M5 | 167 | K3 | 161 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.1.24(45292)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 162 | 162 |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3 | 162 | ? | 143 | u75, HS | 158 | u75,K3,u39 | likely K3 and u75 |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | 162 | ? | 161 | K3 | 161 | u75,K3 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **1.2.24(45293)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | x |  | 143 | u75, HS | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  | 143 | u75.HS | x |  | 161 | K3 | 158 | u75,K3,u39 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **2.2.24(45324)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3,M5 | 174 | M5 | 161 | K3, M5 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  | 140 | K3,M5 | 174 | M5 | 167 | K3 | 158 | all |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely M5 and u28 |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 174 | u4,M5,u28 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-29** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely u28 and M5 |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 177 | M5 | 167 | u4,u13,u28 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-30** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 177 | M5 | 167 | u4,u13,u28 | 164 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-33** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 167 | u4,u13,u28 | 164 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-34** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 180 | u13 | 164 | u13 | 164 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-35** |  |  |  |  |  |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | u13? |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely M5 self-cross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 180 | u13 | 164 | u13 | 164 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-36** |  |  |  |  |  |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | u13? |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely u28 and M5 |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 180 | u13 | 167 | u4,u13,u28 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **182** | 173 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be M5 selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-15** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 158 | M5,u28 | u4 is definitely a parent |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 180 | u13 | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-17** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | 182 | 153 | 173 |  |  |  |  |  |  |  |
|  | 146 | u28 | 156 | ? | 153 | ? | 158 | M5,u28 | 181 | 156 |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 183 | u28 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-19** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely M5 self-cross |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | u13 wtf |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely u4 |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5 | 167 | u4,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-22** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5 | 167 | u4,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 149 | u28 | 177 | M5 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-23** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 158 | M5,u28 | likely u4 is a parent |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5 | 167 | u4,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-26** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely just M5 selfed |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | 181 | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | 182 | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 158 | M5,u28 | likely M5 is a parent |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 180 | u13 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-29** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-30** |  |  |  |  |  |  | 181 | 156 |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely M5 is a parent |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 167 | u4,u13,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-34** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | 182 | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | Likely M5 selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-1-36** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | X |  | 164 | u13 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | U28 | X |  | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | 182 | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 161 | u4,M5 | 158 | M5,u28 | likely M5-u28 cross |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | x |  | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-16** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | 182 | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 161 | u4,M5 | 158 | M5,u28 | likely M5 is a parent of selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-17** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be u28 and M5 |  |  |  |  |  |  |  |  |  |
|  | x |  | x |  | 161 | u4,M5 | 158 | M5,u28 | 166 | missing alleles |  |  |  |  |  |  |  |  |
|  | x |  | x |  | 167 | u4,u13,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 161 | u4,M5 | 158 | M5,u28 | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-23** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 167 | u4,u13,u28 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-24** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | 181 | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | 182 | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 161 | u4,M5 | 158 | M5,u28 | likely M5-u28 cross |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | x |  | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | M5,u28 | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-29** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 180 | u13 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-32** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 161 | u4,M5 | 158 | M5,u28 | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | x |  | 164 | u13 | 164 | u4 | u13? |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-33** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely u28 and M5 cross |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 174 | u4,M5,u28 | 167 | u4,u13,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-2-34** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 180 | u13 | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | u4 is likely a parent |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 158 | M5,u28 | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 180 | u13 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-14** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | likely M5 self-cross |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 167 | u4,u13,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-15** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | likely M5 selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-17** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **182** | 173 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be M5-u28 cross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 177 | M5 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-18** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 161 | M5 | M5 could be parent |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 177 | M5 | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-20** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **182** | 173 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 177 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | M5 is likely a parent |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 177 | M5 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-25** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | M5 is likely a parent |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 180 | u13 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-26** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | X |  | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | X |  | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **166** | missing alleles |  |  |  |  |  |  |  |  |
|  | X |  | x |  | 155 | u28 | 158 | M5,u28 | likely u28 and M5 cross |  |  |  |  |  |  |  |  |  |
|  | X |  | x |  | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-29** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | missing alleles |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | X |  | 161 | u4,M5 | 161 | M5 | u13? |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | X |  | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-30** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | not adding up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 167 | u4,u13,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 180 | u13 | 173 | ? | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-31** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **182** | 173 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | likely M5 selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-33** |  |  |  |  |  |  | NO ALLELES IDed |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  |  |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | x |  | x |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |
|  | x |  | x |  | x |  | x |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-35** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 180 | u13 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-3-36** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | u4 and M5 are likely parents |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 174 | u4,M5,u28 | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 180 | u13 | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be M5-u28 cross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 174 | u4,M5,u28 | 167 | u4,u13,u28 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-16** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 164 | u13 | 158 | M5,u28 | u13? |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 174 | u4,M5,u28 | 167 | u4,u13,u28 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-20** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **182** | 173 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 177 | M5 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-21** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **181** | 156 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | could be M5 selfcross |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 167 | u4,u13,u28 | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-25** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | **182** | 173 |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | could be M5-u28cross |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 174 | u4,M5,u28 | 173 | ? | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-26** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | doesn't add up |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) |  |  |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 162 | u13 | 161 | u4,M5 | 161 | M5 |  |  |  |  |  |  |  |  |  |  |
|  | 146 | u28 | 174 | u4,M5,u28 | 164 | u13 | 164 | u4 |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | **sample** | **AC1-4-27** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 166 |  | 181 |  | 182 |  | 207 |  | Likely M5 selfcross |  |  |  |  |  |  |  |  |  |
|  | allele | parent(s) | allele | parent(s) | allele | parent(s) | allele | parent(s) | **181** | 156 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 156 | ? | 161 | u4,M5 | 158 | M5,u28 | **182** | 173 |  |  |  |  |  |  |  |  |
|  | 140 | u4,M5 | 177 | M5 | 173 | ? | 158 | M5,u28 |  |  |  |  |  |  |  |  |  |  |

In August 2013 and this past summer, samples from three different batches of were taken from the Florida Keys. The parents were genotyped at four loci, 166, 181, 182, and 207 (Table 1). Only 15% of the larvae were assigned parents by Cervus. From the 2013 cross, the most common parent combination was M5 and u28, at about 60% of the identified larvae. A few parent combinations involved parents from different crosses., such as u28 from the 2013 cross matched with u39 from CRF1. This could be a result of mislabeled fragments or contamination in various lab procedures. In CRF1, the most common parent pairing was Horseshoe and u75 at a tie with M5 and u75. M5 was not a possible parent in this cross. Both of the crosses frequency was 40%. In the cross CRF2, the most common parent combination was a three way tie between M5 with K3, u28 with u75, and u13 with u75, all at a frequency of 29%. The parents u28 and u13 were not possible parents in this cross. Contamination and mislabeled fragments could have caused the appearance of these alien parents. These reasons, including the possibility of larvae mutation, could also explain why 85% of the larvae could not be assigned parents. A common issue was the presence of alleles that did not match any of the parents. This could possibly be a result of mutation or the presence of an unknown parent. Some larvae had alleles that could imply self-crossing or two different parents, but there was not enough evidence to determine which was the case.

*Discussion*

The results of this study indicated the some level individual compatibility between the parents in the three crosses; however, the parents were identified for only 15% of the larvae. The low percentage of identified parents could be due to an unknown contamination during the crosses and mislabeling of fragments, in addition to the possibility of colonies self-crossing or self-mutating. Further investigation of these possibilities could include extracting the DNA of the parents again to see if the same alleles are present and verify the accuracy of the alleles originally identified. If the same alleles are found, more larvae samples could be extracted to strengthen the findings of this study.

*Acropora cervicornis* is becoming increasingly threatened by human impacts and climate change. As it is one of the fastest growing reef-building species of coral, its welfare is crucial to the recovery and vitality of Caribbean reefs (5). Studies such as this could improve the prospects for this species, enhancing chances of survival through nursery out-planting (2). Further investigation of these crosses could result in compelling evidence of compatibility between different coral genotypes and enhance reproductive success in the wild by planting these compatible colonies in close vicinity in the wild.

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