Supplemental Figure S1

Alignments of the ORF regions of \textit{A930004D18Rik} and \textit{A830005F24Rik} among the mouse species and closely related outgroup species where the sequences could be identified in the respective genomic regions. (A) shows the summary of the alignments. (B), (C), and (D) show the alignments of \textit{A930004D18Rik} ORF1, \textit{A930004D18Rik} ORF2, and \textit{A830005F24Rik} ORF separately. For each alignment, all nucleotide sequences have been aligned to the one of \textit{Mus musculus} as reference, and amino acids have been translated according to the reference frame. Alignment was done in Geneious Prime (2019.0.3 Biomatters Ltd.). The topology of the species tree is shown at the left part. Nucleotides and amino acids are shown in IUPAC codes. Enablers (common disablers) are marked with red rectangles.
<table>
<thead>
<tr>
<th></th>
<th>A930004D18Rik ORF1</th>
<th>A930004D18Rik ORF2</th>
<th>A830005F24Rik ORF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intact ORF</strong></td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Youngest enabler</strong></td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td><strong>Inferred emergence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>time</strong></td>
<td>2 - 4 mya</td>
<td>8 - 10 mya</td>
<td>6 - 8 mya</td>
</tr>
</tbody>
</table>

- **Mus musculus**
  - Intact ORF: YES
  - Youngest enabler: YES
- **Mus spretus**
  - Intact ORF: YES
  - Youngest enabler: NO
- **Mus spicilegus**
  - Intact ORF: YES
  - Youngest enabler: NO
- **Mus caroli**
  - Intact ORF: NO
  - Youngest enabler: YES
- **Mus mattheyi**
  - Intact ORF: NO
  - Youngest enabler: NO
- **Mus pahari**
  - Intact ORF: NO
  - Youngest enabler: YES
- **Apodemus uralensis**
  - Intact ORF: NO
  - Youngest enabler: NO
- **Rattus norvegicus**
  - Intact ORF: NO
  - Youngest enabler: NO

**Inferred emergence time**
- 2 - 4 mya for A930004D18Rik ORF1
- 8 - 10 mya for A930004D18Rik ORF2
- 6 - 8 mya for A830005F24Rik ORF