Appendix 1

Recipe for PCR reaction, final volume was 25µl

Ingredients	Final concentration
AmpliBuffer A (EURx, Poland)	1×
$MgCl_2$ (EURx, Poland)	1.5mM
dNTP (Fermentas, Canada)	200µM
Forward and reveres primes (BioNEER, Korea)	0.5mM
DNA sample	100ng
Taq Polymerase (EURx, Poland)	1U
Distilled water	Top up until final volume

Recipe for preparation 5× TBE, final volume was 1000ml

Ingredients	Final concentration
$C_4H_{11}NO_3$ (Vivantis, Malaysia)	445mM
H_3BO_3 (Vivantis, Malaysia)	445mM
EDTA (Promega, USA)	10mM
dH_2O	Top up until final volume

For perpetration 1× TBE, 200ml of 5× TBE was diluted with 800ml dH_2O

Recipe for preparation 10 LB/Ampicillin/IPTG/X-Gal agar plates

Ingredients	Final concentration and amount need
LB agar powder (Pronadisa, Spain)	7g
dH_2O	200ml
Ampicillin (Sigma, USA)	50µg/ml
IPTG (Fermentas, Canada)	0.5mM
X-gal (Vivantis, Malaysia)	0.08mg/m

Recipe for DNA ligation, final volume was 10µl

Ingredients	Volume
2× Rapid Ligation Buffer, T4 DNA Ligase (Promega, USA)	5µl
50ng pGEM®-T Easy Vector (Promega, USA)	1µl
Gel extraction product	3µl
3U T4 DNA Ligase (Promega, USA)	1µl

Recipe for preparation 100ml of RF1

Ingredients	Final concentration
$RbCl_2$ (aMReSCO, USA)	0.1M
$MnCl_2.4H_2O$ (BIO BASIC INC, Canada)	0.05M
KoAc (BIO BASIC INC, Canada)	0.03M
$CaCl_2.4H_2O$ (BIO BASIC INC, Canada)	0.01M
Glycerol (Systerm, Malaysia)	15%
Distilled water	Top up until final volume
Adjust PH	5.8 PH

Recipe for preparation 100 ml of RF2

Ingredients	Final concentration
MOPS (BIO BASIC INC, Canada)	0.01M
$RbCl_2$ (aMReSCO, USA)	0.01M
$CaCl_2.4H_2O$(BIO BASIC INC, Canada)	0.07M
Glycerol (Systerm, Malaysia)	15%
Distilled water	Top up until final volume
Adjust PH	5.8 PH

Recipe for PCR colony, final volume was 25µl

Ingredients	Final concentration
AmpliBuffer B (EURx, Poland)	1×
dNTP (Fermentas, Canada)	200µM
Forward and reveres primes (BIO BASIC INC, Canada)	0.5mM
DNA sample	100ng
Taq Polymerase (EURx, Poland)	1U
dH_2O	Top up until final volume

Recipe for preparation 50ml of Solution I (stored at 4°C)

Ingredients	Final concentration
$C_4H_{12}NO_3Cl$ pH 8.0 (aMReSCO, USA)	25mM
EDTA pH8.0 (Promega, USA)	10mM
Glucose (BDH, England)	50mM
dH_2O	Top up until final volume

Recipe for preparation 500µl of Solution II (freshly prepared)

Ingredients	Final concentration
NaOH (Merck, Germany)	0.2N
SDS (Promega, USA)	1%
dH_2O	Top up until final volume

Recipe for preparation 100ml of Solution III (stored at 4°C)

Ingredients	Final concentration
KoAc (BIO BASIC INC, Canada)	3M
Glacial Acetate acid (BDH, England)	11.5%
dH_2O	Top up until final volume

Recipe for restriction enzyme digestion, final volume was 20µl

Ingredients	Final concentration
Buffer H (Promega, USA)	1×
BSA (Promega, USA)	0.1mg/ml
DNA	5µg
*Eco*RI (Promega, USA)	5U

Appendix 2

Mega alignment

Sequence alignment of ITS regions of DNA fragment (~700bp) of *Aphelenchus* spp. (Aph3), *Helicotylenchus dihystera* (Hd6), *Rotylenchulus reniformis* (Rr27), *Xiphinema* spp. (Xip9 and Xip10), *Pratylenchus* spp. (Pra8) and *Meloidogyne* spp. (C4m1and C4m2) samples with out-group (*C.elegans*).

```
#Aph3a3       TTGATTACGT CCCTGCCCTT TGTACACACC GCCCGTCCCT AGCCCCGG [48]
#Hd6c2        .......... .......... .......... .......G.. G--..... [48]
#Rr27a1       .......... .......... .......... .......G.. G--..... [48]
#Xip10a3      .......... .......... .......... .......G.. G--..... [48]
#Xip9a1       .......... .......... .......... .......G.. G--..... [48]
#Pra8c3       .......... .......... .......... .......G.. G--..... [48]
#C4m1d4       .......... .......... .......... .......G.. G--..... [48]
#C4m2a2       .......... .......... .......... .......G.. G--..... [48]
#C4m2b3       .......... .......... .......... .......G.. G--..... [48]
#C.elegans    .......... .......... .......... .......G.. .--T.... [48]

#Aph3a3       GACTGAGCCA TTTCGAGAAA TTTGGGGACC GTTGATTTAA --TTTATC [96]
#Hd6c2        .......... .......... .......... .......... --..... [96]
#Rr27a1       .......... .......... .......... .......... --..... [96]
#Xip10a3      .......... .......... .......... .......... --..... [96]
#Xip9a1       .......... .......... .......... .......... --..... [96]
#Pra8c3       .......... .......... .......... .......... --..... [96]
#C4m1d4       .......... .......... .......... .......... --...T.. [96]
#C4m2a2       .......... .......... .......... .......... --...T.. [96]
#C4m2b3       .......... .......... .......... .......... --...T.. [96]
#C.elegans    ......A.TG A........G AG.......T ..C.C..CG. GG....A. [96]

#Aph3a3       TAAATTATTT TGATGGAAAC CAATTTAATC GCAGTGGCTT GAACCGGG [144]
#Hd6c2        .......... .......... .......... .......... ........ [144]
#Rr27a1       .......... .......... .......... .......... ........ [144]
#Xip10a3      .......... .......... .......... .......... ........ [144]
#Xip9a1       .......... .......... .......... .......... ........ [144]
#Pra8c3       .......... .......... .......... .......... ........ [144]
#C4m1d4       .......C.. .......... .......... .......... ........ [144]
#C4m2a2       .......C.. .......... .......... .......... ........ [144]
#C4m2b3       .......C.. .......... .......... .......... ........ [144]
#C.elegans    G.CT.CG..G .TGC...... ..T...T... ...T...T.. ........ [144]

#Aph3a3       CAAAAGTCGT AACAAGGTAG CTGTAGGTGA ACCTGCTGCT GGATCATT [192]
#Hd6c2        .......... .......... .......... .......... ........ [192]
#Rr27a1       .......... .......... .......... .......... ........ [192]
#Xip10a3      .......... .......... .......... .......... ........ [192]
#Xip9a1       .......... .......... .......... .......... ........ [192]
#Pra8c3       .......... .......... .......... .......... ........ [192]
#C4m1d4       .......... .......... .......... .......... ........ [192]
#C4m2a2       .......... .......... .......... .......... ........ [192]
#C4m2b3       .......... .......... .......... .......... ........ [192]
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#C.elegans    T......... ......... ......... ......A... .......C [192]

#Aph3a3       ACTTTAT--- -------GTG ATGTTCA--- ATTTTGA-AT -CGCAAT- [240]
#Hd6c2        .......--- -------... .......--- .......-.. -.......- [240]
#Rr27a1       ......C--- -------... .......--- .......-.. -.......- [240]
#Xip10a3      .......--- -------... .......--- .......-.. -.......- [240]
#Xip9a1       .......--- -------... .......--- .......-.. -.......- [240]
#Pra8c3       .......--- -------... .......--- .......-.. -.......- [240]
#C4m1d4       .......--- -------... .....G.--- .A.....-.. T.....C- [240]
#C4m2a2       .......--- -------... .....G.--- .A.....-.. T.....C- [240]
#C4m2b3       .......--- -------... .....G.--- .A.....-.. T.....C- [240]
#C.elegans    G.CG.GCCTC TGTGCCC... ..A.C..CAA .CC..A.G.. G.T.G.CT [240]

#Aph3a3       ------G-AA ATA-ATTGTT GTGTAACGGC TGTCGCTGGT GTCTAGGT [288]
#Hd6c2        ------.-.. ...-...... .......... .......... ........ [288]
#Rr27a1       ------.-.. ...-...... .......... .......... ........ [288]
#Xip10a3      ------.-.. ...-...... .......... .......... ........ [288]
#Xip9a1       ------.-.. ...-...... .......... .......... ........ [288]
#Pra8c3       ------.-.. ...-...... .......... .......... ........ [288]
#C4m1d4       ------AT.. ...T...... ...A...... .......... ........ [288]
#C4m2a2       ------AT.. .C.T...... ...A...... .......... ........ [288]
#C4m2b3       ------AT.. ...T...... ...A...... .......... ........ [288]
#C.elegans    GGCTTCACGG TC.GT.GAG. ..CG..AT.T CAA..T.CCA ..TG..A. [288]

#Aph3a3       GTTGCTGATA C-------AG TTGTGAACGT CCGTGGCTGT ATATGTGG [336]
#Hd6c2        .......... .-------.. .......... .......... ........ [336]
#Rr27a1       .......... .-------.. .......... .......... ........ [336]
#Xip10a3      .......... .-------.. .......... .......... ........ [336]
#Xip9a1       .......... .-------.. .......... .......... ........ [336]
#Pra8c3       .......... .-------.. .......... .......... ........ [336]
#C4m1d4       .......... .-------.. .......... .......... ........ [336]
#C4m2a2       .......... .-------.. .......... .......... ........ [336]
#C4m2b3       .......... .-------.. .......... .......... ........ [336]
#C.elegans    .CCA.AACA. .TGGCAAG.. .A....CT.. ...ACC.ATG GA.C.... [366]

#Aph3a3       TGAC-ATGTT AGGACTATAA TGAGTTTAAG ACTTAATGA- GCCTCTTA [384]
#Hd6c2        ....-..... .......... .......... .........- ........ [384]
#Rr27a1       ....-..... .......... .......... .........- ........ [384]
#Xip10a3      ....-..... .......... .......... .........- ........ [384]
#Xip9a1       ....-..... .......... .......... .........- ........ [384]
#Pra8c3       ....-..... .......... .......... .........- ........ [384]
#C4m1d4       ....-..... .......--- --------.. .........- ........ [384]
#C4m2a2       ....-..... .......--- --------.. .........- ........ [384]
#C4m2b3       ....-..... .......--- --------.. ......C..- ........ [384]
#C.elegans    CAGTT..TCC .AA....CTT .TGTG.C.G. G........T .AG.GAA. [384]

#Aph3a3       AGTGA----- GGACGCCAGC ACTCTTTTTT T-------AT ATTTAAAA [432]
#Hd6c2        .....----- .......... .......... .-------.. ........ [432]
#Rr27a1       .....----- .......... .......... .-------.. ........ [432]
#Xip10a3      .....----- .......... .......... .-------.. ........ [432]
#Xip9a1       .....----- .......... .......... .-------.. ........ [432]
#Pra8c3       .....----- .......... .......... .-------.. ........ [432]
#C4m1d4       .....----- .......... .......... .CTCTAT-.. T....... [432]
#C4m2a2       .....----- .......... .......... .CTCTAT-.. T..A.... [432]
#C4m2b3       .....----- .......... .......... .CTCTAT-.. T....... [432]
#C.elegans    ....TTTGCT .TT.TG...T .GA.G..G.. CACGAGTCG. C.CA.C.C [432]

#Aph3a3       AAGAACAAAA TTCCTAGCCT TTCCGGTGGA TCACTAGGCT CGTGGATC [480]
#Hd6c2        ..A....... .......... .......... .......... ........ [480]
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#Rr27a1       ..A....... .......... .......... .......... ........ [480]
#Xip10a3      ..A....... .......... .........T .......... ........ [480]
#Xip9a1       ..A....... .......... .......... .......... ........ [480]
#Pra8c3       ..A....... .......... .......... .......... ........ [480]
#C4m1d4       ..A...T... A.T....... .AT....... .....C.... ........ [480]
#C4m2a2       ..A...T... A.T....... .AT....... .....C...G ........ [480]
#C4m2b3       ..A...TG.. A.T....... .AT....... .....C.... ........ [480]
#C.elegans    ..CCG.T.TG .GT..CCTGG .GG.TA.ATG CGT....... TC.TCT.. [480]

#Aph3a3       GATGAAGA-A CGCAGCAAAC TG-CGATAAG TTTTGCGAAC -TGCAGCA [528]
#Hd6c2        ........-. .......... ..-....... .......... -....... [528]
#Rr27a1       ........-. .......... ..-....... .......... -....... [528]
#Xip10a3      ........-. .......... ..-....... .......... -....... [528]
#Xip9a1       ........-. .......... ..-....... .......... -....... [528]
#Pra8c3       ........-. .......... ..-....... .......... -....... [528]
#C4m1d4       ........-. .......... C.-......T ..G....... -.....A. [528]
#C4m2a2       ........-. .......... ..-......T ..G....... -.....A. [528]
#C4m2b3       ........-. .......... ..-......T ..G....... -.....A. [528]
#C.elegans    TT..CG..G. G.A..TT.GT ..A.....GT C..GAT..T. G..GTT.G [528]

#Aph3a3       GCCTTGA--- -------GCA TAAAAGTTTT GCACGCATAT TGCCGCAT [576]
#Hd6c2        .......--- -------... .......... .A........ ........ [576]
#Rr27a1       .......--- -------... .......... .A........ ........ [576]
#Xip10a3      .......--- -------... .......... .A........ ........ [576]
#Xip9a1       .......--- -------... .......... .A........ ........ [576]
#Pra8c3       .......--- -------... .......... .T........ ........ [576]
#C4m1d4       A......--- -------... C......... .A........ ........ [576]
#C4m2a2       A......--- -------... C......... .A........ ........ [576]
#C4m2b3       A......--- -------... C......... .A........ ........ [576]
#C.elegans    .TT.C.GCCG AGCCAAG..G CC...AACAC AT.A...CC. .TT.AT.. [576]

#Aph3a3       AGGGGTCAA- --ACCCTTTG CTAT--GTCT -----GGTTC AGGGTCAT [624]
#Hd6c2        ..........- --......... ....--.... -----..... ........ [624]
#Rr27a1       ..........- --......... ....--.... -----..... ........ [624]
#Xip10a3      ..........- --......... ....--.... -----..... ........ [624]
#Xip9a1       ..........- --......... ....--.... -----..... ........ [624]
#Pra8c3       ..........- --......... ....--.... -----..... .A...... [624]
#C4m1d4       T.........- --...T.... ...C--.... -----..... ........ [624]
#C4m2a2       T.........- --...T.... ...C--.... -----A.... ........ [624]
#C4m2b3       T..A......- --...T.... ...C--.... -----..... ........ [624]
#C.elegans    TT.AA...GT AC..TGA... .C.AAA.... TCACG.ACAT GC...G.. [624]

#Aph3a3       TATCTTTCAA AGCGAAAGCT T---TATTGT ATAATTGCTT TTGTGGCT [672]
#Hd6c2        .......... .......... .---...... .......... ........ [672]
#Rr27a1       .......... .......... .---...... .......... ........ [672]
#Xip10a3      .......... .......... .---...... .......... ........ [672]
#Xip9a1       .......T.. .......... .---...... .......... ........ [672]
#Pra8c3       .......... .......... .---...... .......... ........ [672]
#C4m1d4       .T.....T.. .......... .---..A.T. ...TA....A ...AT..- [672]
#C4m2a2       .T.....T.. .......... .---..A.T. ...TA....A ...AT..- [672]
#C4m2b3       .T.....T.. .......... .---..A.T. ...TA....A ...AT..- [672]
#C.elegans    .TGT.G.TG. GATTTGCATC .CGA..A.AC G..C.A.... CA.C.ATG [672]

#Aph3a3       TCTTTAT-GT TTTAAATATG ATTGTTAGAT ATGTTTAATT GTTCGCAT [720]
#Hd6c2        .......-.. .......-.. .......... .......... ........ [720]
#Rr27a1       .......-.. .......-.. .......... .......... ........ [720]
#Xip10a3      .......-.. .......-.. .......... .......... ........ [720]
#Xip9a1       .......-.. .......-.. .......... .......... ........ [720]
#Pra8c3       .......-.. .......-.. .......... .......... ........ [720]
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#C4m1d4       --.....-A. .....GA-G. ......GTT. ..-CC..G.. ..AT.A.. [720]
#C4m2a2       --.....-A. .....GA-G. ......GTT. ..-CC..G.. ..AT.A.. [720]
#C4m2b3       --.....-A. .....GA-G. ......GTT. ..-C...G.. ..AT.A.. [720]
#C.elegans    GA.CGG.T.C A.CG.G...C GA..AAGA.C GCAGC.TGC. .CGT-T.C [720]

#Aph3a3       GTATCATCAA CA-TATTGAT TTTTTGACCT GAA--CTCAG TCCAAGAG [768]
#Hd6c2        .......... ..A....... .......... ...--..... ..-G.... [768]
#Rr27a1       .......... ..A....... .......... ...--..... ..-G.... [768]
#Xip10a3      .......... ..A....... .......... ...--..... ..-G.... [768]
#Xip9a1       .......... ..A....... .......... ...--..... ..-G.... [768]
#Pra8c3       .......... ..A....... .......... ...--..... ..-G.... [768]
#C4m1d4       A..A.TA... G.ACCAAACA A......... ...--..... ..-G.... [768]
#C4m2a2       A..A.TA... G.ACCAAACA A......... ...--..... ..-G.... [768]
#C4m2b3       A..A.TA... G.ACCAAACA A......... ...--..... ..-..... [768]
#C.elegans    T..C..CG.. TTGC.GACGC ..AGA.TGG. ...ATT..GA A.GC.T.. [768]

#Aph3a3       CACCCGCTGA ACTTA-AGCA TAT------- ---------- -------- [816]
#Hd6c2        .......... .....-.... ...------- ---------- -------- [816]
#Rr27a1       .......... .....-.... ...------- ---------- -------- [816]
#Xip10a3      .......... .....-.... ...------- ---------- -------- [816]
#Xip9a1       .......... .....-.... ...------- ---------- -------- [816]
#Pra8c3       .......... .....-.... ...------- ---------- -------- [816]
#C4m1d4       .......... .....-.... ...------- ---------- -------- [816]
#C4m2a2       .......... .....-.... ...------- ---------- -------- [816]
#C4m2b3       .......... .....-.... ...------- ---------- -------- [816]
#C.elegans    ....AA...G G.C.CC..TT GG.ACGTCTG GTTCAGGGTT GTTTAACT [816]
```

Sequence alignment of ITS regions of DNA fragment (~1163bp) of *Xiphinema* spp. (Xip9 and Xip10), *Rotylenchulus reniformis* (Rr27), *Aphelenchus* spp. (Aph3) and *Helicotylenchus dihystera* (Hd6) samples with out-group (*C.elegans*).

```
#Xip9a2       TTGATTACGT CCCTGCCCTT TGTACACACC GCCCGTCGCC GTCCGGGA [48]
#Xip10a2      .......... .......... .......... .........T ........ [48]
#Rr27a1       .......... .......... .......... .........T ........ [48]
#Aph3a1       .......... .......... .......... .........T ........ [48]
#Hd6d3        .......... .......... .......... .........T ........ [48]
#C.elegans    .......... .......... .......... .........T A....... [48]

#Xip9a2       CTGAGCTGTC TCGAGAGGAC TGCGGACTGC TGTATCGAGG TCTTCGGG [96]
#Xip10a2      .......... .......... .......... .......... ........ [96]
#Rr27a1       .......... .......... .......... .......... ........ [96]
#Aph3a1       .......... .......... .......... .......... ........ [96]
#Hd6d3        .......... .......... .......... .......... ........ [96]
#C.elegans    ....A...AT ......A..G ..G......T C.CT...... .T.AAC.A [96]

#Xip9a2       TCGCGGTATG GCGGGAAACA GTTCAATCGC AATGGCTTGA ACCGGGTA [144]
#Xip10a2      .......... .......... .......... .......... ........ [144]
#Rr27a1       .......... .......... .......... .......... ........ [144]
#Aph3a1       .......... .......... .......... .......... ........ [144]
#Hd6d3        .......... .......... .......... .......... ........ [144]
#C.elegans    CTT..T.G.T ....A..C.. T..TT..... .T...T.... ........ [144]

#Xip9a2       AAAGTCGTAA CAAGGTATCT GTAGGTGAAC CTGCAGATGG ATCATCGT [192]
#Xip10a2      .......... .......... .......... .......... ........ [192]
#Rr27a1       .......... .......... .......... .......... ........ [192]
#Aph3a1       .......... .......... .......... .......... ........ [192]
#Hd6d3        .......... .......... .......... .......... ........ [192]
#C.elegans    .......... .......G.. .......... ......C... .......C [192]

#Xip9a2       CGATGTGTAC CATAAACACA AAATCGCATA TGATCATGAT GCTTCGCG [240]
#Xip10a2      .......... ..C....... .......... .......... ........ [240]
#Rr27a1       .......... ..C....... .......... .......... ........ [240]
#Aph3a1       .......... ..C....... .......... .......... ........ [240]
#Hd6d3        .......... ..C....... .......... .......... ........ [240]
#C.elegans    ..-..CC.-. TG.GCC.GTG .T...CACA. ACC.T.A... ...---.. [240]

#Xip9a2       ACATGCTTGT CGTTTGCGTG CCATGCCGTA ACGGTTCGCC GAAGCATC [288]
#Xip10a2      .......... .......... .......... .......... ........ [288]
#Rr27a1       .......... .......... .......... .......... ........ [288]
#Aph3a1       .......... .......... .......... .......... ........ [288]
#Hd6d3        .......... .......... .......... .......... ........ [288]
#C.elegans    ..TG....CA ..G.CA-..T GAG..T..A. .T.-----T. A.C.TTC. [288]

#Xip9a2       ATCCGCAACG TTAAAGCTCT TCATTTCCGA ATGAGGTGTC TATGTGTA [336]
#Xip10a2      .......... .......... .......... .......... ........ [336]
#Rr27a1       .......... C......... .......... .......... ........ [336]
#Aph3a1       .......... .......... .......... .......... ........ [336]
#Hd6d3        .......... .......... .......... .......... ........ [336]
#C.elegans    .GTT.AG.T. CC.C.A.A-- --.C.GG.A. GA.TA...A. .G.CC.-. [336]

#Xip9a2       TGGATGAGTC GTGATTAAGA GTGCCGACTA TAATTCTGTG CCATGCAA [384]
#Xip10a2      .......... .......... .......... .......... ........ [384]
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#Rr27a1      .......... .......... .......... .......... ........ [384]
#Aph3a1      .......... .......... .......... .......... ........ [384]
#Hd6d3       .......... .......... .......... .......... ........ [384]
#C.elegans   CCC...GAA. ...GC-.GTT A.T..A.AAC ..C..T.... T..G.--G [384]

#Xip9a2      GTTCCTATCG TATGACATGT GAACGATGGT TGAGCTGCGA AGACTTCA [432]
#Xip10a2     .......... .......... .......... .......... ........ [432]
#Rr27a1      .......... .......... .......... .......... ........ [432]
#Aph3a1      .......... .......... .......... .......... ........ [432]
#Hd6d3       .......... .......... .......... .......... ........ [432]
#C.elegans   C..AA.GAT. AG...A.A.. .TTT.C..-. .CT..A.TAG .CGT.GTT [432]

#Xip9a2      TGAGCATTGC TAGAATGCCG CCTCAAATCA TATTTTTCAA TGTC-GCA [480]
#Xip10a2     .......... .......... .......... .......... ....-... [480]
#Rr27a1      .......... .......... .......... .......... ....-... [480]
#Aph3a1      .......... .......... .......... .......... ....-... [480]
#Hd6d3       .......... .......... .......... .......... ....-... [480]
#C.elegans   CAC.AG.C.T CTC..CA.AA ..G.T.--TG .G.C.CCTGG ..G.TAT. [480]

#Xip9a2      TGTTGAAAAA TATGCTGATC GTGTTGGTGG TTAGGTAGA- -GAGCTTG [528]
#Xip10a2     .......... .......... .......... .........- -....... [528]
#Rr27a1      .......... .......... .......... .........- -....... [528]
#Aph3a1      .......... .......... .......... .........- -....... [528]
#Hd6d3       .......... .......... .......... .........- -....... [528]
#C.elegans   ..CGTCT.GG CT.CT.CT.. T.TGC..A.A GG.A..TAGT T..CGA.A [528]

#Xip9a2      TTTTCGTCTA CCATACCTGG TTGTACAGGA AATCTTAATG ATCCACAG [576]
#Xip10a2     .......... .......... .......... .......... ........ [576]
#Rr27a1      .......... .......G.. .......... .......... ........ [576]
#Aph3a1      .......... .......... .......... .......... ........ [576]
#Hd6d3       .......... .......... .......... .......... ........ [576]
#C.elegans   G.C.T.ATG. T.G.GGT.C. G.-.T.G.CC G.G.CA.GGC GC.A.A.A [576]

#Xip9a2      CATGTTTAGT GGACGCCATA CATGATCACC GAAACATATC ATTTTTTA [624]
#Xip10a2     .......... .......... .......... .......... ........ [624]
#Rr27a1      .......... .......... .......... .......... ........ [624]
#Aph3a1      .......... .......... .......... .......... ........ [624]
#Hd6d3       .......... .......... .......... .......... ........ [624]
#C.elegans   ..CA.AAGCA CCTTTT.... TT...--.T. AGT...C-.G ...GCCA. [624]

#Xip9a2      TAGATTGCAG AAACA----G TGATTATTTT CCAATAATCG CTAACACA [672]
#Xip10a2     .......... .....----. .......... .......... ........ [672]
#Rr27a1      .......... .....----. .......... .......... ........ [672]
#Aph3a1      .......... .....----. .......... .......... ........ [672]
#Hd6d3       .......... .....----. .......... .......... ........ [672]
#C.elegans   A..TC.T..C GG...TGCG. .....TG..G TTG.G.T.T. .ATCTCG. [672]

#Xip9a2      TACT--GAAC TAGCTTCAGC GATGGATCGG TCGATTCGCG TATCGATG [720]
#Xip10a2     ....--.... .......... .......... .......... ........ [720]
#Rr27a1      ....--.... .......... .......... .......... ........ [720]
#Aph3a1      ....--.... .......... .......... .......... ........ [720]
#Hd6d3       ....--.... .......... .......... .......... ........ [720]
#C.elegans   ..A.AC.T.. .......... .......... .T.CA...A. ........ [720]

#Xip9a2      AAAAACGCAG CTAGCTGCGT TATTTACCAC GAATTGCAGA CGCTTAGA [768]
#Xip10a2     .......... .......... .......... .......... ........ [768]
#Rr27a1      .......... .......... .......... .......... ........ [768]
#Aph3a1      .......... .......... .......... .......... ........ [768]
#Hd6d3       .......... .......... .......... .......... ........ [768]
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#C.elegans    ..G....... ..T....... ..C....... ......... ........ [768]

#Xip9a2       GTGGTGAAAT TTTGAACGCA TAGCGCCGTT GGGTTTTCCC TTCGGCAC [816]
#Xip10a2      ......... ......... ......... ......... ........ [816]
#Rr27a1       ......... ......... .....A.... ......... ........ [816]
#Aph3a1       ......... ......... ......... ......... ........ [816]
#Hd6d3        ......... ......... ......... ......... ........ [816]
#C.elegans    ......... ..C....... ....A..AAC T..GCC...A G.T..T.. [816]

#Xip9a2       GTCTGGTTCA GGGTTGTT-- ATCCGA---C CTA------- CTACAGTG [864]
#Xip10a2      ......... ........-- ......---. ...------- ........ [864]
#Rr27a1       ......... ........-- ......---. ...------- ........ [864]
#Aph3a1       ......... ........-- ......---. ...------- ........ [864]
#Hd6d3        ......... ........-- ......---. ...------- ........ [864]
#C.elegans    ......... ........TA .CT.A.TGC. T..GGCTTCT ..T.G.A. [864]

#Xip9a2       ------TGGC TTGTCACAGA ACACTGTTTG TC---GAATG GTACTTAC [912]
#Xip10a2      ------.... ......... ......... ..---..... ........ [912]
#Rr27a1       ------.... ......... ......... ..---..... ........ [912]
#Aph3a1       ------.... ......... ......... ..---..... ........ [912]
#Hd6d3        ------.... ......... ......... ..---..... ........ [912]
#C.elegans    AGTCTTC... .....GGGC. ...T.AG.GA G.TGA..T.C .CGTC.CG [912]

#Xip9a2       TCACGTAATT CCCATTCTAG TCTAGAAGCA TGAAAG--CA ACATGATA [960]
#Xip10a2      ......... ......... ......... ......--.. ........ [960]
#Rr27a1       ......... ......... ......... ......--.. ........ [960]
#Aph3a1       ......... ......... ......... ......--.. ........ [960]
#Hd6d3        ......... ......... ......... ......--.. ........ [960]
#C.elegans    G..TACTGA. .TTG.C.... ..C....... .C.C.AGT.. .G.CAGAG [960]

#Xip9a2       TTT------T CTTATAGAAA ATATCCCTGA ATGAT-TCGT ATTGAAAC [1008]
#Xip10a2      ...------. ......... ......... .....-.... ........ [1008]
#Rr27a1       ...------. ......... ......... .....-.... ........ [1008]
#Aph3a1       ...------. ......... .........A. .....-.... ........ [1008]
#Hd6d3        ...------. ......... ......... .....-.... ........ [1008]
#C.elegans    C..CACCGT. ..GTCTTGT. ..G.GA.GCG C.AC.C.TA. ..C.G.GG [1008]

#Xip9a2       GCGTAT---A TGGTGTTCGA TC--ACCCA- -CGATCAT-- -------- [1056]
#Xip10a2      ......---. ......... ..--.....- -.......-- -------- [1056]
#Rr27a1       ......---. ......... ..--.....- -.......-- -------- [1056]
#Aph3a1       ......---. ......... ..--.....- -.......-- -------- [1056]
#Hd6d3        ......---. ......... ..--.....- -.......-- -------- [1056]
#C.elegans    AGC.GCCAA. ...C..C... CTTG..T.GG CT......CA AGACGTGT [1056]

#Xip9a2       --AACTA-GT ACTTGATGAA T--AAGTAAG GAAAATTATG TT------ [1104]
#Xip10a2      --.....-.. ......... .--..... ......... ..------ [1104]
#Rr27a1       --.....-.. ......... .--..... ......... ..------ [1104]
#Aph3a1       --.....-.. ......... .--..... ......... ..------ [1104]
#Hd6d3        --.....-.. ......... .--..... ......... ..------ [1104]
#C.elegans    TT....GC.. GTC.T....T GTG...CT.C TGC.TC.... .CAGAATG [1104]

#Xip9a2       CGTGGTCCGC CTTGTTG--T -ATTGAACAC ATGCACCGCT ATGTGCAC [1152]
#Xip10a2      ......... -......--. G......... ......... ........ [1152]
#Rr27a1       ......... -......--. G......... ......... ........ [1152]
#Aph3a1       ......... -......--. G......... ......... ........ [1152]
#Hd6d3        ......... -......--. G......... ......... ........ [1152]
#C.elegans    T..C...GCT .C.T.C.AA. AC.G.G.TT. G.CT.GTCTC G....TGT [1152]

#Xip9a2       ATATACGCCG ATTCGAC--- --AACGATTC ATTGCTAA-- -------- [1200]
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#Xip10a2      .......... .......--- --........ ........-- -------- [1200]
#Rr27a1       .......... .......--- --........ ........-- -------- [1200]
#Aph3a1       .......... .......--- --........ ........-- -------- [1200]
#Hd6d3        .......... .......--- --........ ........-- -------- [1200]
#C.elegans    G.TG.TAT.. .A.TA.TTTT CG.TT...G. GGC...G.GA AGAGAGAC [1200]

#Xip9a2       ---------- ------ATTG CAACCTGAAC TCTGGCGTGA TTACCCGC [1248]
#Xip10a2      ---------- ------.... .......... .......... ........ [1248]
#Rr27a1       ---------- ------.... .......... .......... ........ [1248]
#Aph3a1       ---------- ------.... .......... .......... ........ [1248]
#Hd6d3        ---------- ------.... .......... .......... ........ [1248]
#C.elegans    GGTGCGTGTC TTGCTA..CT .......... ..A.T..... ........ [1248]

#Xip9a2       TGAACTTAAG CATAT [1263]
#Xip10a2      .......... ..... [1263]
#Rr27a1       .......... ..... [1263]
#Aph3a1       .......... ..... [1263]
#Hd6d3        .......... ..... [1263]
#C.elegans    .......... ..... [1263]
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