Additional file 11

Nucleotide-level alignments of retrogene introns ('Sbjct', blue and red, splice sites) and parental genes ('Query', program NCBI-BLAST [S1]).

Red downward arrows indicate the exon-exon borders of parental genes. In XXyac-R12DG2.2, the retrogene is also annotated to be embedded near the 3' end of an ncRNA gene candidate (LOC100190939, Additional file 12). In CSMD3, green mark the intragenic region of the retroposed sequnece. The retrogene is an alternative translation start point (Additional file 12). In WBP2NL, the retrogene is located in its first intron, but could be transcribed at sometimes (Additional file 1 and 2). Besides, the intronic region at XXyac-R12DG2.2 and AC019016.1 could be spliced in two patterns.

References

S1. Johnson M, Zaretskaya I, Raytselis Y, Merezhuk Y, McGinnis S, Madden TL:
NCBI BLAST: a better web interface. *Nucleic Acids Res* 2008, **36 (Web Server issue)**:W5-9.

TMEM14D

```
Query  ACAGGCAGCGTGCCGTCCCTGGCTGCAGGGCTGCTCTTCGGCAGTCTAGCCGGCCTGGGT
       ||||||||| |  ||||||||||||||||||||||||||||| |||||||||||||| |||||
Sbjct  ACAGGCAGGGCGCCGTCCCTGGCTGCAGGGCTGCTCTTTGGCAGTCTAGCCGGCGTGGGT

Query  GCTTACCAGCTGTATCAGGATCCAAGGAACGTTTGGGGTTTCCTAGCCGCTACATCTG
       |||||||||||||||||||||||||||| |||||||  ||||||||||||||||||||||
Sbjct  GCTTACCAGCTGTATCAGGATCCAAGGAATGTTTGGGATTTCCTAGCCGCTACATCTG
```

RPS3AP5

```
Query  TGGTTTTACTAAAAAACGCAACAATCAGATACGGAAGACCTCTTATGCTCAGCACCAACA
       |||||||||||||||||||||||||||||||||||||||||||||||||||||||||| ||
Sbjct  TGGTTTTACTAAAAAACGCAACAATCAGATACGGAAGACCTCTTATGCTCAGCACCAGCA

Query  GGTCC-----------------------------------GCCAAATCCGGAAGAAGATG
       |||||                                    ||||||||||||||||||||
Sbjct  GGTCCTGAGAAATCCGGAAGACCTCTTATGCTCAGTACCAGCCAAATCCGGAAGAAGATG

Query  ATGGAAATCATGACCCGAGAGGTGCAGACAAATGACTTGAAAGAAGTGGTCAATAAATTG
       ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  ATGGAAATCATGACCCGAGAGGTGCAGACAAATGACTTGAAAGAAGTGGTCAATAAATTG
```

XXyac-R12DG2.2

```
Query  GACAATGATGGGGATGGCTTTGTCACTACTGAGGAGCTGAAAACCTGGATCAAACGGGTG
       ||||||||||||| ||||||||||||||||||||||||||  ||||||||||||||||||
Sbjct  GACAATGATGGGTATGGCTTTGTCACTACTGAGGAGCTGAAAACCTGGATCAAACGGGTG

Query  CAGAAAAGATACATCTTTGATAATGTCGCCAAAGTCTGGAAGGATTATGATAGGGACAAG
       ||||||||||||||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct  CAGAAAAGATACATCTTTGATAATGTCGCCAAAGTCTGGAAGGATTATGATAGGGACAAG

Query  GATGATAAAATTTCCTGGGAAGAATACAAACAAGCCACCTATGGTTAC--TACCTAGGAA
       |||||||| ||||||||||||||||||||||||||||||||||||||   ||||||||||
Sbjct  GATGATAACATTTCCTGGGAAGAATACAAACAAGCCACCTATGGTTACTATACCTAGGAA

Query  ACCCCGCAGAGTTTCATGATTCTTCAGATCATCACACCTTTAAAAAGATGCTGCCACGTG
       ||||||||||||||||||||||||||||||||||||||  ||||||||||||||||||||
Sbjct  ACCCCGCAGAGTTTCATGATTCTTCAGATCATCACACCTTTAAAAAGATGCTGCCACGTG
```

HSP90B2P

```
Query  TCTTGCTAAACTTCTTAGGTTCCAGTCTTCTCATCATCCAACTGACATTACTAGCCTAGA
       ||||||||||||||||||||||||||||||||||||||||| ||||||||||||||||| |
Sbjct  TCTTGCTAAACTTCTTAGGTTCCAGTCTTCTCATCATCCAGCTGACATTACTAGCCTACA

Query  CCAGTATGTGGAAAGAATGAAGGAAAAACAAGACAAAATCTACTTCATGGCTGGGTCCAG
       ||||  ||||  |||||||||||||||||||||||||||||| | |||||||||||||||
Sbjct  CCAGGATGTTGAAAGAATGAAGGAAAAACAAGACAAAATCTGCCTCATGGCTGGGTCCAG

Query  CAGAAAAGAGGCTGAATCTTCTCCATTTGTTGAGCGACTTCTGAAAAAGGGCTATGAAGT
       |||||||||||||||||||||||||||||||| ||||||||||||||| |||||||||||
Sbjct  CAGAAAAGAGGCTGAATCTTCTCCATTTGTTTAGCGACTTCTGAAAAGGGGCTATGAAGT
```

```
Query    TATTTACCTCACAGAACCTGTGGATGAATACTGTATTCAGGCCCTTCCCGAATTTGATGG
         |||||||||||||||||||||||||| |||||||| ||||||||||||||||||||||||
Sbjct    TATTTACCTCACAGAACCTGTGGTTGAATACTGCATTCAGGCCCTTCCCGAATTTGATGG

Query    GAAGAGGTTCCAGAATGTTGCCAAGGAAGGAGTGAAGTTCGATGAAAGTGAGAAAACTAA
         ||||||||||||||||||||||||||||||||||||||||| ||||| ||||||||||||
Sbjct    GAAGAGGTTCCAGAATGTTGCCAAGGAAGGAGTGAAGTTTGATGACAGTGAGAAAACTAA

Query    GGAGAGTCGTGAAGCAGTTGAGAAAGAATTTGAGCCTCTGCTGAATTGGATGAAAGATAA
         |||||||| |||||||||||||||||||||||||||||||| |||||| ||||||||||
Sbjct    GGAGAGTCATGAAGCAGTTGAGAAAGAATTTGAGCCTCTGCCCAATTGGGTGAAAGATAA

Query    AGCCCTTAAGGACAAGATTGAAAAGGCTGTGGTGTCTCAGCGCCTGACAGAATCTCCGTG
         |||| ||||||||||||||||||||||| |||| |||||| |||||||||||||||| |||
Sbjct    AGCCATTAAGGACAAGATTGAAAAGGCTATGGTATCTCAGTGCCTGACAGAATCTCTGTG

Query    TGCTTTGGTGGCCAGCCAGTACGGATGGTCTGGCAACATGGAGAGAATCATGAAAGCACA
         ||||||||||||||||||||||||| ||||||||||||||||||||||||||||||||||
Sbjct    TGCTTTGGTGGCCAGCCAGTACGGGTGGTCTGGCAACATGGAGAGAATCATGAAAGCACA

Query    AGCGTACCAAACGGGCAAGGACATCTCTACAAATTACTATGCGAGTCAGAAGAAAACATT
         ||||||||||||||||||||| ||||||||||||||||| |||||||| |||||||||||
Sbjct    AGCGTACCAAACGGGCAAGGGCATCTCTACAAATTACCATGCGAGTCGGAAGAAAACATT

Query    TGAAATTAATCCCAGACACCCGCTGATCAGAGACATGCTTCGACGAATTAAGGAAGATGA
         |||||||||||||||||| |||||||||||||||||||||||||||||||||||||||||
Sbjct    TGAAATTAATCCCAGACATCCGCTGATCAGAGACATGCTTCGACGAATTAAGGAAGATGA

Query    AGATGATAAAACAGTTTTGGATCTTGCTGTGGTTTTGTTTGAAACAGCAACGC-------
         ||||||||||||||||||||||||||||||||                    ||
Sbjct    AGATGATAAAACAGTTTTGGATCTTGCTGTGGTTTTGTTTGAAACAGCAATGCAGCAGTG

Query    -TTCGGTCAGGGTATCTTTTACCAGACACTAAAGCATATGGAGATAGAATAGAAAGAATG
          ||||||||| | ||||||||||||||||||||||||||||||||||||||||||||||||
Sbjct    ATTCGGTCAGGATGTCTTTTACCAGACACTAAAGCATATGGAGATAGAATAGAAAGAATG

Query    CTTCGCCTCAGTTTGAACATTGACCCTGATGCAAAGGTGGAAGAAGAGCCCGAAGAAGAA
         | | |||||||||||||||||    | ||||||||||||||||||||    ||||| |||||
Sbjct    CCTTGCCTCAGTTTGAACA--CATCCTGATGCAAAGGTGGAAGAA---CCCGACGAAGAA

Query    CCTGAAGAGACAGCAG
         ||||| ||||||||||
Sbjct    CCTGAGGAGACAGCAG
```

HSP90AA4P

```
Query    TGGGAGTCCTCAGCAGGGGGATCATTCACAGTGAGGACAGACACAGGTGAACCTATGGGT
         |||||||||||   |  ||||||||||||||||||||||||||||||||||||||| |||
Sbjct    TGGGAGTCCTCATTAAGGGGATCATTCACAGTGAGGACAGACACAGGTGAACCTATAGGT

Query    CGTGGAACAAAAGTTATCCTACACCTGAAAGAAGACCAAACTGAGTACTTGGAGGAACGA
         | ||||||||||| |||||||| || || ||||||||||||||||||||||||||||||
Sbjct    CATGGAACAAAGGTTATCCTACCGCTAAAAGAAGACCAAACTGAGTACTTGGAGGAACGA

Query    AGAATAAAGGAGATTGTGAAGAAACATTCTCAGTTTATTGGATATCCCATTACTCTTTTT
         | |||||| ||||||||||||||||||||  |||||||||||||||||| | ||||||||
Sbjct    AAAATAAATGAGATTGTGAAGAAACATTCT--GTTTATTGGATATCCCGTCACTCTTTTT
```

```
Query   GTGGAGAAGGAACGTGATAAAGAAGTAAGCGATGATGAGGCTGAAGAAAAGGAAGACAAA
        ||||||||| ||| ||||||||||| ||| |||||||||| ||||||||||||||| |||
Sbjct   GTGGAGAAGAAACATGATAAAGAAGTCAGCAATGATGAGGCCGAAGAAAAGGAAGATAAA

Query   GAAGAAGAAAAGAAAAAGAAGAGAAAGAGTCGGAAGACAAACCTGAAATTGAAGATGTT
        ||||||||| ||||||||||||||||||||| |||||||||||||||||||||||||||
Sbjct   GAAGAAGAAAAGGAAAAAGAAGAGAAAGAGTCCGAAGACAAACCTGAAATTGAAGATGTT

Query   GGTTCTGATGAGGAAGAAGAA---AAGAAGGATGGTGACAAGAAGAAGAAGAAGAAGA--
        ||||||||| || |||||||||   |||||||||||||||||||||||||||||||||||
Sbjct   GGTTCTGACGAAGAAGAAGAATAAAGAAGGATGGTGACAAGAAGAAGAAGAAGAAGAAG

Query   ----------TTAAGGAAAAGTACATCGATCAAGAAGAGCTCAACAAAACAAAGCCCATC
                  |||||||||||||||||||||||||| ||| |||||||| ||||||| |||
Sbjct   AAGAAGAAGATTAAGGAAAAGTACATCGATCAAGGAGAACTCAACAAA-CAAAGCCTATC

Query   TGGACCAGAAATCCCGACGATATTACTAATGAGGAGTACGGAGAATTCTATAAGAGCTTG
        || |||||| | || || || ||||||||| |||| ||| |||||||||| || |||||||
Sbjct   TGTACCAGATACCCTGATGACTTTACTAATTAGGAATACAGAGAATTCTACAAAAGCTTG

Query   ACCAATGACTGGGAAGATCACTTGGCAGTGAAGCATTTTTCAGTTGAAGGACAGTTGGAA
        |||| | |||||||||| |||||||||||||||||||||||||||||||||||||||||||
Sbjct   ACCATTAACTGGGAAGATTACTTGGCAGTGAAGCATTTTTCAGTTGAAGGACAGTTGGAA

Query   TTCAGAGCCCTTCTATTTGTCCCACGACGTGCTCCTTTTGATCTGTTTGAAAACAGAAAG
        |||||||| |||||||||||||||||||||| ||||||||||| ||||| |||| |||||||
Sbjct   TTCAGAGCCTTTCTATTTGTCCCACGACTTGCTCCTTTTGAGCTGTTGGAAACCAGAAAG

Query   AAAAAGAACAACATCAAATTGTATGTACGCAGAGTTTTCATCATGGATAACTGTGAGGAG
        |||||||||| |||||||||| || |||||||| | |||||||||||||||||||||||||
Sbjct   AAAAAGAACAAAATCAAATTGTCTGCACGCAGAGATCTCATCATGGATAACTGTGAGGAG

Query   CTAATCCCTGAATATCTGAACTTCATTAGAGGGGTGGTAGACTCGGAGGATCTCCCTCTA
        ||||||||||||||||||||||||||| |||||||||||||||||||||||||||||||||
Sbjct   CTAATCCCTGAATATCTGAACTTCATCAGAGGGGTGGTAGACTCGGAGGATCTCCCTCTA

Query   AACATATCCCGTGAGATGTTGCAACAAAGCAAAATTTTGAAAGTTATCAGGAAGAATTTG
        || || | ||||||||||||||||| |||||||||||||||||||||||||||| ||||||
Sbjct   AATATTTTCCGTGAGATGTTGCAATGAAGCAAAATTTTGAAAGTTATCAGGAATAATTTG

Query   GTCAAAAAATGCTTAGAACTCTTTACTGAACTGGCGGAAGATAAAGAGAACTACAAGAAA
        |||||||||||||||||||||||||||||||||||| |||| ||||||||| ||| |||||
Sbjct   GTCAAAAAATGCTTAGAACTCTTTACTGAACTGGTAGAAGGTAAAGAGAGGTACTAGAAG

Query   TTCTATGAGCAGTTCTCTAAAAACATAAAGCTTGGAATACACGAAGACTCTCAAAATCGG
        ||||||||||| |||||||||||||||||||||||||||||||| ||||||||||||||| |
Sbjct   TTCTATGAGCCGTTCTCTAAAAACATAAAGCTTGGAATACACGGAGACTCTCAAAATCAG

Query   AAGAAGCTTTCAGAGCTGTTAAGGTACTACACATCTGCCTCTGGTGATGAGATGGTTTCT
        ||||| ||||||||||||| |||| ||||||||| ||||||||||||||||||||||||| |
Sbjct   AAGAAACTTTCAGAGCTGCTAAGATACTACACATATGCCTCTGGTGATGAGATGGTTTAT

Query   CTCAAGGACTACTGCACCAGAATGAAGGAGAACCAGAAACATATCTATTATATCACAGGT
        ||| ||||||||||||||||||||||||||||| ||||||||||||||||||||||||||||
Sbjct   CTCCAGGACTACTGCACCAGAATGAAGGAAAACCAGAAACATATCTATTATATCACAGGT
```

```
Query   GAGACCAAGGACCAGGTAGCTAACTCAGCCTTTGTGGAACGTCTTCGGAAACATGGCTTA
        |||||||||||||||||||||||||||||| || ||||| |||||||| |||||||||||
Sbjct   GAGACCAAGGACCAGGTAGCTAACTCAACCATTGTGCAACGTCTTTGGAAACATGGCTTG

Query   GAAGTGATCTATATGATTGAGCCCATTGATGAGTACTGTGTCCAACAGCTGAAGGAATTT
        ||||||||||||| ||| |||||||||||||||||||||||||| |||||||||||||||
Sbjct   GAAGTGATCTATACGATCGAGCCCATTGATGAGTACTGTGTCCAGCAGCTGAAGGAATTT

Query   GAGGGGAAGACTTTAGTGTCAGTCACCAAAGAAGGCCTGGAACTTCCAGAGGATgaagaa
        ||||||||||||||||||||||||||||||||||| | | |||||||||||||||||||||
Sbjct   GAGGGGAAGACTTTAGTGTCAGTCACCAAAGAGGACTTGGAACTTCCAGAGGATGAAGAA

Query   GAGAAAAGAAGCAGGAAGAG---------------------AAAAAAACAAAGTTTG
        |||||||||| ||||||||||                     |||||| ||||||||||
Sbjct   GAGAAAAGAAACAGGAAGAGGGAAACAAAAAACGAAACAAAAAAAAAACCAAAGTTTG

                                                         ↓
Query   AGAACCTCTGCAAAATCATGAAAGACATATTGGAGAAAAAAGTTGAAAAGGTGGTTGTGT
        ||||||||||||||||| ||||||||| ||||||   || |||||||||||||||||||||
Sbjct   AGAACCTCTGCAAAATCGTGAAAGACATTTTGGAG--AAGAGTTGAAAAGGTGGTTGTGT

Query   CAAACCGATTGGTGACATCTCCATGCTGTATTGTCACAAGCACATATGGCTGGACAGCAA
        |||||| ||||||||| |||||||| ||||||| ||||  |||||||||||||||||||||
Sbjct   CAAACCAATTGGTGACGTCTCCATGTTGTATTGTCTCAAGCACATATGGCTGGACAGCAA
```

HSP90AA5P

```
Query   GGAGTACGGAGAATTCTATAAGAGCTTGACCAATGACTGGGAAGATCACTTGGCAGTGAA
        |||||| |||||| ||| || ||||||||||||||| |||||||||||||||||||||||
Sbjct   GGAGTATGGAGAGTTCCATCAGAGCTTGACCAATAACTGGGAAGATCACTTGGCAGTGAA

          ↓
Query   GCATTTTTCAGTTGAAGGACAGTTGGAA--------------------TTCAGAGCCC
        ||| |||||||||||||| |||||||||                     || |||
Sbjct   GCACTTTTCAGTTGAAGGGCAGTTGGAAGAGTTGAAGGACAGTCGAAGAGTTTAGAAGAG

Query   TTCTATTTGTCCCACGACGTGCTCCTTTTGATCTGTTTGAAAACAGAAAGAAAAAGAACA
        ||| ||||| || || ||||||||||||||| || |||||||||||||||||||||||||
Sbjct   CTCTTTTTGTTTCAAGATGTGCTCCTTTTGACCTATTTGAAAACAGAAAGAAAAAGAACA

Query   ACATCAAATTGTATGTACGCAGAGTTTTCATCATGGATAACTGTGAGGAGCTAATCCCTG
        ||||   | ||||||||| |||||||||||||||| ||||||||||||||||||||||||
Sbjct   ACATTCAGTTGTATGTACACAGAGTTTTCATCATGGGTAACTGTGAGGAGCTAATCCCTG

               ↓
Query   AATATCTGAACTTCATTAGAGGGGTGGTAGACTCGGAGGATCTCCCTCTAAACATATCCC
        ||||  ||||||||||||||||||| |||||| ||||||||||||||||| || |
Sbjct   AATACCTGAACTTCATTAGAGGGGTGATGGACTCAGAGGATCTCCCTCTAAATATTTTTT

Query   GTGAGATGTTGCAACAAAGCAAAATTTTGAAAGTTATCAGGAAGAATTTGGTCAAAAAAT
        ||||||||||||||||||||||||||||||||||||||||| |||||||||||||| ||
Sbjct   CTGAGATGTTGCAACAAAGCAAAATTTTGAAAGTTATTAGGAAGAATTTGGTCAAACAT

Query   GCTTAGAACTCTTTACTGAACTGGCGGAAGATAAAGAGAACTACAAGAAATTCTATGAGC
        |||||||||||||| |||||||||||| || |||||| |||||||||| || ||| | |||
Sbjct   ACTTAGAACTCTTTGCTGAACTGGCAGAGGATAAAAGAACTACAAAAAGTTCCACGAGA

             ↓
Query   AGTTCTCTAAAAACATAAAGCTTGGAATACACGAAGACTCTCAAAATCGGAAGAAGCTTT
        |||| ||| ||||||||||| ||| ||||| | ||||||||||||||||| |||||||||
Sbjct   AGTTATCTGAAAACATAAATCTTTGAATATAT--AGACTCTCAAAATCAGAAGAAGCTTT
```

```
Query    CAGAGCTGTTAAGGTACTACACATCTGCCTCTGGTGATGAGATGGTTTCTCTCAAGGACT
         |||||||||| |   || | ||||||||||||| ||||||||||||| ||||| |  |
Sbjct    CAGAGCTGTTGAAATAGTGCACATCTGCCTCTCGTGATGAGATGGTTTATCTCATTGTGT

Query    ACTGCACCAGAATGAAGGAGAACCAGAAACATATCTATTATATCACAGGTGAGACCAAGG
          |   ||||||||||||  ||||||||||||||||||||||||| || ||||||||||||
Sbjct    TTT---CCAGAATGAAGGCAAACCAGAAACATATCTATTACATTACAGGTGAGACCAAGG

Query    ACCAGGTAGCTAACTCAGCCTTTGTGGAACGTCTTCGGAAACATGGCTTAGAAGTGATCT
         |||| |||||||||||||||||||||||| |||||| ||| |||||||||||||||||||
Sbjct    ACCAAGTAGCTAACTCAGCCTTTGTGGAATGTCTTCAGAAGCATGGCTTAGAAGTGATCT

Query    ATATGATTGAGCCCATTGATGAGTACTGTGTCCAACAGCTGAAGGAATTTGAGGGGAAGA
         ||||||| |||   |||||| |||||||||||| |||||||||||||||| ||||| ||||
Sbjct    ATATGATCGAGTTGATTGATAAGTACTGTGTCCAGCAGCTGAAGGAACTTGAGAGTAAGA

Query    CTTTAGTGTCAGTCACCAAAGAAGGCCTGGAACTTCCAGAGGATGAAGAAGAGAAAAAGA
         || |||||||||| ||||||| || ||||||||||||| |||||||||||||| |||||||
Sbjct    CTGTAGTGTCAGTTGCCAAAGAGGGTTTGGAACTTCCAGAAGATGAAGAAGAAAAAAAGA

Query    AGCAGGAAGAGAAAAAAACAAAGTTTGAGAACCTCTGCAAAATCATGAAAGACATATTGG
         | |||||||||||||||||||||||||||||||||||||||||||||||||||||| |||
Sbjct    AACAGGAAGAGAAAAAAACAAAGTTTGAGAACCTCTGCAAAATCATGAAAGACATGTTGG

Query    AGAAAAAAGTTGAAAAGGTGGTTGTGTCAAACCGATTGGTGACATCTCCATGCTGTATTG
         ||||||||||  ||||||||||||||||||||    |||||||| |||||||||||||||
Sbjct    AGAAAAAAGTCAAAAAGGTGGTTGTGTCAAAC----TGGTGACATCCCCATGCTGTATTG

Query    TCACAAGCACATATGGCTGGACAGCAAACATGGAGAGAATCATGAAAGCTCAAGCCCTAA
         ||||||||||||||||||||||||||||||||||||| ||||||||||||||||||||
Sbjct    TCACAAGCACATATGGCTGGACAGCAAACATGGAAAGAATCATGAAAGCTCAAGCCCGGT

Query    GAGACAACTCAACAATGGGTTACATGGCAGCAAAGAAACACCTGGAGATAAACCCTGACC
         ||||||||||||||||||| ||| ||||||||||||||||||||||||||||||||||||
Sbjct    AAGACAACTCAACAATGGGCTACGTGGCAGCAAAGAAACACCTGGAGATAAACCCTGACC

Query    ATTCCATTATTGAGACCTTAAGGCAAAGGCAGAGGCTGATAAGAACGACAAGTCTGTGA
         ||| ||| ||||| |||||||||||||||||||||||||||||||||||| ||||||| ||||
Sbjct    ATT-CATGATTGAAACCTTAAGGCAAAGGCAGAGGCTGATAAGAACAACAAGTCAGTGA

Query    AGGATCTGGTCATCTTGCTTTATGAAACTGCGCTCCTGTCTTCTGGCTTCAGTCTGGAAG
         ||||||||||||||||||||| ||||||| |||| ||| ||||||||||| ||||||
Sbjct    AGGATCTGGTCATCTTGCTTTACTAAACTGCACTCCCATCTCCTGGCTTCAGTATGGAAG

Query    ATCCCCAGACACATGCTAACAGGATCTACAGGATGATCAAACTTGGTCTGGGTATTGATG
         | || |||| |||| ||||||| |||||| |||||||||||||||||||||||||| ||||||
Sbjct    ACCCTCAGAGACATACTAACAAGATCTATAGGATGATCAAACTTGGTCTGGGTGTTGATG
```

CSMD3

```
Query    ATGGGAGTGGACATCCGCCATAACAAGGACCGAAAGGTTCGGCGCAAGGAGCCCAAGAGC
         ||||||||| |||| |||||||      |||||||||||||||||||||||||||| ||||||
Sbjct    ATGGGAGTTGACACCCGCCA---CAAGGACCGAAAGGTTCGGCGCAAGGAGCCTAAGAGC

Query    CAGGATATCTACCTGAGGCTGTT----GGTCAAGTTATACAGGTTTCTGGCCAGAAGAAC
         ||||||||||||||||||||||      |||||||| | ||||||||||  || | | ||||
Sbjct    CAGGATATCTACCTGAGGCTGTCTGTCGGTCAAGCTGTACAGGTTTCCAGCAA-AGGAAC
```

```
Query    CAACTCCACATTCAACCAGGTTGTGTTGAAGAGGTTGTTTATGAGTCGCACCAACCGGCC
         |||||||||||||||||| ||||||| |||||||||||||||||||||||| |||||||||
Sbjct    CAACTCCACATTCAACCGGGTTGTGCTGAAGAGGTTGTTTATGAGTCGCAACAACCGGCC

Query    GCCTCTGTCCCTTTCCCGGATGATCCGGAAGATGAAGCTTCCTGGCCGGGAAAACAAGAC
         |||||| ||||||||||||||||| ||||||||||||||||||| |||||||||||| ||
Sbjct    ACCTCTGCCCCTTTCCCGGATGATCTGGAAGATGAAGCTTCCTGGCCGGGAAAACAAAAC

Query    GGCCGTGGTTGTGGGGACCATAACTGATGATGTGCGGGTTCAGGAGGTACCCAAACTGAA
         ||||||||||||||||| ||||||| ||||| |||||||||||||||||| |||||||| ||
Sbjct    AGCCGTGGTTGTGGGGGCCATAACGGATGACGTGCGGGTTCAGGAGGTGCCCAAACTAAA

Query    GGTATGTGCACTGCGCGTGACCAGCCGGGCCCGCAGCCGCATCCT--------------
         ||| ||||| |||||| |||||||||||||||||||||||| ||| |
Sbjct    GGTGTGTGCGCTGCGCATGACCAGCCGGGCCCGCAGCCACATCTTCTAGGGAGTGGGGTG

Query    -----------------------CAGGGCAGGGGGCAAGATCCTCACTTTCGACCAGCT
                                | |||| |||||||||| |||||||| ||||||
Sbjct    GGGTGGGGGTGGGGCGGAGCGGAGCGGGGCGCGGGGCAAGAGCCTCACTTTTCGCCAGCT

Query    GGCCCTGGACTCCCCTAAGGGCTGTGGCACTGTCCTGCTCTCCGGTCCTCGCAAGGGCCG
         ||| ||||||||||| |||||||| ||||  |||| |||||||| |||||||| |||||||||
Sbjct    GGCGCTGGACTCCCCCAAGGGCTGCGGCGTCGTCCGGCTCTCCGGTCCTCCAAAGGGCCG

Query    AGAGGTGTACCGGCATTTCGGCAAGGCCCCAGGAACCCCGCACAGCCACACCAAACCCTA
         || |||||||                ||||| | |||||| |          |||||||||
Sbjct    AGGGGTGTAC--------------GCCCCGGAAACCCTG-----------CAAACCCTA

Query    CGTCCGCTCCAAGGGCCGGAAGTTCGAGCGTGCCAGAGGCCGACGGGCCAGCCGAGGCTA
         | ||||||||||| |||||||||||||||||| || |||| |||| |||||||||||| ||
Sbjct    CATCCGCTCCAATGGCCGGAAGTTCGAGCGCGCGAGAGACCGAAGGGCCAGCCGAGGATA

Query    CAAAAAC
         |||||||
Sbjct    CAAAAAC
```

WBP2NL
```
Query    CATCGGGTGGTGCCGCAGGGGCCACATCCCTGTGTTTTGTGTACCCTCTTGATTTTGCCC
         |||| || |||||| | |||||||||||| ||||||||||||||||||||||||||||||
Sbjct    CATCAGGCGGTGCCACTGGGGCCACATCCTTGTGTTTTGTGTACCCTCTTGATTTTGCCC

Query    GTACCCGTCTAGCAGCTGATGTGGGTAAAGCTGGAGCTGAAAGGGAATTCCGAGGCCTCG
          ||| ||| |||||||||||||||||| |||||||||||  |||||||||| ||||| |||
Sbjct    ATACTCGTGTAGCAGCTGATGTGGGCAAAGCTGGAGCTGAAAGGGAATTGCGAGGTTTCG

Query    GTGACTGCCTGGTTAAGATCTACAAATCTGATGGGATTAAGGGCCTGTACCAAGGCTTTA
         |||||||||| |||||||||||||||||||||| |||||||| |||||||||||||||||||
Sbjct    GTGACTGCCTAGTTAAGATCTACAAATCTGACGGGATTAAGAGCCTGTACCAAGGCTTTA

Query    ACGTGTCTGTGCAGGGTATTATCATCTACCGA-------GCCGCCTACTTCGGTATCTAT
         |||||||||||||||||||||||| ||||||||       || ||||||||||||| ||||
Sbjct    ACGTGTCTGTGCAGGGTATT---ATCTACCGAGCTGCCTGCTGCCTACTTCGGTAACTAT

Query    GACACTGCAAAGGGAATGCTTCCGGATCCCAAGAACACTCACATCGTCATCAGCTGGATG
         ||||||||||||||||||||||||||||||||||||||||||||| |||||||| ||||||
Sbjct    GACACTGCAAAGGGAATGCTTCCGGATCCCAAGAACACTCACATTGTCATCAGTTGGATG
```

```
Query    ATCGCACAGACTGTCACTGCTGTTGCCGGGTTGACTTCCTATCCATTTGACACTGTTCGC
         ||  |||||||||||||||||| |||||  |||||||||||||||| |||||  |||   || | ||
Sbjct    AT-GCACAGACTGTCACTGCCGTTGCTGGGTTGACTTCCTATTCATTTAACACCATTTGC
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AC019016.1

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Query    GCGATCAACATCACCAACGGCGAGGAAGTGGCAGTGAAGCTAGAATCTCAGAAGGCCAGG
         |||||||  |||||||||||| ||  ||||||| ||||||||  |||||||||  ||||||||
Sbjct    GCGATCAGCATCACCAACGGTGAAGAAGTGGTAGTGAAGCCAGAATCTCAG--GGCCAGG

Query    CATCCCCAGTTGCTGTACGAGAGCAAGCTCTATAAGATTCTTCAAGGTGGGGTTGGCATC
         |||||||||||||||||||| ||||||| ||| || || |||||  ||||||||||||||||||||||
Sbjct    CATCCCCAGTTGCTGTACAAGAGCAGGCTTTACAAGATGCTTCAAGGTGGGGTTGGCATC

Query    CCCCACATACGGTGGTATGGTCAGGAAAAAGACTACAATGTACTAGTCATGGATCTT-CT
         ||||||||||| |||||||| ||||||  || |||||| ||||||||||||||||||||||| || ||
Sbjct    CCCCACATACGGTGGTGTGGTCAGGAAGAAGACTATAATGTACTAGTCATGGATTTTTCT

Query    GGGACCTAGCCTCGAAGACCTCTTCAATTTCTGTTCAAGAAGGTTCACAATGAAAACTGT
         ||||||||||||||||||||||      ||||||||||||||||||||||||||||||||||||||||
Sbjct    GGGACCTAGCCTCGAAGACC-----AATTTCTGTTCAAGAAGGTTCACAATGAAAACTGT

Query    ACTTATGTTAGCTGACCAGATGATCAGTAGAATTGAATATGTGCATACAAGAATTTTAT
         ||||||  ||||||||||||||||||||||||||||||||| |||||||||||||||||||||||||
Sbjct    ACTTATATTAGCTGACCAGATGATCAGTAGAATTGAACATGTGCATACAAGAATTTTAT

Query    ACACAGAGACATTAAACCAGATAACTTCCTAATGGGTATTGGGCGTCACTGTAATAAGTT
         ||||||||  |||||||||||| ||||||||||||||||||||||||||||||||||  ||||||
Sbjct    ACACAGAGCCATTAAACCAGGTAACTTCCTAATGGGTATTGGGCGTCACTGTAGTAAGTT

Query    ATTCCTTATTGATTTTGGTTTGGCCAAAAAGTACAGAGACAACAGGACAAGGCAACACAT
         |||||  |||||||||||||||||||||||||||  |||| |||||||||||||||||||||||||||
Sbjct    ATTCCGTATTGATTTTGGTTTGGCCAAAACGTACGGAGACAACAGGACAAGGCAACACAT

Query    ACCATACAGAGAAGATAAAAACCTCACTGGCACTGCCCGATATGCTAGCATCAATGCACA
         ||||||||||||||||||||||||||||||||||||||||| ||||||||||     |||||||
Sbjct    ACCATACAGAGAAGATAAAAACCTCACTGGCACTGCCCTGTATGCTAGCC---ATGCACA

Query    TCTTGGTATTGAGCAGAGTCGCCGAGATGACATGGAATCATTAGGATATGTTTTGATGTA
         ||||  ||||||||||||||||||||| ||||||||||||||| ||||  |||||||||||||||||
Sbjct    TCTTAGTATTGAGCAGAGTCGCCGGGATGACATGGAATCGTTAGAATATGTTTTGATGTA

Query    TTTTAATAGAACCAGCC--------TGCCATGGCAAGGGCTAAAGGCTGCAACAAAGAAA
         ||||||||||||||||||         ||||||||||||||||||||||||||||||||  || ||||||
Sbjct    TTTTAATAGAACCAGCCAACCAGCCTGCCATGGCAAGGGCTAAAGGCTGCAGCAGAGAAA

Query    CAAAAATATGAAAAGATTAGTGAAAAGAAGATGTCCACGCCTGTTGAAGTTTTATGTAAG
         ||||||||||||||||||||||||||||||||||||||| || ||||||        || ||||||||
Sbjct    CAAAAATATGAAAAGATTAGTGAAAAGAAGATGTCTACTCCTGTT------TTTTGTAAG

Query    GGGTTTCCTGCAGAATTTGCGATGTACTTAAACTATTGTCGTGGGCTACGCTTTGAGGAA
         |||||| ||||||||||||||| || ||||||||| |||||||||||| ||||   ||| ||| ||
Sbjct    GGGTTTGCTGCAGAATTTGCCATATACTTAAACCCTTGTCGTGGGCTACACTTAGAGAAA

Query    GCCCCAGATTACATGTATCTGAGGCAGCTATTCCGCATTCTTTTCAGGACCCTGAACCAT
         ||||||||||||||||||||||||| ||||||||| |||||||||| ||||||||||||||||||| ||||
Sbjct    GCCCCAGATTACATGTATCTGACGCAGCTATTCTGCATTCTTTTCAGGACCCTGATCCAT
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Query    CAATATGACTACACATTTGATTGGACAATGTTAAAGCAGAAAGCAGCACAGCAGGCAGCC
         |||||||||||||||||||||||||||| |||||||||||||||||||||||||||||||
Sbjct    CAATATGACTACACATTTGATTGGACAAAGTTAAAGCAGAAAGCAGCACAGCAGGCAGCC
```