

## Description of Additional Supplementary Files

**Supplementary Data 1:** List of oligonucleotide sequences.

**Supplementary Data 2:** Sequencing data summary of small- and long-RNAs

**Supplementary Data 3:** Gene expression levels in oocytes and early embryos derived from WT, *Piwil2*<sup>-/-</sup>, *Piwil3*<sup>-/-</sup> and *Piwil4*<sup>-/-</sup> golden hamsters.

**Supplementary Data 4:** Gene expression levels in *Piwi*-deficient golden hamster testis.

**Supplementary Data 5:** Differentially expressed consensus TEs in WT versus *Piwil1*<sup>-/-</sup> MII oocyte.

**Supplementary Data 6:** Differentially expressed consensus TEs in WT versus *Piwil3*<sup>-/-</sup> MII oocyte.

**Supplementary Data 7:** Gene expression levels in oocytes and early embryos derived from WT and *Piwil3*<sup>-/-</sup> golden hamsters.

**Supplementary Data 8:** Top10,000 piRNA expression during oocyte and embryo development in WT or *Piwil3*<sup>-/-</sup> mutants.

**Supplementary Data 9:** List of delayed genes in maternal *Piwil3*<sup>-/-</sup> embryos

**Supplementary Data 10:** Consensus-TE expression levels in oocytes and early embryos derived from WT and *Piwil3*<sup>-/-</sup> golden hamsters.

**Supplementary Data 11:** Consensus-TE expression levels in *Piwi*-deficient golden hamster testis.

**Supplementary Data 12:** Gene expression levels in *Piwil1*-deficient spermatogenesis of golden hamster.

**Supplementary Data 13:** Consensus-TE expression levels in *Piwil1*-deficient spermatogenesis of golden hamster.

**Supplementary Data 14:** The pachytene piRNA clusters in spermatogenesis of golden hamster.

**Supplementary Data 15:** The syntenic genomic coordinates of the pachytene piRNA clusters in spermatogenesis of golden hamster for mouse and human.