

Additional file 2: Supplementary figures S1-S21

for the manuscript

Tribolium madens satellitome reveals a network of highly abundant satellite DNAs in megabase-sized regions hallmarked by macro-dyad symmetries

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Fig. S1. Overview of transposable elements (TEs) identified in the Tmad1.0 assembly using the Earl Grey pipeline.

Fig. S2. Alignments of partial sequence segments between *T. madens* satDNAs and Repbase-deposited repetitive elements.

Fig. S3. Localization of the low-copy-number satDNAs TmSat5 **(A)**, TmSat6 **(B)**, TmSat7 **(C)**, TmSat8 **(D)**, TmSat9 **(E)**, TmSat10 **(F)**, and TmSat11 **(G)** on the *T. madens* metaphase chromosomes (2n=20+supernumeraries) determined by fluorescence *in situ* hybridization.

Fig. S4. Structural organization of TmSat1 and TmSat2 repeat units.

Fig. S5. Short (<10 bp) inverted repeats in the subunits of TmSat1 and TmSat2 **(A)**, and predicted secondary structures of TmSat1 and TmSat2 repeat units **(B)**.

Fig. S6. The ModDotPlot visualization of the multi-megabase sized regions containing intermingled arrays of TmSat1 and TmSat2 satDNAs in the four contigs (ptg000032l, ptg000011l, ptg000031l, and ptg000014l) from the Tmad1.0 assembly.

Fig. S7. The length of the TmSat1 arrays related to the number of subarrays they contain.

Fig. S8. Diverged subunits INV_1a and INV_1b from the inversion sites in the TmSat1 arrays.

Fig. S9. Structure of the inversion site INV_2 in the TmSat2 arrays and a possible explanation for its formation.

Fig. S10. Structure of the transition zones TRANS_1 and TRANS_2 between the TmSat1 and TmSat2 arrays.

Fig. S11. Visualization of the raw PacBio HiFi sequencing reads (>30 kb) demonstrating the authenticity of macro-dyad symmetries and conserved segments in TmSat1 and TmSat2 arrays.

Fig. S12. PCA clustering of TmSat1 and TmSat2 monomers, as well as INV_1a, INV_1b, INV_2, TRANS1, and TRANS2 segments derived from the 12 longest contigs of the Tmad1.0 assembly.

Fig. S13. Graph networks illustrating sequence-similarity relationships among TmSat1, TmSat2, INV_1a, INV_1b, INV_2, TRANS_1, and TRANS_2 sequences extracted from the 12 longest contigs of the Tmad1.0 assembly.

Fig. S14. Meiotic bouquet-like configurations showing associations among non-homologous chromosomes of *T. madens*.

Fig. S15. Predicted secondary structures of TmSat3 **(A)** and TmSat4 **(B)** repeat units.

Fig. S16. The abrupt transitions between **(A)** TmSat1 and TmSat3 arrays, and **(B)** TmSat1 and TmSat4 arrays.

Fig. S17. A raw PacBio HiFi read consisting entirely of TmSat4 repeats separated by microsatellite (AC)_n arrays of different lengths.

Fig. S18. K-mer analysis of the satDNAs TmSat1, TmSat2 and TmSat4, performed to investigate the possible presence of the orthologous satDNAs in the congeneric species *T. castaneum* and *T. freemani*.

Fig. S19. The relationships between the orthologous satDNAs TmSat3 from *T. madens*, TfSat02 from *T. freemani*, and TCsat15 from *T. castaneum*.

Fig. S20. Alignments of the *T. madens* low-copy-number satDNAs and their orthologs among the known *T. castaneum* and *T. freemani* satDNAs.

Fig. S21. Comparison of the TmSat2 consensus sequence defined in this work and the GenBank entry U30599.

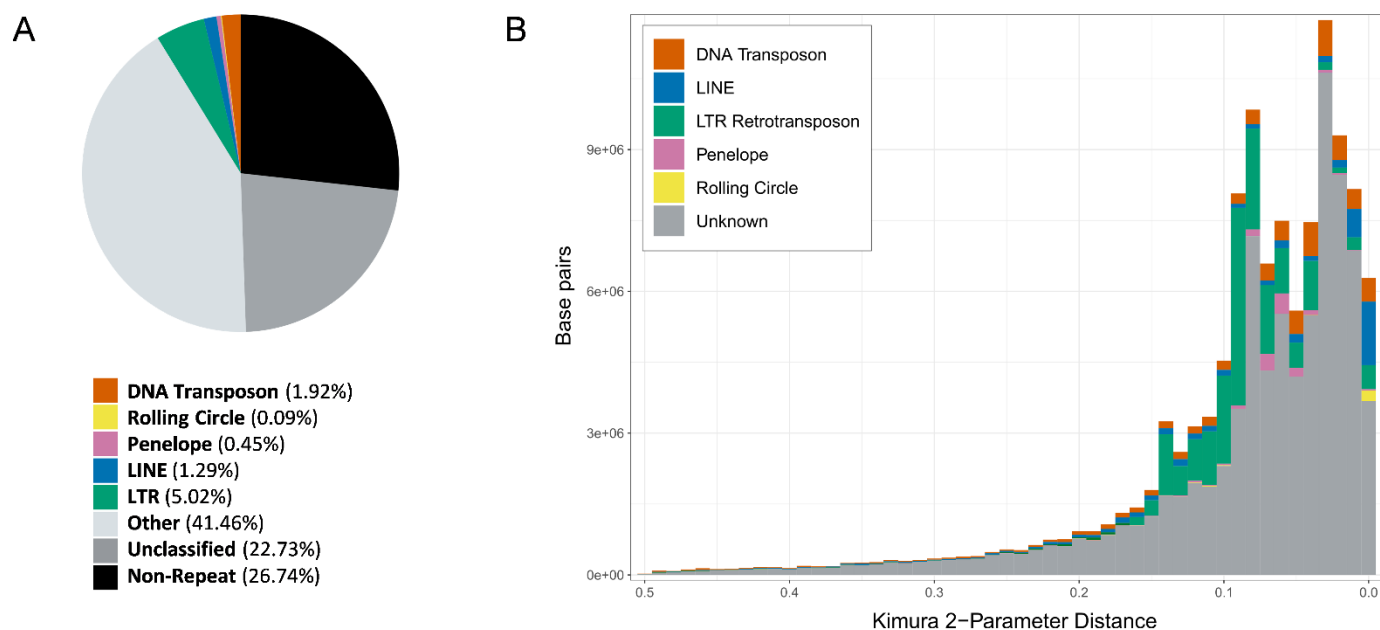


Fig. S1. Overview of transposable elements (TEs) identified in the Tmad1.0 assembly using the Earl Grey pipeline. **(A)** Summary chart showing the proportional representation of major TE classes in the assembly. **(B)** Repeat landscape plot summarizing TE activity using Kimura 2-Parameter Divergence.

TmSat1

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat1	38	191	Harbinger-N3 AT	246	408	d	0.7125	3.7500	84

```

38 tcaaagtattttcaaccaataactggctc-taat-aagagtttttctctaaataaagcaatttgagctat 105
   ||||| | | | | | | | | | | : | | | | | | | | | | - | | | | | | | | | | : | | | | |
246 tcaaagtattttcaa-caatttttggctcgtaatctacagatt-----aaaaataaag-agactcatctat 308
                                     | | | | | | | | | | | | | | | | | | | | | | | |
106 -t-ttc--aatccaatt--ttgctcgat-ttp-----aatacagaattaattcaa--aactaa--tgtat 158
   -|-|-|--||| |-|-|--||| |-|-|-| |-----| |||:||| |||||: |--:| |||--|||
309 ctcttcgtaatgc-attgattgatc-atatatggggagcattaccggaataattttattgagtaattgtat 376
                                     | | | | | | | | | | | | | | | | | | | | | | | |
159 ttttattagtataattgcttcaatcttaatttt 191
   ||||| |||:-|||| | : | |:|||||||
377 atttataagt-taatttatgtatttttaatttt 408

```

TmSat2

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat2	85	143	<u>DNA9-3 STu</u>	2301	2353	d	0.8519	4.0000	78

85 aaaataagacgattttgattaattttcaacagattttcttagatt---ttaagccagaaaaaca 143
||||||| |||:|||||||-----||| |---|||---|||
2301 aaaataagacttttaattaatttt-aacaga-----ttagagtgaattaag---gaaaaaca 2353

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat2	154	356	Gypsy21-PTR_I	12905	13118	d	0.7449	9.0000	72

```

154 atgtattttcaacacaatacgtgtttaaatagccggttttcagccactataatagaatttacgcaactttta 223
   ||||| | | | : ||| |-----||| | |-| ||||-|-|----|
12905 atgtattttcaaaaaaacatgttgaat-----cactttcat-gtattt-c---ac---a 12952

    224 atcgatttg-----ctcgattttaaatcaga--aatcgctctaataca----atgtatttc---aacg 278
       | :: ||||-----|| ||-----||||-|-|-|-| ||||-----|||||||-----|||
12953 aacagggttggtcaccttgga----aaataagaccaat-gct-gaaatcactttcatgtatttcacaaaact 13016

    279 a---tgaaataac-----tgt-tttcagtcaaaa-t-----aaagcaatttgagctatttc-c-aattc 330
       |--|-----||-|-|-|-|-|-|-|-|-|-|-|-|-|-|-| ||| || ||||-|-|| ||
13017 aatctgaaatcactttcatgtatttca--caaaaactaatctgaaatcactttcatgtatttcacaaaact 13084

    331 cattttg-----cttt-at-ttttcagaaaaac 356
        |||||-----|||---|-| || || |||||
13085 aatttgaaatcactttcatatatatttcacaaaac 13118

```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat2	394	427	<u>RTEX-3 CaAu</u>	4730	4766	c	0.8889	1.0000	72

427 atttgggtcaa--tttt-aaaccagtaattgaaccaa 394
 ||||| ||||| -- ||||-|||:|||:|||||
 4730 atttgggtcaaacttttcaaataaataattgaaccaa 4766

TmSat3

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat3	212	264	Kolobok-1_SIn	2179	2248	c	0.8929	2.0000	84

264 aaaaagtgaata-----tt-----gtaaaaat---tgtgaaactttaaacgcgtttttctacgaa 213
|||||-----|-----|:|||||-----|
2179 aaaaagtgaataattctcatcttatacacgtataaatgtatgtgaaactttaaacgcgtttttct-cgaa 2247

212 a 212
|
2248 a 2248

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat3	409	436	GYPSOR1_I	4719	4748	d	0.9310	99.0000	68

409 gaaactaaaggagatagccc--aatgtggt 436
|||||-----|-----|
4719 gaaactaaaggagatagcacagaatgtggt 4748

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat3	473	520	EnSpm-14N1_DR	1527	1576	c	0.7959	1.8000	72

520 atctagtgtttttgaacatgtctcagat--tcgattttaacctatcttat 473
|||||:|||||:|||||:|---:| | |||||:| |:|
1527 atctaagtgttttgaaaatgtcttagatgacctaattaaacttttttat 1576

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat3	590	643	Transih-N1_CQ	908	954	c	0.8163	3.5000	68

643 ccaatcgattccccggaacattttacataggtataggtcaaaatattatgtcat 590
|||||:|||||:| |---:| | |||||:|
908 ccaatcgattccccggaatgtttttacataagaa-----acactattat-tcat 954

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat3	715	790	Academ-1_AP	6553	6629	c	0.7692	4.0000	84

790 aaaattaaattttctgacatat--attaaaa--atttcagtgtctc-tacgatgaatagttatcgagaaaa 726
||||| ||||| || |---| ||---|:--|---| | :| |||||
6553 aaaattattttttctttcattttattataagtat---tg-tcgtaaaatcaatagttatcgagaaaa 6619

725 tttctgataaa 715
|:|---| |||
6620 tctc-gaaaaa 6629

TmSat4

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat4	202	271	piggyBac-5_XL	6057	6124	c	0.7857	4.0000	74

271 cttcatttttaaa-atgt-ggcatagtatttcgaaataagatcgaacaacgcatgcatctcgcca-a--ca 207
|| |||||:||||-|| |-||-||| |||-----||| || |-||||||||||||| ||||:|-|---||
6057 ctgcatttcaaacatttaggc-taggtatt-----atacgaac-aacaacgcatgcaactcgtcacatgca 6119

206 acaaa 202
|||||
6120 acaaa 6124

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat4	274	320	Transib-2_CoFl	1885	1931	d	0.7917	2.6667	68

274 cacttaaaaaagaaaacgcaacc-tatattacagtaaagggtgtatgtat 320
|||||||:|||||:||||-||| |||- |||| | ||||:|||||
1885 cacttaaaaaaggaaacttaaccttatttta-tgtaatgttgtgtat 1931

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat4	418	457	Gypsy-3_BlaAdu-I	611	651	c	0.8293	6.0000	70

457 attaat-ccaaacgaaatactataccatttttattatttt 418
||||||-|| |||:| ||||||| || | |||||||||
611 attaatacctaacaacatactattccctattttattatttt 651

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat4	606	666	piggyBac-3_DAn	33	91	d	0.7742	3.0000	70

606 tgatagttagtaaaaaactc-ttatcttattcttttcattgcttgttgact-atcaattgtgtt 666
||||-||||--|||| |-||-||||:||||||||||||| |:| |||||-| ||||: |||
33 tgat-gtta--aaaata-tcgttattttattcttttcattccttttgactcaaaaattaagtt 91

TmSat7

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat7	115	165	Academ-8_MyCo	3441	3485	d	0.8298	2.0000	70

115 atttttgcagaaaatgaagcttattataagggcatttgactgtaaaaaaat 165
|| ||||:||||:||||-----||| |-||||||||||||| |||||:|||||
3441 atatttacagagaat-----ttataa-aagggcatttcactgtgaaaaaaat 3485

TmSat9

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat9	162	208	REP4_XT	180	227	d	0.9167	1.0000	112

162 aactgcagaccggtttcgccctt-ttggggctcatcagtgtagtgtag 208
||||:|||||:|||||-----||| |-||||||||||||| |||||:|||||
180 aactacagaccggtttcgcccttcttggggctcatcagtgtagtgtag 227

TmSat11

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat11	264	330	Ginger1-5 HM	1109	1170	c	0.8413	99.0000	82

```

330 aaacagaga---gcaataaa-atgtttttgattctaa-aataaccagatttgtttaaaaaatttcggttg 266
      ||||| |----|||||||-----|||-----|||-----|||-----|||-----|||
1109 aaacagtgaatggcaataaatatgttt-----aacaataac-agatttgtttacaaaa--tggattg 1168
      ||
265 tt 264
      ||
1169 tt 1170

```

TmSat13

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat13	79	121	<u>Dada-U6 DaAe</u>	4028	4079	d	0.8478	4.0000	68

79 tgctgatggtatcatcg---atca----ttgtatttttcttta-tttgtc 121
|||::|:||||| | ---|||----| ||||| ||||-|||
4028 tectataatatactacatcactgtttttgtattttattattttgtc 4079

TmSat16

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat16	78	450	Helitron-N10 LMi	399	804	c	0.7195	2.3714	256

```

450 gatttgggcttctcggttaaaaatgaagaacacgtgttttaggattttgaaaattccacctcttagggg 381
   ||| |||: |:|:||||:|::| |:||:||||| |||:| | |||||:||||| || : ||:||
399 gatattggaatcttggcaggattaaaaaacacgagtttcagtatttttggaaattcaacaagtaagagg 468
   ||| |||:||||-|||| || || | |--||||-----|||---| || || |:|:|:|:| |--|
469 gtaaaataggggatgaaaaattcttttgaaaacacgttgctattcagacaattttgaagctagaagc--t 536
   ||| |||:||||-|||| || || | |--||||-----|||---| || || |:|:|:|:| |--|
324 g-aaaatttg-tatttaggctt-tcgattaaaaatcaagtaatacgtgtttcaggatttttggaaatttc 258
   |-||| |||-||||-| ||-|:|:|:|:| |:|:| |||||:|||||:| |||||:|||||:|
537 gcaaaaattgatattt-gtattgttggttagaatttaaaaaatcgtgtttcggtatttttggaaattca 605
   |-||| |||-||||-| ||-|:|:|:|:| |:|:| |||||:|||||:| |||||:|||||:|
257 accctcaaggggggttgaa--ca-agggta-aaacttcgtaaaaatccgtt---ttt-----tttt- 204
   ||| | |||||:|:|:|:|--- |---| |---| -: | |||---|---|:|:|:|:|---|---|---|---|
606 accataaaggggggttaattggagaggggatgtttttcg-aaa--atctgttgctatttaggcaattttg 672
   ||| | |||||:|:|:|:|--- |---| |---| -: | |||---|---|:|:|:|:|---|---|---|---|
203 aagttaaatctatgaaaattggattttg----ggtgttc-agttaaaaacaaaatagcacgtgtttcaa 140
   |||||:| |||:|:| || | |||||-----| |||:| | | |-----| |||||:|
673 aagttagaactcaaaattttcgatttggattcggggttcgaatttaaaaga-----cacgtgtttcgg 736
   |||||:| |||:|:| || | |||||-----| |||:| | | |-----| |||||:|
139 ga-ttttggagaaattctatccctaagggggtcaaataaggggatg-aaa----g-tttgtataaatatgt 78
   |-|||||---|---| |:| | |||||-----|---|---|---|---|---|---|---|---|
737 t-|tttttgea-aattccaccaataagggggtgaatacggggtcagaaattgatttttcaaaaatatgt 804
   |||||:| |||:|:| || | |||||-----| |||:| | | |-----| |||||:|

```

TmSat17

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat17	9	54	L1-68 TAe	1820	1866	d	0.8085	2.3333	70

9 caagtactttactatagcccaaaaatgac--actcttttaatatta 54
|||-|||:|||||:||||||| |--||| |||
1820 caa-taacattattatagctcaagaaattaccactcttttaaatctta 1866

TmSat20

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat20	85	122	Helitron-41 CGI	9976	10018	c	0.8780	2.0000	74

```

122 ttgagtgccttacattg-tcagtgtta---ccaaatt-aagat 85
      ||||| ||||| ||||| -|:||||| |---| ||||| -|||||
9976 ttgattgccttacattgattagtgttatagccaaattcaagat 10018

```

TmSat21

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat21	144	240	<u>Helitron-N9_AT</u>	1755	1853	c	0.7872	3.0000	70

```

240 cat-aattttttaataaaa--c--tag-----atgttcgaataagagtacaaa---aaattgagtt--tt 187
    |||---|||:| |||||---|||-----|||::|||---||| ||---||| ||| |||---|||
1755 catcaattctgtaataaattcaatagtatccatgtttaaat--ga-taccaataataaattgagaaactt 1821
    |||---||| |||||---||| |||---||| |||---||| |||---||| |||---||| |||
    186 ttaataaaatttattaattaataaatgatgatcaataaacattt 144
        |||---||| |||||---||| |||---||| |||---||| |||---||| |||---|||
1822 tttaa--aatttataaatta-taca-----aataaacattt 1853

```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat21	261	354	Athena-T1 As	21911	21986	c	0.7738	2.2000	74

```

354 ttcttattaatttc aaatttaactctctagttacagtttttttcgtaattaaattagtgctcgttagta 285
   ||| | ||||| :||||||| |:-|:-| ||| |:-| :|:||||-|-|:-|:-|:-|:-|
21911 ttcgcttaatttagaatttaactcttt--tt--agtttggtt-gctactaaat--gt-tcttg-----a 21967

    284 ttatttatagtcataaaaaactta 261
       ||||| |||--|---|||||
21968 ttatttttag--at---aaactta 21986

```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat21	360	434	<u>Athena-I1 As</u>	410	475	c	0.7971	4.0000	72

```

434 tgtggctca-gctgaattattttaaaatgttc-agcttcgctctttaaaactacttttactcctaataac 367
    ||| |||||---|||-----|||:-| |||-----|||:-| |||||
410 tgttgctcatgctgaattattttaaaaa---tcgaacatcatcaatta-----ttta-tgataataac 467

366 -ataatat 360
    -|||||
468 aataatat 475

```

TmSat24

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat24	275	447	MuDR-1 PaM	520	672	d	0.7333	2.1667	104

```

275 aattttcaagaaaagttaa-ttttcat-tatatt--ttacataatttttagagctttctaaattatctatag 340
||||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
520 aattttcaagaaaatttttagtttgatacatttagttaga-aatttttag---tt----atttat-ggtag 580

341 -ttttaattatttaataattggataacagcttgctatttgatttaatttt-gtggttttgctaggaaggtt 408
-||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
581 atttttagtttagtt-attattgg-t---agatt-ttagtttagttaattttgtagattt--tagtaa--tt 640

409 attacaagtgcacaaaattcaagccatttttgataaaatt 447
-||-----||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
641 -tt-----tga-tagattgtagttatttttgtagaatt 672

```

TmSat25

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat25	42	114	Crack-5 SP	4555	4624	c	0.7808	11.0000	88

```

114 ttccaacatgcatgtaataactattttca--taatttttttcgcaaaagttttaataattatttcttttg 47
||||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
4555 ttcccat-atg-atgtaataata--atttcatttcattttatccgaaaatgattaaataatatactttt- 4619

46 ttctg 42
|||
4620 atctg 4624

```

TmSat28

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat28	91	116	I-1 DPe	3130	3156	d	0.9630	99.0000	70

```

91 taccaacaacacttttcttacc-tcaaa 116
||||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
3130 taccaacaacacttttcttaccatcaaa 3156

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat28	320	372	Gypsy18-VV LTR	1098	1153	c	0.8000	4.0000	74

```

372 agaataattttcaaaaatttgag---aaa-attgagtaataattttggaaagtagagat 320
||||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
1098 agaataattttcgaaaattttagggtaaatagtttagtta-attttggatattagaatt 1153

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat28	378	417	hATm-1 AA	5357	5394	d	0.8500	99.0000	72

```

378 ttactcaagtcacaaaaagggccattttttcaaacacaaa 417
||||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -||| -|||
5357 ttact-aagtcac-aaaagggtcgattttttcaaaaaaaaa 5394

```

TmSat29

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat29	1	40	Harbinger-13 CGI	2530	2570	d	0.8293	6.0000	70

```

1 ttgca-aaattaagtcacaaaagcgttttttcgcctgtttt 40
  |||:-||||||| ||||| |||
2530 ttgtacaaattaagtcacattccgcttttttcgcctgatt 2570

```

TmSat30

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat30	280	332	Gypsy-3 PomCan-I	38	87	d	0.8302	5.0000	82

```

280 atttc-ccagacaactttccagggttgaggactttctttctatttttaaatat 332
  ||||-|||| | ||||-||||-||| || ||-||||||| |||||
38 atttctcagaaaactttc-aggt--gggcacgtt-tttctattttgaaatat 87

```

TmSat32

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat32	112	285	EnSpm-3N1 RSa	755	892	c	0.7740	4.7500	96

```

285 tgtc-aaataccaaactccaaaactcattctgacagatgacataacacatcaaattttaactattgaaa 217
  ||||-|||| | ||||| ||| :|||-----|||-----||| || || ||
755 tgtctaaatcccaactccaaacccatt-----gat-----aattttataattttcaaa 804

216 agtcaaattatattttcc----gttcgaaaaaatt-tagtttttatttaaaaaacgtggttataaacattt 152
  ||----||| |||:|---- ||-|||:||-||-|||:|| |||-----|| ||-|||
805 ag----attatattttcaaatcttc-aaaagattata-ttttgttgcaaaa-----tagaaa-attt 860

151 aaaaatactaataataatattatttctgttttaatttgata 112
  |||-----||| ||| | ||| ||-|| || || ||
861 aaa-----taa-ataatttgattt-tg-tataagtttata 892

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat32	294	371	Harbinger-8 CGI	5930	6005	c	0.7848	6.0000	70

```

371 aaagaatttggtacttatattccat-acaatttttt-taa-ta---a--aaattacttcccgccacattt 310
  ||| | |||: ||||| ||| -||-| ||||| ||| -||-| ||||| ||| -||-| |||
5930 aaatattttactacttatatt-cataagaatttttgtaagtatttaccaaatt--ttc---cca-attt 5992

309 ttgacacctgtcaaat 294
  ||||-|| ||-|||
5993 ttga-acatg--aaat 6005

```

TmSat33

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat33	2	100	HARB-7 ALy	4647	4734	c	0.7553	2.6667	88

```

100 tattttagaagtattaattttaattgagattttttgtgctctatcttattgattttattccaactcta 31
  ||||:|||||----||| |||||----||-||--|||||||:||| ||||| || |||||---- ||:| ||
4647 tattctagaa---attaagtttaa---a-at--atttgcctttatgttatttatgttat--aaattgta 4705

30 ccttcattta-gctctattttttgttattt 2
  :|-|||| ||-||:| ||| |||
4706 tc-tcatgtatgttttaattttttaattt 4734

```

TmSat34

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat34	11	80	<u>Tx1-17 CGI</u>	2958	3022	c	0.8182	4.5000	92

```

80 aaatcttaaaaaatac gatttttttgacata--aaatagaagacaaaaaccatgtataaccagttaaaaata 13
   ||||| |||||---|||:| |--||| ||||| ||||| | |||||----|||:|
2958 aaatcttcaaaata---ttttttaacttagaaaaagtagacaaaaacaaagtataa----ttaagaa 3020
   ||
12 ct 11
   ||
3021 ct 3022

```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat34	130	189	<u>KolobokP-10 CGI</u>	1603	1661	d	0.7869	3.0000	78

```

130 aaaaattggtctcagagcaattactcgtt--tttttaggaatttcaaaaatgtaacaaaat 189
    |||||:|||||:|-|-||-- ||:| ||||| |||-|||||
1603 aaaaattggttcagagcagtta-t-gttaaattacattattttcaaaaatct-acaaaat 1661

```

TmSat36

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat36	36	157	<u>hAT-73_HM</u>	219	341	d	0.7815	7.0000	100

```

36 acaattc-tataagacaatttttttagttttgttgatttaacattactt-----t----tgtttt 92
   |||||:-| || |--|||||||---|||||||---||| |||||-----|----| |||||
219 acaattgttttaata--attttttt--ttttgtgt--tttaaaaattacttaagaaaaataagtgttt 282
                                     |||||
93 ataagtttgaaa---ttaaggctaaaatttaattttttaagaaactccatttcataagtataaaaaact 157
   |--|||||---|---| | | ||||| |||||---| | | | ||||| |||||
283 a--agttt-aaactttttca---tcataatttaatttt--aa-atattagatttcataagtttataaaact 341

```

TmSat37

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat37	38	130	<u>Polinton-2 DTa</u>	8473	8565	d	0.7579	2.6000	82

[illegible]

TmSat39

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat39	27	97	Kolobok-7 CGi	2600	2674	c	0.8082	7.0000	86

97 atttcagctaaaaacgcaattat--tttgcaaaattgcgttgaag-a-taagccaaa----aa-ttcaac 37
||||-|||||||:|||| || --||| ||| ||||----|||-|-| || ||||----||-|||||
2600 attt-agctaaaaatgcaagtaaaactttccaatattg----gaagcactcaggcaaatgaaaacttcaac 2664

36 aaaatagtgg 27
|||||||
2665 aaaatagtgg 2674

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat39	137	340	Gypsy-131 DTa-I	1167	1317	c	0.7590	3.6667	82

340 ataaaaaaattttaacaagttaaaaaattataaaattaaatcgaaagcccaaaaaataaattcaaatagat 271
|||||||---| |||:|:| |||| | ||||| ||| -||-|----|||:|:| ||||:|-
1167 ataaaaaa--taaaataaaaataaaaataaaaataaaaata-aaa----aaaaataaactaaaataaa- 1228

270 gttatttcgtttatttcggtcgattaaaa-aaaatcactctgtatgtactactgaattagtgaattgta 202
-----|| ||||-|||| | ----||-||:|---|||----|||
1229 -----ataaaaataaaaataaa-----at-tatta---aatta-----ttggt- 1261

201 atccccgattgataatttcgtcaaattttc-ttaaagaaattgaaaactaccaatttggtg-aaaat 137
-||:| -|||||||---|---|---|---|---| ||| |---|---|---| |||
1262 -tctct-ttgataatttcgt-aaatttcgtt--ag--attttaacaa--aattt--ttgttaaat 1317

TmSat40

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat40	58	86	MuDR-43 TAe	8544	8573	d	0.9333	1.0000	72

58 gaaaaacaa-catgttttgcgccaatttt 86
|||||||---|---|---|---|---|
8544 gaaaaacaaacatgttttgcgccaatttt 8573

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat40	227	269	Gypsy-17 NeMe-I	2051	2098	d	0.8667	99.0000	70

227 gacaaat---tttccttaaaaaa--tta--cagatttgcaagcagatttg 269
|||| ||---|---|---|---|---| |||||
2051 gacacatggctttcc--aaaaaaccttatgcagaattgcaagcagatttg 2098

TmSat43

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat43	133	168	Tad1-21 PoXa	526	562	c	0.8889	2.0000	68

168 aaagacctcaacctaaaag---acctgaagataatcttc 133
||||---|---|---|---|---| |||||
526 aaag--ctcagcctaaaagcagacctgaagataatcgct 562

TmSat44

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat44	1	50	Gypsy-16_LSal-I	3227	3276	c	0.8039	2.0000	76

```

50 tacttt-cttttctttgttaaataaggcaaaaaataggtcaagaattgttt 1
   |||||:-|| |||:-|||||||:| |:||||| |:| |||||
3227 tactttgtgttcct-gttaaataaagaagaaaatgttaacaattgttt 3276

```

TmSat45

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat45	105	151	Daphne-9_LMi	1901	1948	c	0.7959	7.0000	68

```

151 accaca-cgagaaagattgcaccaa-tctacaaatgtgacatggaa 105
   |||||:-| | || ||-||||||-|:||||||| |||||
1901 accacagccacaatccttg-accaaatatttacaaatgtgccatggaa 1948

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat45	210	249	Kolobok-1_CGi	1861	1905	c	0.8571	2.0000	72

```

249 gaaaagccaacaacttca-ggaact----ccaaaaccaactccac 210
   ||||| |||||:-|||||----||||| |:|:|
1861 gaaaagccaaaaacttcagggaactcacacaaaaacaatttcac 1905

```

TmSat47

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat47	113	154	BEI-32_EnEI-I	1417	1458	d	0.8372	4.0000	68

```

113 gattattaaattga--aatgtcacaaattttatagtcacttgtca 154
   |||:| | |||:-||||||| |||||:-| ||-|||
1417 gatcattttattgacaaatgtcacaaattttat-gaca-ttgtca 1458

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat47	234	324	Gypsy-30_DPu-I	4013	4100	d	0.7614	2.5000	80

```

234 ttttttgtcactactctacattattcaagttggcaacattgactatcacattca----a-atgtcacaa 298
   |||:| | |||: | ||-|||:||||-----| | |:|-||||||| |||||----|-|| |||||
4013 tttcttagtcataacgct-catcattc-----catcttcg-ctatcacattcatatcatatttcacaa 4073

299 tttcatagttaac-tgtcatttatctc 324
   ||||| | | :-||| |:| |||
4074 tttcatattttgcttgccttcattctc 4100

```

TmSat49

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat49	123	199	Keno-7 XT	2727	2800	c	0.7692	2.2500	72

199 ctttta-ctc---tattcttgtga-catttagtcataaaagtggtcacttttgtgatattttatggtgaa 135
|||||:-|| ---||||:-|| |||:-|||: |||: |||---||| |||---|||:-|||:-|||||
2727 cttttaactaatatatt-ttctgatcatcaagtttta--gtgctc--ttct-tga-attttatggtgaa 2789

134 aaaagagattaa 123
|||||:-|||
2790 aaaag-ggttaa 2800

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat49	223	279	Sola2-4B HM	4653	4709	c	0.7586	3.0000	70

279 gtacaaaatgtcaaataatgtacctctcctg-aagcagcatgtcagggtaaaagtaaa 223
||||||| |||:-| ||| | :| ||:-|||| | :| |||||||
4653 gtacaaaatttcaga-actgtagcattactacaagcaccttataagggtaaaagtaaa 4709

TmSat50

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat50	32	158	Helitron-N7C ALy	526	669	d	0.7500	2.6667	82

32 ttttaattttataaatt--attccgattaccacttgttttttaatt---tt-ttttacttgataaaa-a 94
||| |||||||||:-||--|||:-||-||:-||:||||| || |---||-|||||: |: || ||-|
526 ttgaattttata-ttcaatttc-at-ac-atttattttttgaaatgtattttttatataactacaata 591

95 atattttt-----tttaacttt--aacaccttgataaatt--tttt--tt--tatt---c--gaatttt 145
| |||||-----|||||:-|||---|||---:|| ||||---|||---|||---|||---||| ||-
592 agatttttaaatatttttaa-tttgcaaca---tataaaattagttttacttgatatttttcaagaatat- 656

146 cataaatattttaa 158
||| |||||||||
657 catcaatattttaa 669

TmSat52

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat52	208	514	Helitron-1 ArHy	1795	2087	c	0.7176	4.0909	112

514 gttta--aatttgtaa---gtaatagtacttaataaaagtcaaaag-tacgattacaatttacttaattaa 451
||||--||||| |||---||| |||:-||| |||||---||| -||---|||:|||||---|||
1795 gttattaatttttaagtgtatt--tattttttaaaa---aaaatcta--attataattt--ttaattaa 1855

450 a--attaa--tta-aatg--aaatttgaaggttttaaat-tatttatttttttaaatgtagataaccagg 389
|--||| |--|||:-||| --|||||:|---||:||||-||:-|||:|||||:||| |--| |--|
1856 agtattatgtttagaattttaaatttaaa---ttcaaatatactt-ttttttgaattt---ttac--gt 1916

388 aacacaattt-acgcatacattgtcttaa-aagtta---actttcgacgttccaa--aagc-aattaaatt 327
|| -|||||:-||:-|||: ||--|||:-|| |||---| ||| | |||---|--| ||-|||| |--
1917 aag-caatttgaca-atatttt--ttaagaatttatataatttataagtt---attatgctaattaca-- 1977

326 taagttaattata-taaa---aataaaatt-t--gtataattaattac---aaataatttaaaattacta 267
-||| --| ||||:-|||||---||||:||||-|--|| | ||||| -||---||| |||||---|||
1978 -aagg--agtataataaagtaaatagaattatcagtccttattaag-acgtgaattatttta---tacta 2039

266 gtacttacttaattacgctaatttaggcacaaaaagtttgagaaaaagtatattaataaag 208
-|--||| || |--|:-||| : :|||---||| |||||||||---|||
2040 -t--ttaaaaaaat--g-taatactgtttaaa--tttagaaaaagta---taataaag 2087

TmSat53

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat53	55	137	<u>11-170 XL</u>	1382	1465	c	0.7711	3.2500	84

```

137 aatt-ataggtttacatcgggaagtttt----cttaatgtcttgagaatttttctcaatattttgaggtt 73
    ||||-| || |||||:|||||----||-||| || | :|||:|||||----
1382 aattgaaagcattaccatcgggaagtttcacatt-atgtc-tgattattatgttcaatgttttga---- 1445
    72 tccta--gtggtttctttt 55
        ||||--|| |||: |||
1446 tcctaccgtgttttgttt 1465

```

TmSat54

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat54	19	160	<u>Mariner-13_OT</u>	7644	7798	d	0.7230	4.5000	84

```

19 atgacaatcgt---t-atttct-tttttt---ctggttttcctttc-taa--accaataaagtattaaata 77
   |||| |||:|---|-||| | -|||||---||||||| | -:-||-||:|||||-|---|| ||
7644 atgaaaattgtcattcatttataatttttagactggtttcctatcgcaagtactaataaa-ta--aatta 7710

78 atacttttagagggtgtttcctttg-----tctttttaattccactttttt-----ttacaatgcttttt 137
   | |||| | | : || :|||----- || |||| | | -|||||-----||| |-| ||||
7711 agacttttggttagttgttttgaagaagattattatttgca-ttttttaaaaattacta-gcatttta 7778

138 ctctgttcttaatacaaatctctt 160
   ||: | ||||-||--||||| ||
7779 cttgggtctt-at--aatctgtt 7798

```

TmSat55

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat55	140	204	Kiri-3 DSuz	2239	2303	d	0.7538	2.8000	72

140 tttttttcc--acagcaataaacccaaattaaaaatttgatgaatcatgaaatggaattttgtgtt 204
||:|||| |--|||| |:| || ||| ||| |:|||||:|--||||:|||||||
2239 ttcttttacgtacagagattacaaaaatataaactataatgaatta--aaaacggaattttgtgtt 2303

TmSat56

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat56	96	150	Gypsy-21 ST-LTR	84	131	c	0.8235	1.6667	68

150 ttttttaagttatcttaaatctc caaat-gtctactgtaattttttttacaat 96
 ||||| |-----|||--|||:-||:-|| | |||||:|:|
 84 ttttttcaagttatct---tct--aaatagttt--tgtcatttttttcataat 131

TmSat57

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat57	132	242	<u>Kolobok-20 HMa</u>	2560	2658	d	0.7736	3.3333	84

```

132 ttgtttctaattgagaaaaaatgatgagggttttatgc-ttgttttgc-ga--c-gaat--aaaaacgtaaa 194
|||||:-|||---:|||:-|||---||||-|-|| |||||:-|--|-| ||--|||||
2560 ttgttt-taa---gaaag-tgatg---tttaggcattttttgctgattcagcattaaaaaacgtaaa 2620

195 atttattttctgtagttttatgcccgttttgcgacaattaaaaataaaa 242
||||-|||:| |--||| |----:|||---|-|:||| ||
2621 attt-tttttt---ttttt---gttt--c-ataattcaaatataaa 2658

```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mn:Ts</u>	<u>Score</u>
TmSat57	326	370	<u>CR1-74 AAe</u>	5019	5059	d	0.8333	6.0000	68

326 ttgtgtttatttgacaagaagacgacgaggttttatgcccgttt 370
||| ||| ||| ||| ----| ||| ||| ||| ||| :||
5019 ttctgttgatatgaaaagaa---gaggaggttttatgccattt 5059

TmSat58

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat58	50	81	<u>ERV3-1 CLan-I</u>	1756	1790	d	0.9091	2.0000	70

50 ggaatcaaa---cctcaaccagttcccggatttga 81
 ||||| :---|||||||
 1756 ggaatcatggccctcaaccagttcccggatttga 1790

TmSat60

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat60	42	79	<u>MuDR-17 CGI</u>	6549	6585	d	0.8718	2.0000	72

42 tattttcaactttgatgttttctttaaatagtaaa-tgtag 79
||||| - ||||| - : ||||| - |||||
6549 tattttcaactta-atgttttctttaa-aataaattgtag 6585

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat60	86	118	<u>DIRS-50 CGI</u>	507	538	c	0.8788	1.0000	68

118 aaaacttgggttttgatggagacacaaattgat 86
 |||:|:|:-|||:|
 507 aaaacttgggtcttgatgaaga-acaaattaat 538

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat60	196	231	CACTA-1 PB	4580	4617	d	0.8919	1.5000	78

196 atacattttttt--aattaccttaacatattgtat 231
|||||::|||
4580 atacatttttttcaaattgtcctaacaatttttat 4617

TmSat61

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat61	163	217	hAT-8_AvMa	2529	2578	c	0.7925	1.3333	68

217 ttataaaatgtttaatgactttgtgttgatggagagaatttaactattaagaa 163
||:|:|:-||:||||:|||||||---||:|:| |---| |||||
2529 ttgaagaa-gttcaatgattttgtgttga--ggaaaaattgaa--agtaagaa 2578

TmSat62

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat62	151	293	EnSom-N30_DTa	223	369	d	0.7571	2.8750	106

151 gaaataataatgttttcaaagtataat--taaagt-attttgataaatagtaaagatcaagaaattta 217
|||||: ||:|:-|||:--| ||--|| |:-| ||||| | ||||| ||:|
223 gaaataaccatattt-caaaa--aaaatggtatggtcaatttgatatttttaagatcaagttattca 289

218 tatcatttttttaacaagga-atcaatcaaaagataaaattaat-gttttttat-----c---aaaa 274
|||||||-----|-|| |||---||||| | :||||- |||||-----|---|||
290 tatcatttt-----gatatgaat--aaagattatgttaatcttttttatattatttgctcaaaaa 348

275 atac--aatttaacatttttt 293
|||---|||:|:|||||
349 atactaaatttggtatttttt 369

TmSat63

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat63	177	225	ATCOPIA65_I	3094	3140	c	0.8298	99.0000	70

225 taaatgacaccaa--ctcaaagagttgaagttcgaaccctgtctaaaacaa 177
|||||----|---||||||| ||||| ||| ||
3094 taaatga----aattctcaaagagttgaagttcgaaaaatgtcacaaagaa 3140

TmSat64

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat64	115	263	Medea	5181	5358	c	0.7405	3.8571	94

263 atcta-atttttgattt---tttga--c-tgttttaacgaaattttgcaaag-aaattagtttttagct 202
||| |-||||| |||---||| |---|---| | : || | |||---||| ||||:|:|
5181 atcaacatttttgctttatttttgtaaactgttttaaacagtttatgaaaagtaaataagtttctggtt 5250

201 taaaaacgtactcaaatgctagaaaaag-----g---ctaaaat---g--attatatttacg 153
:|:|||| |:-|||---||| ||| -----|---| || |---|---| | ||||-
5251 caagaacgaac-caaat-ctagtaaaacttccatattattgtcactcaatttttagcaattttttttac- 5317

152 ttctaatatagcaattttttggtttattgt-----aaaaatta 115
-|| |:-||||| ||||| ||| |-----||| |||
5318 -tcaagt-tagcaaattttggtttattttcagcgaaatatta 5358

TmSat65

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat65	199	244	<u>MuDR-37_M1</u>	1682	1722	d	0.8571	99.0000	68

199 gcaaaatttgatcaatttctataaggttaacaatttgg-gaaaaaaat 244
|||||
1682 gcaaaatttgatctattt-----ggtaacaattgggtgaatatcaat 1722

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat65	293	352	<u>Ix1-27_DR</u>	1222	1283	c	0.7903	2.0000	74

352 ttctactaccaa--a--ttttaacaaaatctgaattattgtttgagttgtaaatatt-tct 293
|||:|-|-||--|||:||||||| |:|: |||||-- || |||||:-||
1222 ttatttc-ccaactacttttgacaaaatctgtagtctttgtt--cttttaaatattattct 1283

TmSat67

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat67	113	151	<u>Gypsy-55_DTa-LTR</u>	1728	1768	c	0.8537	4.0000	74

151 ggt-aattagaagtaaattgag-tgtattttccataataat 113
|||-||||||| ||||| | -|||||:|||||||
1728 ggtcaattagaattaaattcatatgtattctccataataat 1768

TmSat69

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat69	150	204	<u>L1-84 SpPu</u>	2181	2242	d	0.8070	4.5000	78

```

150 aagaaaaatca-ctgt-----taaaagcacaaaataggagaactagaaactggtatcaaa 204
    ||||| | - | | | | | : | | | | | | | | | | | | | | | | | | | | | | | |
2181 aagaaaaatcagctgtcacttgattagaacaagaggggagaattagtaactggtatcaaa 2242

```

TmSat70

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat70	47	122	Kolobok-N12 XT	322	390	d	0.8056	2.0000	86

```

47 caaaaaac-atcacaaacttgtaa-aaaagtaatatgtataaatcaagggtcgtatt-caattttctagttt 113
   |||||:-||:|||||||:-|| |:-|||:|-|-----||| |-|||:-:||||
322 caaaaaccattacaaacttgtaataaatgt-atattgcaa-----gctgccttagaatttt--ggttt 381
                                     :||| |||
114 ttttttta 122
    :||| |||
382 cttttatta 390

```

TmSat71

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat71	9	90	Helitron-N44 Aly	1801	1884	d	0.7558	4.6667	88

9 ttaaaa-aaaacaaaaaaa--caccaaat-gtcaccaagaaggaaaaaacatgcgtttcaaaattaca 74
||||| - ||| ||||| --||: |||| -|-| | ||-||||||| | : |||| |||| : |
1801 ttaaaacaaaagaaaaaattccacttaattagt-agcaaa-aaggaaaatagaaaaatttctaattcta 1868

75 aa-ttgtcgttttagta 90
||-|||-----||
1869 aagttg-cgttttagta 1884

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat71	187	270	<u>Copia-2 CoGl-I</u>	1794	1867	c	0.8133	3.5000	76

270 aaatagctctgtaagtaactcaaaacagttggtaaaatagtacttttatag---act--tatattgtgag 206
||||| || ||||---||:| ||--||--||||| |||||||||---|||---|||||-----
1794 aaatagactttaaa---acttaatac--tt--taaaatattacttttatagataacttctatatt----- 1851

```

205 gtaaaatagtat-ttaaaat 187
    ----||| | ||-||:|
1852 ----aatattatcttagaat 1867

```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat71	296	326	RTEX-12_SK	124	153	c	0.9032	99.0000	68

326 actgatttttgaacaatgattaagtatttt 296
|||||
124 actgatttttgaactatg-ttaagtcctttt 153

TmSat72

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat72	4	117	<u>Kolobok-N2 HM</u>	967	1052	d	0.7917	4.5000	76

4 aaaaattacaggattagtttttaagggtttaagcacgttttaagcattatTTTTTTtagacagcaag 73
 |||||:--||| |||---||||| ---|||||---||||| |||-----|||:| |||
 967 aaaac--cagcatt--tttttac---tttaa---cgttttaagcctta-----ttttaaacatgaag 1021

74 aatctatgaaaattc-atgtatgcttcaatccgtaaaatTTTTT 117
 ----|||---||||-|| |||---||-|||----|||||||
 1022 ---tat---aattcgatttat--t--aaacc---aaatTTTTT 1052

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat72	269	495	<u>CryptonV-2_CTe</u>	255	482	c	0.7412	2.1538	118

495 ataacaaaaacttgacgttttgattaatattaataattattaatgaca--accagt-atctt-att--- 433
 ||||| ||-||| | -||| :||| -||| :||| ||||| ||| -|| :|| -| :||| -||---
 255 ataacattaa-ttgac-ttgactaat--taataacattattaatga-atgactgtgcaccttcatttac 319

432 g-taatt-cgtttttaatttaattc--gtttctttgaatggtaaaaaacttttccttatcctacttat-tt 368
|-||||-| ||| || |--||||-:||||-----|| |||-|||---|:||| ||||-|
320 gataattacctttgaaat--attcaaatc-----aacaaa-ttcc---attctaattatgta 373

```
367 ggaaaaaatccgaacaacgacaataacttagtgt---aaca-tttg--c-gttaataattgtt--- 309  
   ||| || |---|-:||-|||:|--:|:|---|||---|||---||| :|||---  
374 ggataacat--g-gca--gacagtga--tggtatgacaacactttgatcatgtt--ttaagctgttcaa 434
```

308 tttgattaat-t-tacacat---ttttaccaa--agt-ttcttattt 269
||||||| -|-||| |---||| ||||--||-||| |||
435 tttgattaatatatacacattaatttttccaatcagtttctaattt 482

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat72	879	1172	Medea	6441	6746	c	0.7320	2.0385	166

```

1172 aaaatctcgcaaaaaaactgtgatttttagttcaaaaacttgcttaaaact-tgaaaaataaagtaacac 1104
      |||||:||||| ||||:| ||||| |||| |||| -| |||||---||-||| |
6441 aaaatctcgcaaaaacactgtaataatagttcaaaaacgtgctaaaaacgtcaaaaaa--aa-taaaaa 6507

1103 aattttcgaccaaattttaggttttagcttgtttttgac--aaactttcactcaaaacgagtattaa 1036
      ||-----|| ||:||||:|-||||:||||:||||:|-|||---||| :|||||:|:|: --||
6508 aa-----acataactttgta-ttttcggcttattctt-gacgcaaa--ttggctcaaaacaagcc--aa 6565

1035 atcgaatgaacaaacaaaatattatc---aatttaaa--tctaatttggtaattttcagtcagtttt- 972
      ||:||||:||||:|: || |||:|||| |---||||| : --|:||||---| ||||| ||||:|:| |||---
6566 attgaacgaaatagtcataat-ttagcccaaattttgcggtttta----gtaattttcagctaatttta 6630

971 -----aacaatactttg----tattttggaaa---ccgaaaaacta-taaaaatgcaaa 926
      -----||||| |:|||||---||||| :| ||---|:||||| ||-| |||||---|||
6631 aaaaaatttcaaaaaaacaaaattttgtgtctattacagcaatttcaaaaaaatactcaaaa---aaa 6697

925 attaacacta-a---tttag-gtttattttg-gtaaatttttggtttgtttt 879
      ||||-||||-|---||| |-|: |||||---|---|||||---|:|||||
6698 tttaa-actatacaattttcgagcaaatttgtgt---ttttt-gtctgtttt 6746

```

TmSat73

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat73	40	181	Gypsy-103_NS-I	1041	1178	d	0.7286	4.5000	98

```

40 aaaaagtgtttttgtttgtttcctttctagtaatacttgtttaaatta-a---tcaattttc--gaaaa 103
      ||||| | -|||| |||:||||| |||||---|| | || |||---|||---|:|||||---|---|
1041 aaaaagta-tttttctttatttctttcttag-aaaagttttt---ttagacccccaattttcaagaaaa 1105

104 attatgtcaaaaaacaagtattttcaagttgtaatatatt--gttattattggacatt-tattaagaaaa 170
      |--||-:|||||---| ||||| | | |:|:| ||--| | | || |||---| |||:||||
1106 a--at-ccaaaaa-----tattttcattattgatgtcttagaaagtctttttaattgttttaaaaaaa 1167

171 aacaattaaaa 181
      || || |||||
1168 aaaaaataaaa 1178

```

TmSat74

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat74	322	364	L1-78_XI	1828	1869	d	0.8140	3.5000	70

```

322 agactcaccttacatggaagcaaatcccccatttaaaacaca 364
      |||||---|| || |:|:|||| ||||| ||| |||
1828 agactcac-ttccaggaaaacaaaatcccccattttaaaaaca 1869

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat74	476	541	DasNov-4.624	4177	4237	c	0.8125	9.0000	94

```

541 ttctacactttttgtttaccctgtatgtgtttttcaagagtcgtctatttcaataaagtttaaaaa 476
      || ||||| |||||---| ||||| | | |-| |||| |:| ||||| |||||---| |||||
4177 ttatacacttattgttta---tgtatgtttatgt-atgagtgatattttcaataaa-tttaaaaa 4237

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat74	549	740	Mariner-38_OT	8222	8432	c	0.7222	4.4286	78

```

740 ttaaacaattcataaaa--aac--ac-tattg--a-tttaaaaacaattttattt-----gt 691
||||:|||| |-----|||---|||---|||---|||---|||---|||---|||---|||
8222 ttaataataataaaaacaaacttacgtatttttagtttaaaaaataattttatttacaatcttattgt 8291

690 tggattgttagatcatagtcctttgatcaaaaaattgggtat--t--ataagttataaa----aaatggtg 629
||:||||:|---|---|---|:| | | | | | | | | | | | | | | | | | | | | | | |
8292 tgaattatt-g--c----tttagagaaaaaaatt--atatcatccataattta-aaatcttagat--tg 8349

628 aacttaaaaaataaaaaagtattttga-a----aaaatatttagtgaaaa--caatcg-tatttt-cataat 568
||||: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
8350 aactwgtttaattaacttttattttgagagaggaaaagttt--tgaatattcaaaagtattttgca-aa- 8415

567 acttagtttagataaaaata 549
|||||---||| ||| | ||
8416 actta--ttatatacacta 8432

```

TmSat75

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat75	357	394	P-41_HM	3012	3052	c	0.8500	99.0000	70

```

394 tttttttttgtaat--at-aaaaaatgtgatcgtattttta 357
||||||| |||||---||-||||||| ||| |||| |||
3012 ttttttttagtaatcgattaaaaaatgttatcttattgtaa 3052

```

TmSat76

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat76	80	136	Gypsy-3_DSer-I	6885	6942	d	0.7931	8.0000	72

```

80 tattccttaattaatttaggactttc-ctatttcac-tcaaattg--aaacatgaattaat 136
||||:| ||||| ||||| |||||---|||---|:|||||---| |||-----||| |||
6885 tatttcataattaatttagttctttctatatttcacgt---atggccatacatgaataaat 6942

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat76	212	544	ISL2FU-N3_BTa	1005	1295	d	0.7138	3.8000	96

```

212 aaaaac---aagcataattacaaaatcatttgcaaaaaaactacaaaacaccatacgaaaataaaaataaa 278
|||||---||---| |||||---|||---|||---|:|||||---| |||-----||| |||
1005 aaaaacttgaa--aaaatta-aaat-att-gtaaaaaa--ttgaaaa-----aataaaaaaaa 1056

279 attttgcaaaagaaaattaaaaagtgttaagtttttaataa---gacataataacaaaagaacattaaaa 345
|---| ||| :|||||||---|---| ||| |---| | |||| |---| | |||
1057 at----caaataaaaattaaaaa----ta---ttgtaaaaattgaaaaataaaaaaa-atcaaataaa 1114

346 aaataaagttctgaat-ttgaacctgaaaagttagaactgaaatcggaattttataaattggaattaga 414
|| |||-----|||---|||-----|||-----|:|||||---| || |||| | :|| |:|
1115 aattaaa-----aatttgaa-----aaa-----aattgaaa-----aaattaataaaatcaaataaaa 1163

415 gtttcaaaagtttcagttcacaaaattgtcttaaaacagtcagaaaaaaggat--atttttgaacgaaa 482
:| | | |---| |||---| || | : | |||| |---| ||| :|| |---| |||: | |
1164 attagaaa-----cagt-----aaaataatattaaaaaaa-ca-aaattaagtatcaattattggaggcat 1222

483 gtttctg-----aattatgacttttca--gatctgctaatacatac--ata--cttagcaataatgtt 539
|| | |-----||| |---| || |---| |---| ||| :||---|||---| ||||| |||:| | |
1223 ctttattttaaaaataatttt-attattaattgtt-tgaaaaaagttattaataaacttagcaatagtatt 1290

540 tttgc 544
|||||
1291 tttgc 1295

```

TmSat77

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat77	1	81	Sola3-2_NV	1035	1115	c	0.7561	3.2000	90

```
81 ttatttttagcttggttctgctgatttagttgtt--ttttaaatagagacttatttattttgccaataat- 15  
||||||| ||||| |--||:: |||| | | |--||:|||| |:|:|| |||| | | ||||| |  
1035 ttatttttagattgttt--cttatttttatgtttcttcattctaataaaaaaacatattaatatgatgccaaaatt 1102  
  
14 atgattaaaaatta 1  
|| -|||||||  
1103 att-ttaaaaaatta 1115
```

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat77	290	624	<u>Medea</u>	6512	6810	d	0.7255	2.7368	126

```

290 ataattttt---ttttcaattttaaatct---cgcagatctggcttaaaa-aggcaaaaaa-aac-acattt 350
   |||||:|||---|||||:::||| -|||---|||||:|||---|||:-||| ||| |-|||-|| | -
6512 ataactttgtatttttcggccttat-tcttgacgcaaata-tggctcaaaacaagccaaattgaacgaata- 6578

351 ttggtc-taatt----ctataattttt---tttgacttatgtttaacgaaattttacaaataggaaagt 412
   ---|||-|||||---|:-||||| ---|||:| || ||| | |||||---|||---|-----|-----
6579 ---gtcataatttagccca-aattttgcggttaaagtaatttttcagctaatttta-aaa----aa---- 6635

413 attacctgaaaaacatgctaaaaacacttttttttgttt-tatttttagcaaaatctcgaaaaaaaaactgag 481
   ||| | :|||||||-----|||-----||||| |-||| :|||||--|:| |||||-----
6636 atttcaaaaaaaaca-----aaa-----tttgtgtctattacagcaa--tttcaaaaaaa----- 6685

482 attttcgttcactataaagacttgaaaaggtcaagtaaacaccattttcgaccaaattttgtgtttttcg- 550
   ---| |--|||---|||:| || |||---| |-|||---||||| ||||| ||||| |||||:|-
6686 ---tac--tca---aaaaaatttaaa---cta-ta-ca--attttcgagcaaattttgtgtttttgt 6738

551 --gttaatattttgccaaaatcttactcaaaatga-gctaaatccaa---caaaataacattaaattaga 614
   --||-----|||||:||||| :|||:||||| |-|||---|||---||| | | :||| |||:-
6739 ctgtt---ttttgtcaaaagtattattcaaaaacaagctaaat-caagtc caatttagtctaatttgg- 6802

615 cttatttttt 624
   --|||||||
6803 --tatttttt 6810
```

TmSat78

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat78	87	370	<u>MuDR-N16 RSa</u>	285	530	c	0.7050	5.3000	108

```

370 aaaagagcaacaacacataa--attttaatgaatttttagcataaaa--aatgagtcaaaaaaatatt 305
    ||||:| ||-|||||---|||||---||||| |---|| |||---|||||---|||:|: | |||||
285 aaaaaatca-caaca---ataattattttatt---ttatta--ataaaataaataaaaaataaaatata 345
    ||||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
304 aaaaaaattactaaaatatgaagataaacaattattgctgtgttcacataacgcaaaataaa---tac 239
    || ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
346 ataataataa--aaact-tgaaaa-aatcaaaaaaatt-----cataaaaatcaaaataaaaaataa 403
    ||||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
238 attttagataatgattcacttcattgtggagcagaatactttaagctaacaatccacaagaat-aatcta 170
    |||: ||||| ||||| |||---||: ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
404 attcaagataatgatt---tttatttt--attagaat-c--tacg---agaat-cagtagaatcaat-t- 459
    ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
169 acaataattcaggtgcgggatagaataagacataaatattctaaattaatttagtttaaatatcaatagt 100
    |||| || |||---|---|: |||| | || ||| ||| ||| ||| ||| ||| ||| ||| |||
460 acaaaaaatca----c----aaaataattattttattttatttaataaaaaataataaaa-ataaatata 519
    ||||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||

99 taaaaaaagttaat 87
   |||||---|||
520 taaaaaa--taat 530

```


Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat80	139	361	Medea	6315	6552	c	0.7130	3.5385	100

```

361 gaaatttcgcagaatatttgcatttctgcctgaaaaacgtccgaaaa----aaacaaattg--ttaacat 298
    |||||:|:||||:|||||||:| ||||| | |||----|| || |:-- |||
6315 gaaattttgcggaataactgcatcttctgtctgtaaacgtgccaaaaacaataaaaaaacgcaaaaacaa 6384

297 ttt--tta--atattt----aaagtcattttgtatacaatttttagtct-ttttag-----tgt----- 248
    | |--:|--|| |----||| |----|||: || || | |-| ||-----| |-----
6385 tgtacctactattatcgacaaaagt-attttt-tatattattattattatgttatagcaaatctcgcaa 6452

247 -----tttaatttatcttaaaaaaacgtgttttaaaa-ggtcgaaaaagagaacattaacaacattttt 185
    -----| |||-| || | |||||:| |||-| |:| |||:| ||-|--|| ||||-----
6453 aaacactgtaa-taatagttcaaaaacgtgctaaaaacgtcaaaaaaataa-a--aaaaacat----- 6513

184 caactaaatttgtaatttttgtattattttgaaaaaatttgtct 139
    -|||---||--||-|||:| ||||:||||: | || || ||
6514 -aact---tt--gt-attttcggcttattcttgacgcaaatggct 6552

```

TmSat83

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat83	60	96	KolobokD-11_MyEd	10397	10436	c	0.8462	2.0000	70

```

96 atttaataaaga-aca--actaattgtctttattcttctt 60
    | |||||:|---||-||: |||||
10397 awttaataaaaacacagcacctattgtctttattcttctt 10436

```

TmSat86

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat86	46	192	Gypsy-5N_PPa-LTR	186	323	d	0.7343	3.0000	94

```

46 tgtccattttaagagctctcaatagaaaaaatagta---taagaaacac-gtgcttttttagtttcttg 111
    || |:|||||---|---||| |||||---| |||: |---| |||||---|||
186 tgactattttaaa-a---ctcaaaagaaaaaatagtaaatttagaaggctcatgattttt--tttcttg 249

112 gagtggcac-taaaaatatttttt--ttctcaa-taaagttaagttaataaaattagattactt-ta 176
    :| |---||-| |||| |||||---| | ||-|| |:|---|||:| |||---| |---||-|
250 aatt---actttaaatcttttttttagtgataaaactacaatt---ttagtagaatt--tct--cttcta 309

177 ccattctaacaaatta 192
    --||| | :|||
310 --attcttaggaatta 323

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat86	303	332	Polinton-4_SM	7301	7332	c	0.9062	99.0000	68

```

332 aataatt-ta-atcttgtaataaatcaaggtt 303
    |||||---||-||| |||||
7301 aataattctagatcttttaataaatcaaggtt 7332

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat86	345	399	Helitron-13_ZM	6889	6938	d	0.8148	4.0000	68

```

345 ttggaaatgactgacaatttctataaaaagtgtagcgtt-tg-tatttgacaatcaa 399
    |||||---|| -||||||| |||||---|:| |---|---||| ||
6889 ttggaaa-gaa-gacaatttctattaaagt---atgttatgcta--tgacaataaa 6938

```

TmSat87

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat87	29	92	hATm-41_HM	366	424	c	0.7969	1.2500	70

92 aactgttaatcgtagccgaat-aa-tttttacggaat-aatatttcttgattcattttacatcagaa 29
||:|:||||--||-|:||||-||-||||--||||-|:||||| |||||---||-|||
366 aattattaat--ta-ctgaattaactttt---gaattaacatttcttcattcatttta-at-aaaa 424

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat87	188	231	PABL_AI	1307	1353	c	0.8261	6.0000	74

231 taaataatttaacagaaaaaa-taa--actcgacgaatgatttttca 188
||||| |||||-----|---|| | |:||| |||||
1307 taaatactttaacagaaaaaaggaaagactagtcaaatgctttttca 1353

TmSat88

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat88	153	371	Helitron-N42_Aly	582	806	d	0.7169	3.2500	96

153 tattttgtaataatattagtttta-attaataatacag----agtggtccagcttgctaagtgtt-gttt 216
|||||: |||||-----|||---||| | | |----|:||||--|| | |: |||| |---| |
582 tattttaaaaaatattatttttagattaaaaaaatggttaaatgtt-a--tagtaaatgtatgattgt 647

217 aattgtttttgcaataaaaaaggaatgaatt--tggaataaaaactcgaa---cacatgtca----agta 277
|| ||||| :|| | | |||:|||---|---| | || |:|||----|:| | |---| |||
648 aaaagtttttttaagatataagaaat-aattcat---atttaaaattgaatattatatttcaagagagta 713

278 a----ataaattcgaagcat---cgaattaaattcgttttaaccaattaatttaattatcttagt-ttaa 339
|----|-----|---|---|---|---| | |--- |-----|-----|:|---|
714 atagtataaattc-a--cattgacgaa---aaa----atataa-aaattaatt---gtatcttaattata- 769

340 caacaatgg--aagta-aac---aaaaataaaaaattt 371
-||: ||:|---||:|---|---|-----| || | |
770 -aattatagtaaaaataaacaataaaaaataaaagtt 806

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat88	381	447	Helitron-1_DVir	586	651	c	0.8209	1.3333	78

447 acactaa-ata-acatgtggttaataatttcatcaaaatcggtt--gat---tagatctcgagttattaaa 385
||| |||---|---|---|:---|-----|:|||||---|---|---|-----|-----|
586 acaataagatatac-tgta-taa-aatttcatcaagatcggttaagatacataga-----agttattaaa 647

384 aaaa 381
: |||
648 gaaa 651

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat88	494	579	hAT-125_HM	2095	2181	d	0.7674	2.1667	80

494 cattttt-tactaatttttaataaatc--agtttttttttaattt---gctctcgatcaattgtttttg 557
|||||---|---| | || |: |:|---| |||:|:|||||---|-----|:|---| |||||
2095 catttttgta--aaatattattgacacctagtagtatttcttcaattttgagctctttgat---tttttttg 2159

558 aggcat--aaataaaaagttgtt 579
|---|---|-----| |||
2160 a--catttttaataaaaaagttgtt 2181

TmSat89

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat89	30	109	Polinton-5 HM	3956	4029	d	0.7600	3.0000	76

```

30 tttctaataatattattttgctaaaaataggccaaaaaa-tcactttttgtaaaaaaattgtgtaaaaata 98
   |||:|||||:|||||:|||||:|: |||||:-|:|-----|:|||||:| || |||
3956 tttttaatatattagtttgctaaaaaaataaaaaaagttac-----aaaaaaattattgcaatata 4017

99 gaaagtg-aatt 109
   :|| |||-|||
4018 aaatgtgtaatt 4029

```

TmSat90

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat90	17	47	Mariner-52 HSal	163	193	c	0.9032	1.5000	72

```

47 atttttttaaatagaacacccctgtattttat 17
   |||||:|||||:|||||:|: |||||
163 atttttttaaatagaacaccccatatttttat 193

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat90	97	190	Iad1-8 PoXa	1342	1430	d	0.7527	2.6000	74

```

97 aattct-tgaaatgttggtctaaatgaagctctatgacgctgcaa---aaaccgt-tttgtgctatctttt 161
   |||| |:-|||||:-|:-|||:| : |||||---|---|:-|||||---| |||| |:-||||| ||
1342 aattgtctgaaatat-ggccactctaagct--at--c-ctgcaagagaaccctatttgtgctatctgtt 1405

162 caaataagggcacaaatttcactt-tttaca 190
   | ||-|||----| ||:|:||||-|||||
1406 ccaa-aag---ccatcttacttctttaca 1430

```

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat90	215	277	I-56 AAe	6205	6263	c	0.7812	2.0000	76

```

277 aaaaatgatgtcaa-ttgtgaaaaaatttaacttctgtgatgctaataatgcaaaaccaaatttgt 215
   |||||:-|:-|||||:-||:| || ||:||||:-|| |:|-| |||||:|||||:-| |||||
6205 aaaaat-a-gtcaacttattgataagatttga-ttgtat-aggctaataatgcaaaacc-aatttgt 6263

```

TmSat91

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat91	155	218	EnSpm-20 CGi	3901	3972	d	0.7941	8.0000	76

```

155 atttttgttataaaagtttc-attttaacaaaaaatca-taaaa-----at-gt--tgattttttgata 214
   |||||:||||| || |:-| |||||---| ||| ||:-|| |-----|:-|---| |||||:| |||
3901 atttttgttataaaatttactaatttaac--aaaattcactaatattctcatagttatgatttttaata 3968

215 tgat 218
   |||
3969 tcat 3972

```

TmSat93

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat93	16	567	MuDR-8_VV	9649	10222	d	0.6827	4.9545	96

16 taaataaaaaattattataaaattataa---aaa-----att--cgaatata--agttatttc--t--- 65
||||-||||| -||-|||||||---|||-----|||---| ||||--|-|||||---|---
9649 taaa-aaaaaw-at-aaaattataattgaaatctcagttattaactactatayta-ttatttcgataaa 9714

66 gttgaaatta-c-taa---aaattagtagtagtagtgataatttttaattattttaagactttctattaa 130
|:|:| |||-|-|||---||| |---| |:|:|---| || | |||: | |||| |: | || ||||
9715 gataaatttatcataataataaataa--attaata-tyttaaaaaattaacaaattaaatattataaattaa 9781

131 ta--t-----ttttctat-ttctttctttgacatat---tttaggcacgacaaagactatt--ttta- 184
|---|-----||| |---| || | | |:|:|---|||--- |:|--- |:|:|:|:|---|||---
9782 taawttatacaattttatattattattatattatagttatataagttta-ttat-tttaagattattaatttat 9849

185 gaatta-----attcttttctacgagattttgctctaataataataaacattt-t-tttaattaacta 245
||| |-----||| || |---| |:|:|---||| |---| ||-|||---|:|:| | || ||
9850 taataaatcaaatattcatttata--atatct---tctatt---tatcaa-atttatgtttgttgaaata 9910

246 a-atta-atTTTT--g-ttaaatat--ttaattccttaaaaaagta-a----gacaaattt-aataactc 302
|-|:|:|---|---|---|---|---| |||: ||| |||---|---| |---|---|---|---|
9911 atactagatttttaagtttaaatataaaataattattattttaagtataatttta-aaatttcaatca-ta 9978

303 cagtgt--ttt-atagtgttgaaataaaacttta---tacaaaaaggaaacaaatca-aattttaaaaaa 365
| |||---|||---||| || || |||:| |---| || |||---|||:|:|:|---|---| |||
9979 aattgtsatttaatagtttttaattaaattkgaaagtaaaaaaa--aaataaaattataattgaaatctc 10046

366 aattgtgtgcacta-aaaatgattatgt--at-aacaaaaattaaaaaatcgagttttataaagtcgaaa 431
|:|:|---|---| |||---| | ||| |||---|---| | |||---|---| |||---|---|
10047 agttat-t-aactactataytattatttygataaagataaatt----tatc-a-taatataaa-t---aaa 10105

432 ttaactatacagggtgttaaaaa--aagattgtaaaattttttgaaggctttcacactttgattttttt 499
|||---|||---|---|---| ||| ||| |---|---| || |:| ||-||---|---|
10106 ttaa-tat-c-----ttaaaaaattaacaaattaaatatmtt--aa---attaataawtt-at----- 10154

500 gaaaattcgtttttgttttcttttta--ctatat-ttttttttattttctaaaatt-ttaaat--ttaac 563
-| |||---||| |:| || || |---|:|:|---| || |||---|---|:|:|---|---|:|:|
10155 -acaat---tttatatattatttatattatgttatataaatttattattt--taagattattaatttattaat 10218

564 aaat 567
||||
10219 aaat 10222

TmSat94

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat94	102	159	Helitron-N21_Aly	15057	15106	d	0.8364	2.0000	70

102 gatgtgcctttgcatgct-taaaaattgacaacaagtataaaaaatgagcaaaatt-aca 159
|||| |---|||---||-|||||||---|:|:|---|---|---|---|---|---|---|
15057 gatgag--tttg--gctataaaaat-gataacaa---a-aaaaatgagcaaaattgaca 15106

TmSat96

Name	From	To	Name	From	To	Dir	Sim	Pos/Mm:Ts	Score
TmSat96	73	109	Iad1-67_PoXa	3771	3809	c	0.8462	99.0000	68

109 aacacaaaaaaa-ctacaagaaaattgctggtt-tctcag 73
|||| | ||| -||||||| ||-||| ||
3771 aacacgaaaaacgctacaagaaaattgctcttctctaag 3809

TmSat98

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat98	205	270	Merlin9 SM	951	1009	d	0.7937	2.0000	74

205 ctactttgtttttatcacagagtgtccttttttaataaatttg-cgaaaaatctaattttgggtcgt 270
 |||||:|||||:|:|:|||||---||| ||| ||-:|||||-|||----|||||:|:-|||
 951 ctactttgtttttaaataaagtgt--tttattttat-gatttgtcgcaa----aattttagg-cgt 1009

TmSat103

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat103	13	62	<u>Gypsy-9 RC-LTR</u>	874	921	d	0.7959	4.5000	72

13 tatatttttcatgattttgaagtttgaatgttgttgaaaaaatatgt 62
||| || || ||||| |||||: ||||| ||| |--: ||| |||
874 tatcttgttgaaatgattttgaaatttgaatgatcttg--agaaagatgt 921

TmSat104

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat104	18	65	KolobokE-3 MyEd	10299	10352	c	0.8113	2.5000	72

65 aatttaagagat-g--taaca-acacag-a-acaataaaagttttttgatt 18
||||| |---| |||-||:-||-| ||| :||| ||| ||
10299 aatttaagagatatgcatcacatagcatacataagaataaaagtgtttt 10352

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat104	75	122	BEL-30 CloCur-I	5139	5183	c	0.8261	7.0000	74

122 acacgatttttgaccgattttcttccatatttgcaatttttaagccat 75
||||||| |---| || ||| |||:||||||| |||||
5139 acacgatttgt---cgttgtctgccacatttgcaattttgatgccat 5183

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat104	194	300	<u>Troyka-1 PtyJor-I</u>	774	901	d	0.7876	4.0000	92

```

194 attaattataaaaatttggtagtcaaaaa----aata-t-----caccacca---aaataagtt-at 247
   ||| ||||| ||||| ||||| ||| | |||----:|:-|-----||| || |---|||:|:-||
774 attcattataaaaatttggta-taacaaattttagtacttttaccgcactacaaattaaataaataat 842

248 t-tt-atg-----tcaaaaaatgcattgaatatgaattttactaatttttttagtgataa 300
   |-|-|-|-----:|:-|-----||| ||| |---|||:|:-||
843 tattaatggataataaataaataatgcattcaatatgaatttta--aa-tatttta--gataa 901

```

TmSat105

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat105	90	123	<u>Copia-7 RC-I</u>	1203	1233	c	0.9091	1.0000	70

123 gaaaatttgctcaaatctcctaataattttctc 90
 ||||| |--|||||||:|||||-|||||
 1203 gaaaatt--ctcaaatctcccaataa-tttctc 1233

TmSat106

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat106	26	89	<u>Gypsy-14 Cas-LTR</u>	681	740	c	0.8254	1.6667	86

89 aaaatccttatttttagctcaaattaccttgacgtaaaaagtatgatcttc--attta 26
|
681 aaaatccttattttt--ctcaa-tactttcacctaataaa---tat-ccattttatctttccaatta 740

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat106	94	121	<u>Neptune-13_PMon</u>	6357	6382	d	0.9630	99.0000	68

94 gaaaactagaaaaatagtagattacata 121
||| | | | | | | | | | -- ||| | | | | |
6357 gaaaactagaaaaat--tagattacata 6382

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat106	183	212	<u>Gypsy-42 CAN-I</u>	2404	2433	c	0.9333	2.0000	76

212 gttttcctttccttgaaagaagatgattgtg 183
 |||||:||||||| |||||
 2404 gttttcctttccttgaatgaagatgattgtg 2433

TmSat107

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat107	52	90	<u>Gypsy-33_AnFu-I</u>	3710	3749	c	0.8718	99.0000	70

90 ataaca---aaagacaataaaccaacagcttcaaaccaaatt 52
 |||||---||||||| |||||---| || |||||
 3710 ataacactgaaagacaatataccaaca--tacataccaaatt 3749

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat107	158	207	<u>Gypsy-655_AA-I</u>	4612	4654	c	0.8667	99.0000	76

207 ccaacagcttccaaatttagtaataaaaaagaacaagggttcaaaaattcg 158
||| - |||
4612 ccaa-agcttgaaatcgaagtataaaaaagaacaag-----aaattcg 4654

TmSat108

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat108	309	372	hAT-3N1 CGI	1275	1336	c	0.7656	2.4000	76

372 aaaaacattt-tatagataccgaaaagcctcaaaaagtccttgtttttgaaaaatcaaatgaa 309
||| ||| ||-||| ::|| |||| |:-||| |||||:|:||||| ||||-::|||
1275 aaatacagttgtatacgcacggaaaacgt-tcaaaaagtccttgtttattgacaaat--gatgaa 1336

TmSat109

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat109	10	70	<u>Gypsy-35 Nvi-I</u>	2155	2212	d	0.8000	3.5000	72

10 tatttaccagttataaaaaaag--tgcaaacattccctgtttttgtataaactt-aaaaaaat 70
 || || |||||--||:|:|:|--| ||||-|||---| ||||| ||||| |||||
 2155 tagttcccaag--aagaagaaggatgaaaa-attc---gtttttgtattaacttccaaaaaat 2212

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat109	204	240	<u>Gypsy-53_SpEx-LTR</u>	26	66	c	0.8718	99.0000	72

240 att-ttttacaa---gtcggtgaaaacaattctatttttaa 204
|||-|||||---| ||| ||| ||| ||| |||
26 attgttttacaatttgcggttaaatcaagtctatttttaa 66

TmSat110

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat110	22	86	<u>Gypsy-50 C0-I</u>	8125	8185	c	0.8226	6.0000	80

```

86 agtaatttaagtaatg--accgaaattgaaaaatactgcttgattaatt--cttattcaaaaaaaaaa 22
   |||  ||||| ||||| |--|:--||| ||||| |-----||-||| |--|||  ||||| |||||
8125 agtatattaagtaatggtatc--aaattgaaaaaaa----tga-taaattcacttaacaaaaaaaaa 8185

```

TmSat111

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat111	47	112	Gypsy-339K_ZM-LTR	683	751	d	0.7500	7.0000	72

47 aaacaacatgttttcaaacatggt---tttggatca-aaaatttacagaaaatgcccaaaaatctgtga 112
||| | ||| |:| |||| | ---|||:|-||-||| | ||||| | ||||| | ||
683 aaaaatcatgatctaaacatctgcaattttat-tcataaaataaacagaaaatggggaaaaatctgaga 751

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat111	144	299	<u>Ix1-3 SPur</u>	3657	3805	c	0.7237	3.3750	86

```

299  aaaatgttatttgtaaaaaacaaaaaaa-----atatttgctataatttga---caagaaattcgtcg 239
    ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||
3657 aaaatgttatttg-aaatacaagaaaatataagatactt-cgataatgaggaagttaagaaagtattag 3724
    ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||
238  aaattagtcatacaat-ttc-tcgtttcataaattaaaaagtcttttgggtg-tacaattggcatgac 172
    ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||
3725 aaat--gt--taaaatgatcat--tttaaganatta----tg-ttgatcttgatataatt--catg-- 3778
    ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||
171  ttttattatatttcatttttcaataat 144
    ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||
3779 tttcattttactt-gttttgtaataat 3805
    ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| ||||| |||||

```

TmSat115

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat115	4	99	<u>Daphne-30 LMi</u>	3174	3260	d	0.7802	8.0000	70

4 actgctttgaaacaaa-tct--gaatatcacttttgatttccga-aaaacttggaataaacaccttcttttat 69
||||| ||||| |||||---|:-|||---| |||||----| ||||| |||----||| |---| ||
3174 actgctttgaaaaaaattcttcg-gta-ca---tgatt----ataaaactagga----accgt-tgtaat 3229

70 cttcaaaactctt---agaaaaaa-aaattgaaaa 99
|| ||---|||---| ||||| ||---||| |||||
3230 ctgca---tcttgaaagaaaaaataaagtgaaaa 3260

TmSat116

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat116	14	188	<u>Polinton-1C HM</u>	9553	9752	d	0.7322	5.6667	112

```

14  ttataaaaa---acaaacaaaataagaaataataattataaa-aat--agaaaaaaaatatttttttt 77
   || |||||---| ||| ||| ||| ||||| | |||||---||| || | ||:|||| |
9553 ttgataaaatttagcaactaaaaaagcaataattaatataaagaatgaagataatcaatgttttaagt 9622

78  gtaaaatattgcaag---attaaa---aa-a---aataggctgtaa---agctaaa-aacttaaaaac 132
   ||:---|||||||---| |||||---||-|---|||: :|||---|| ||||-|:|||||||
9623 gtg---tattgcaagagcattaatatcaacagataataatcctcaagagtagataaagagcttaaaa- 9688

133 ttcaag---aattctaaaatcgataaaaaaagcgaaaatcca--at----aatcgaagaacacaa 188
   -|||||---|| |||| | ||||| ||--|| ||||---|||: || |||||
9689 -tcaagctgaaaaaataaactgggataaaaata--gaattccagatccttaaatcaaatcacaa 9752

```

TmSat117

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat117	26	77	<u>DIRS-4 SpEx</u>	5112	5157	d	0.8542	99.0000	76

26 cataaagtctcg-tgtaattaggaattaatgccttgtttgagctgaaaaaa 77
 |||||-----|-----|-----|-----|-----|-----|-----|-----|
 5112 cataaag---gatgttaatta---ataaatgccttgttttcaccttaaaaaa 5157

TmSat118

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat118	269	324	<u>Gypsy-N1 OD-I</u>	1748	1801	d	0.7857	9.0000	72

269 aaaaaaaattctttcaagatttaaactgtgaataaaattcacaact-tcaaaat 324
 ||||| ||||| --||| ||||| :||| ||||| ||||| ||||| -||| - |||||
 1748 aaaataaattcga--aaatatatttgactagtgaataaaattc-caactggcaaaat 1801

TmSat120

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat120	81	124	KolobokE-1 Ocy0le	4755	4794	d	0.8571	99.0000	74

81 agaaaaattgcataattagcgtaaattgacgtaaattgtttc 124
 ||| ||| ||| ||| --- ||| ||| | - ||| ||| ||| |||
 4755 agaaaaattgcataatta---tcataatttc-aaaattgtttc 4794

TmSat121

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat121	4	31	Mariner3-2N1 LMi	805	833	c	0.9310	99.0000	70

31 agtgtaacggaatttaattttcaa-acct 4
 ||||| ||||| ||||| ||||| -|||
 805 agtgtaacgtaatttaattttcaatacct 833

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat121	35	84	EnSpm-N1_DTa	868	923	d	0.8113	3.5000	74

35 tataaaaatatttcttaaaaaat-gaaatgtttt-tgaa----gagcgggtttttcaa 84
|| ||||||| ||||| -||||-|||-||---:|| | |||||
868 tagaaaaaatatttctgaaaaaatagaatatatttctgaatttcaggcgattttcaa 923

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat121	119	217	hAT-79 SM	1466	1571	c	0.7549	7.5000	78

```

217 ttactcttttcttaatgaattttattggaaaaactgtattg--aatat-----t-----aaaaaaaatatatc 158
    ||| || |||---|||---||| ||| : ||| ||| ||| ||| |||--- |||-----||-|| ||| ||| |||
1466 ttaatcattt--taa--aattttcttgaaaaactgtattgcctatatagccaatccaataaaaaatctac 1531
    ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| ||| |||
    157 agaagc-taa-----aaaagcaaagtagatactt-gtttcgtaat 119
        |:|:|:|---||-|| | ||| |---||-||-||| ||| |||
1532 tggagcttaacgatattgcaaa--agat-cttggttgagaatt 1571

```

TmSat122

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat122	55	128	Academ-59 ArMa	978	1049	c	0.8082	4.0000	90

```

128 ttttacgtcaaatcgatcttaaaaaacaaaggctcacagctgaatgttttgacaa---attaaaga-aggaa 63
    |||||----||-||: ||||| ||||| |||||: |||---|----| |||||---| ||
978 ttttacgt---tc-attgtaaaaaacaaaggaccagctgaacgattt--caacggattaaagacattaa 1040
    62 aaaa-tgag 55
    ||||-|||
1041 aaaactgag 1049

```

TmSat123

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Name</u>	<u>From</u>	<u>To</u>	<u>Dir</u>	<u>Sim</u>	<u>Pos/Mm:Ts</u>	<u>Score</u>
TmSat123	359	454	<u>Gypsy-15 HRo-I</u>	1486	1592	c	0.7812	1.8333	68

```

454  tgagaaattaaaaaaacgtcatttgataaag--ttcaagatttcattaaagaagttgg--ttaaaaaat--- 392
    |||:|||||:|---|---|:|  --||| |||||  |||---|--- |||||---
1486  tgaataattagaaa---tca---gacaaacaattcaagatttcaagaaaga--tggaagtaaaaaataaa 1546
    391  gtgagatttcaa-----ataaaa-----at--ttcaacagcttag 359
        :|-|:|||||:|||||:|||||:|||||:|||||:|||||:
1547  at-aaatttcaatgaacatatataaaaacgacatgcttcaacatctcag 1592

```

Fig. S2. Alignments of partial sequence segments between *T. madens* satDNAs and Repbase-deposited repetitive elements. Similarities between satDNAs and Repbase entries were accessed by the CENSOR tool on October 17th 2025.

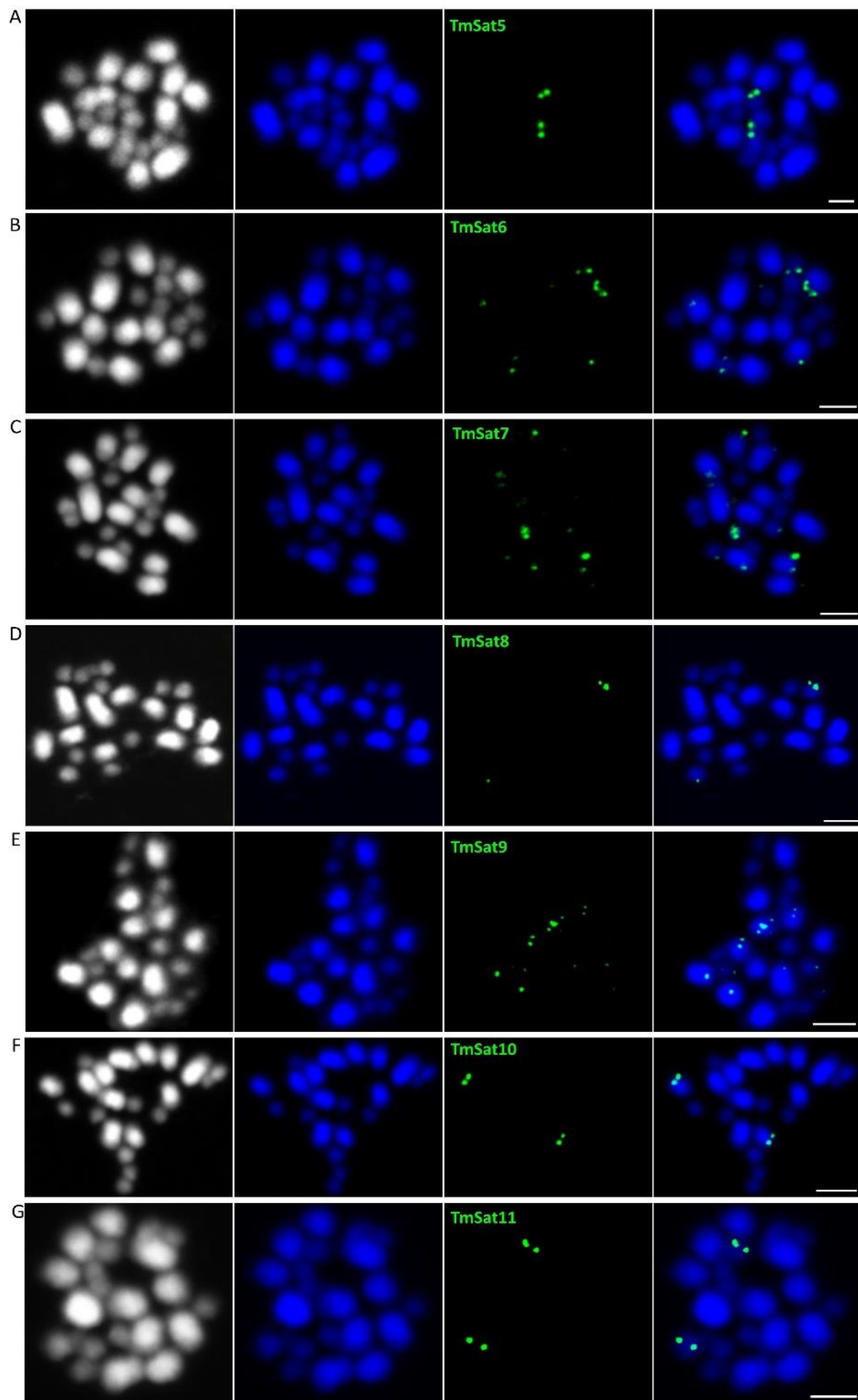


Fig. S3. Localization of the low-copy-number satDNAs TmSat5 (**A**), TmSat6 (**B**), TmSat7 (**C**), TmSat8 (**D**), TmSat9 (**E**), TmSat10 (**F**), and TmSat11 (**G**) on the *T. madens* metaphase chromosomes ($2n=20+\text{supernumeraries}$) determined by fluorescence *in situ* hybridization. The first panels show the chromosomes in a black and white version to better visualize the contours of the chromosomes. The chromosomes are stained in DAPI (blue fluorescence), while satDNA-specific probes are shown in green. The bar represents 3 μm .

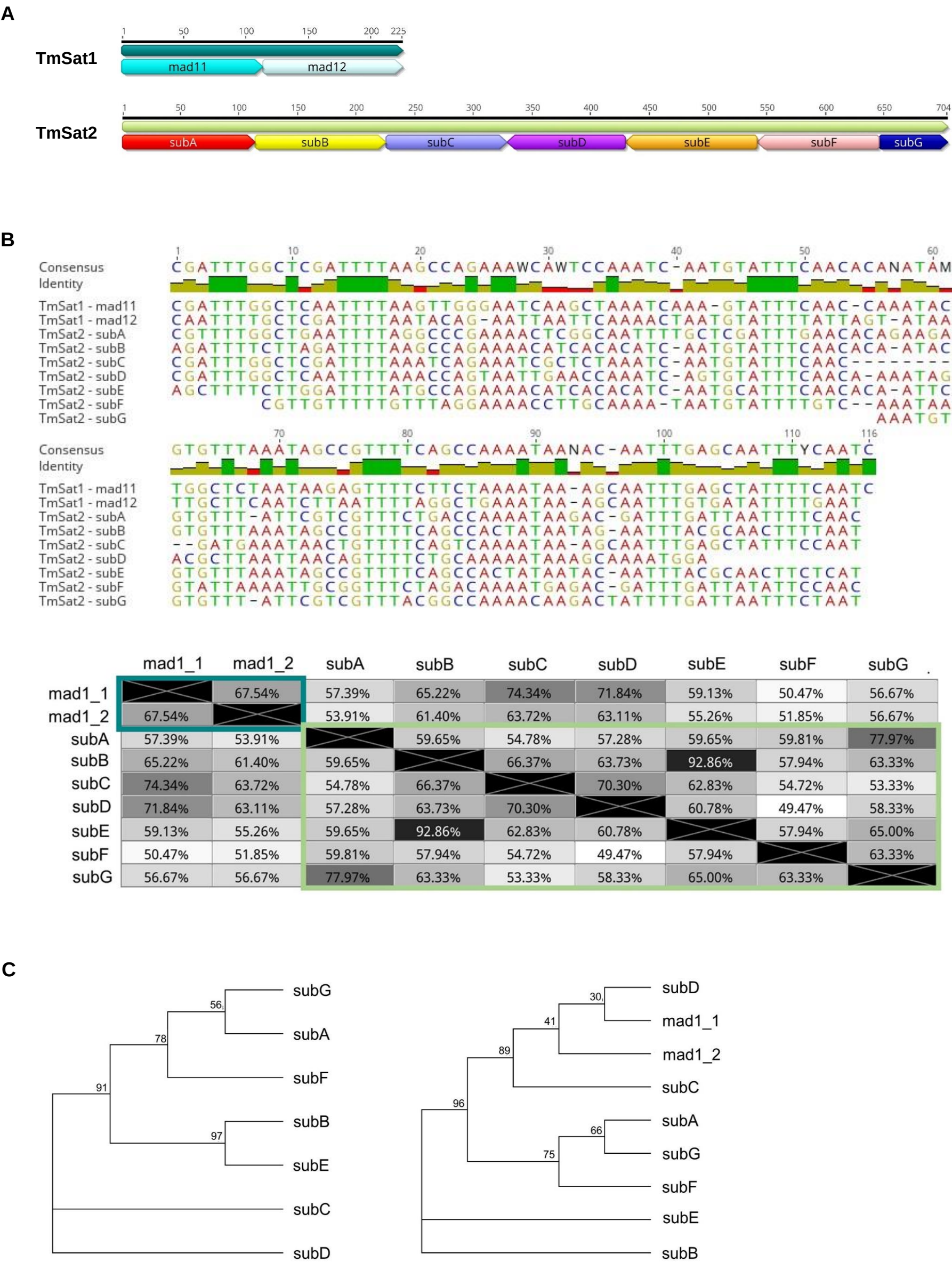
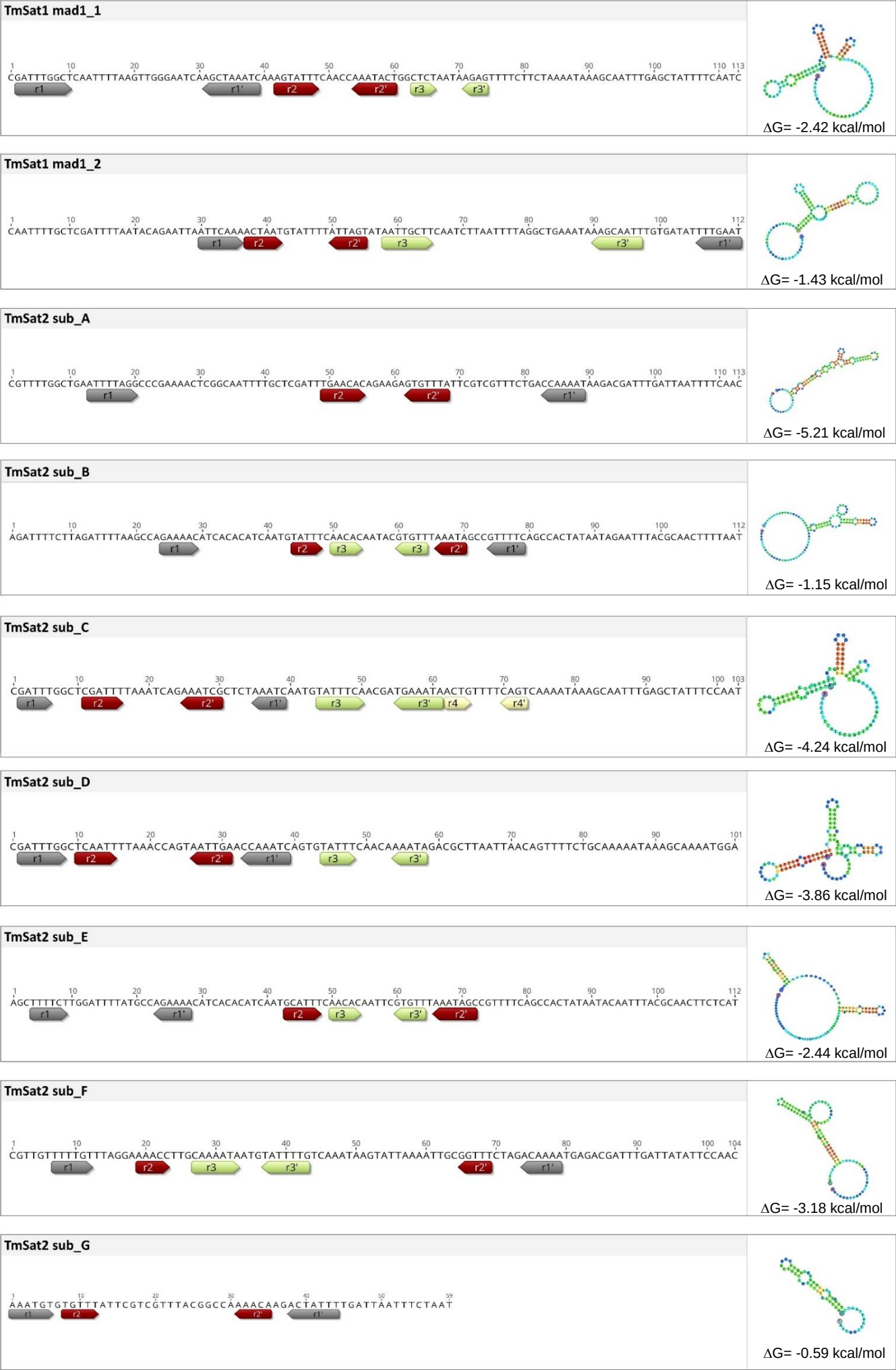


Fig. S4. Structural organization of TmSat1 and TmSat2 repeat units. **(A)** Schematic representation of TmSat1 and TmSat2 structure and the organization of their subunits. The arrows indicate the orientation of the subunits. **(B)** Alignment of the TmSat1 and TmSat2 subunits and matrix of their pairwise similarities. **(C)** Maximum likelihood trees reflecting relationships between the TmSat2 subunits (left) and the TmSat1-TmSat2 subunits (right). The numbers above the branches indicate the percentage of bootstrap values for 100 replicates.

A



B

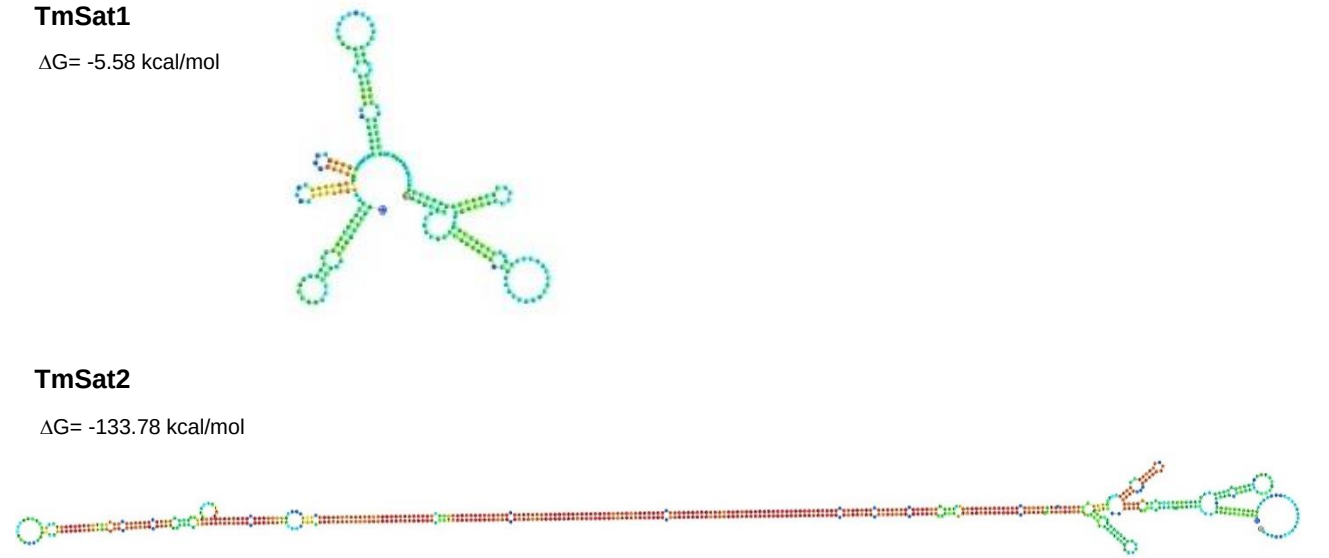
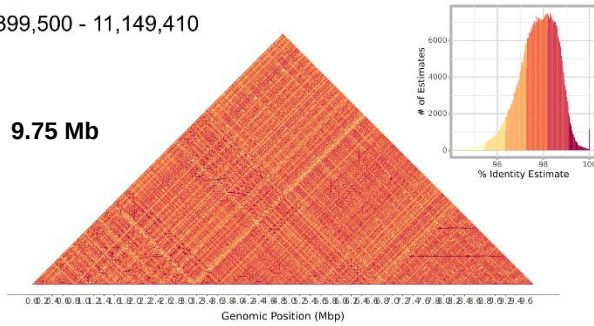


Fig. S5. Short (<10 bp) inverted repeats in the subunits of TmSat1 and TmSat2 (**A**), and predicted secondary structures of TmSat1 and TmSat2 repeat units (**B**). Potential secondary structures were predicted using the RNAfold tool [63] and DNA Matthews 2004 energy model.

ptg000032l

1,399,500 - 11,149,410

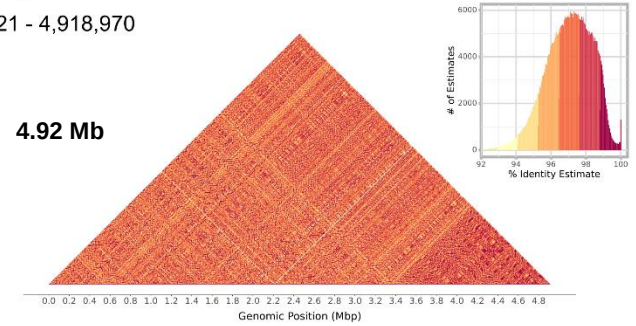
9.75 Mb



ptg000011l

121 - 4,918,970

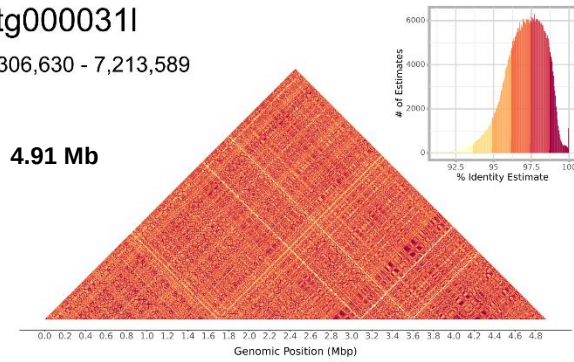
4.92 Mb



ptg000031l

2,306,630 - 7,213,589

4.91 Mb



ptg000014l

74,838 - 3,454,058

3.38 Mb

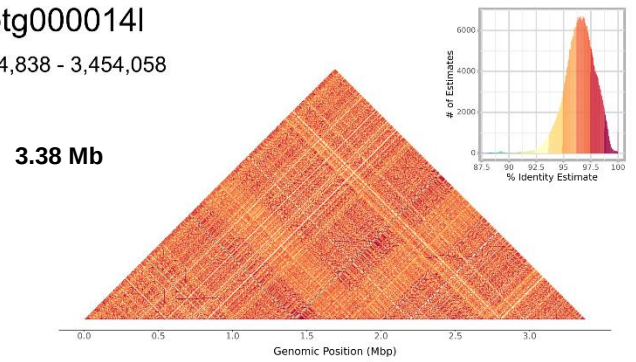


Fig. S6. The ModDotPlot visualization of the multi-megabase sized regions containing intermingled arrays of TmSat1 and TmSat2 satDNAs in the four contigs (ptg000032l, ptg000011l, ptg000031l, and ptg000014l) from the Tmad1.0 assembly. The lengths and positions of the TmSat1-TmSat2 regions within the contigs are indicated below the contig names, and the identity estimate values are shown in the color histogram along each plot.

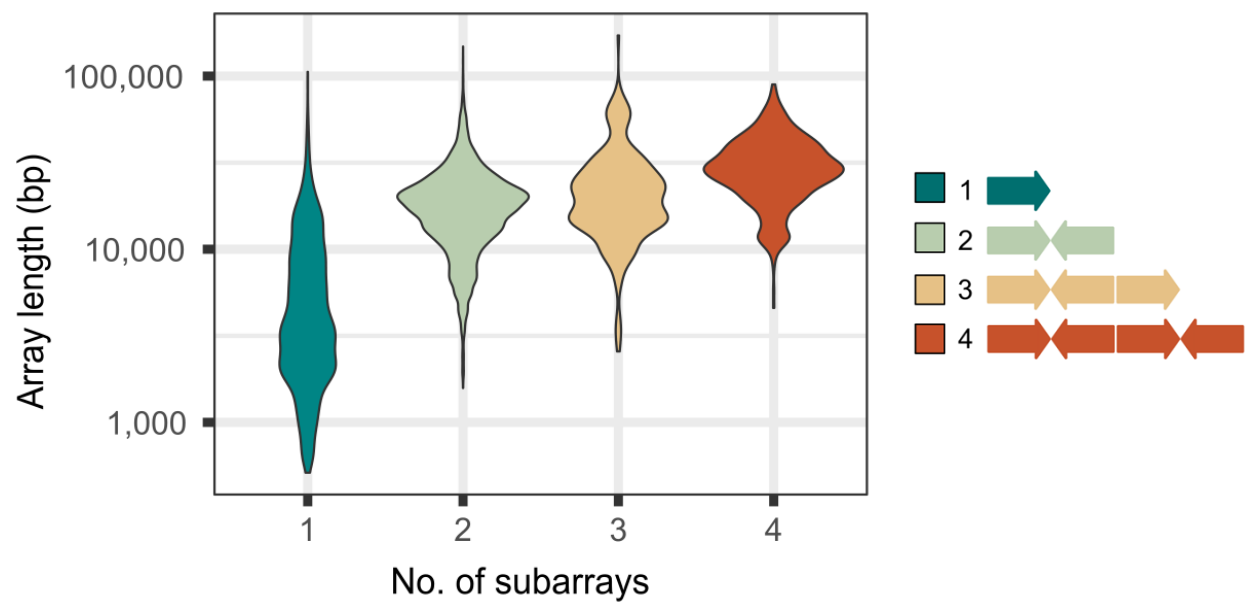


Fig. S7. The length of the TmSat1 arrays related to the number of subarrays they contain.

A



B

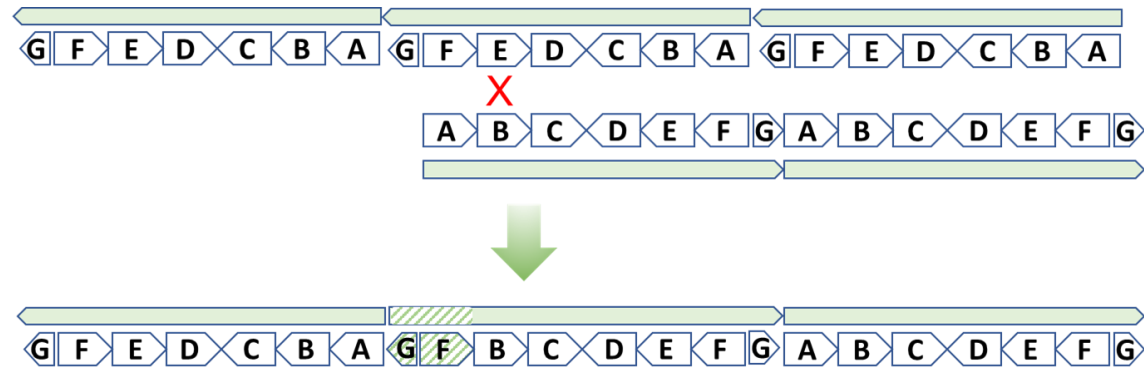


Fig. S9. Structure of the inversion site INV_2 in the TmSat2 arrays and a possible explanation for its formation. **(A)** Alignment of the INV_2 sequence and the canonical TmSat2 subunits sub_G and sub_F. The sequence logo indicates 12 nucleotide differences between INV_2 and the subG+subF subunits. **(B)** The most parsimonious scenario of how an inversion rearrangement could occur between TmSat2 tandem repeats and generate the INV_2 site. We propose that ectopic recombination has occurred between two oppositely oriented TmSat2 arrays, most likely between the highly similar subunits sub_E and sub_B, which share the highest pairwise similarity (92.9%) among the TmSat2 subunits (as indicated in Fig. S4B-C).



Fig. S10. Structure of the transition zones TRANS_1 and TRANS_2 between the TmSat1 and TmSat2 arrays. **(A)** Schematic representation of the TRANS_1 segment and the alignment of the four subunits (I-IV) and the TmSat1 subunits mad1_1 and mad1_2. The percentages in the arrows indicate the similarity to the corresponding sequences (TmSat1 monomer, subunit mad1_1 and subunit mad1_2). **(B)** Schematic representation of the TRANS_2 segment and the alignment of TRANS_2, TmSat2 subunit sub_D and TmSat1 subunit mad1_2. The box highlights the sharp transition between the subunits sub_D and mad1_2 with the underlined duplication of the TTCAAT motif.



Fig. S11. Visualization of the raw PacBio HiFi sequencing reads (>30 kb) demonstrating the authenticity of macro-dyad symmetries and conserved segments in TmSat1 and TmSat2 arrays. **(A)** The raw reads consisting entirely of TmSat1 repeats, with the conserved INV_1a and INV_1b inversion sites indicated. **(B)** The raw reads showing the intermingled TmSat1 and TmSat2 arrays forming macro-dyad symmetries. The conserved inversion sites INV_1a, INV_1b and INV_2, as well as transition zones TRANS_1 and TRANS_2 are indicated.

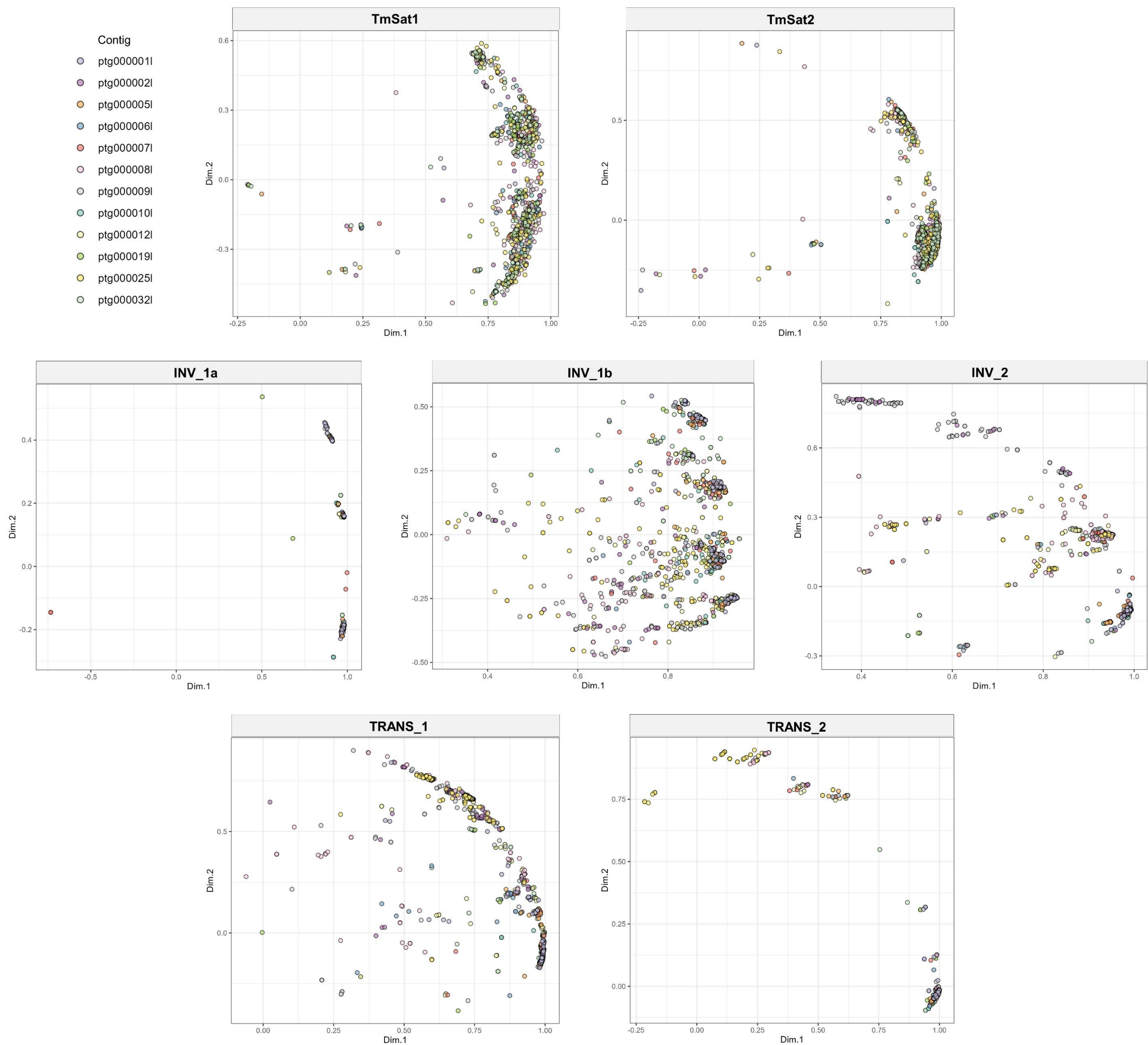


Fig. S12. PCA clustering of TmSat1 and TmSat2 monomers, as well as INV_1a, INV_1b, INV_2, TRANS1, and TRANS2 segments derived from the 12 longest contigs of the Tmad1.0 assembly. Owing to the large number of annotated TmSat1 and TmSat2 monomers, these datasets were downsampled by randomly selecting 100 monomers from each contig. For all other sequence sets, the complete sets of annotated sequences were included. Each dot corresponds to an individual sequence, colored according to its contig of origin.

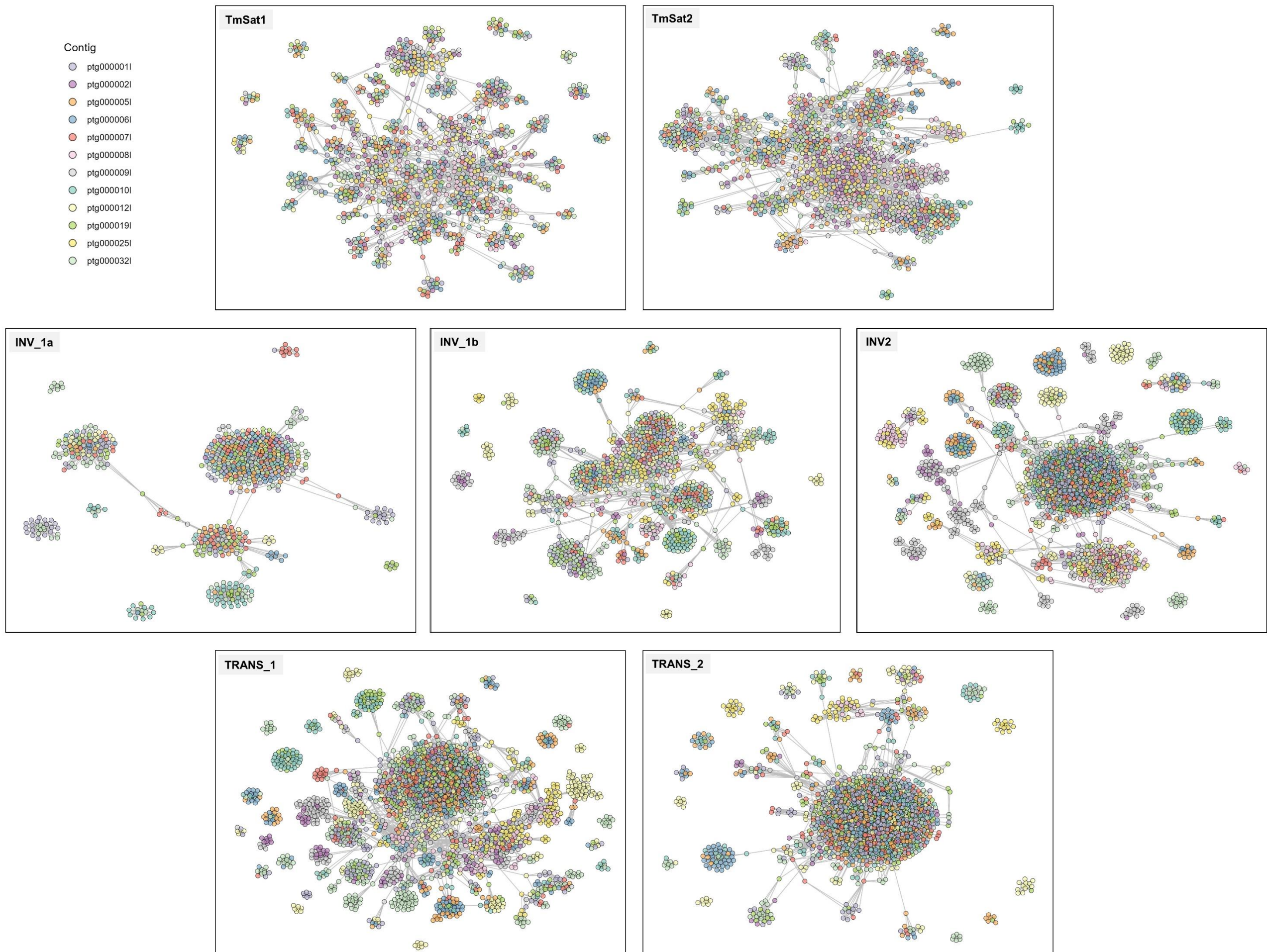


Fig. S13. Graph networks illustrating sequence-similarity relationships among TmSat1, TmSat2, INV_1a, INV_1b, INV_2, TRANS_1, and TRANS_2 sequences extracted from the 12 longest contigs of the Tmad1.0 assembly. These networks were generated from the same sequences analyzed by PCA in Suppl. Fig. S12. Each dot represents an individual sequence, colored according to the Tmad1.0 contig on which it is annotated. A color-coded contig legend is provided.

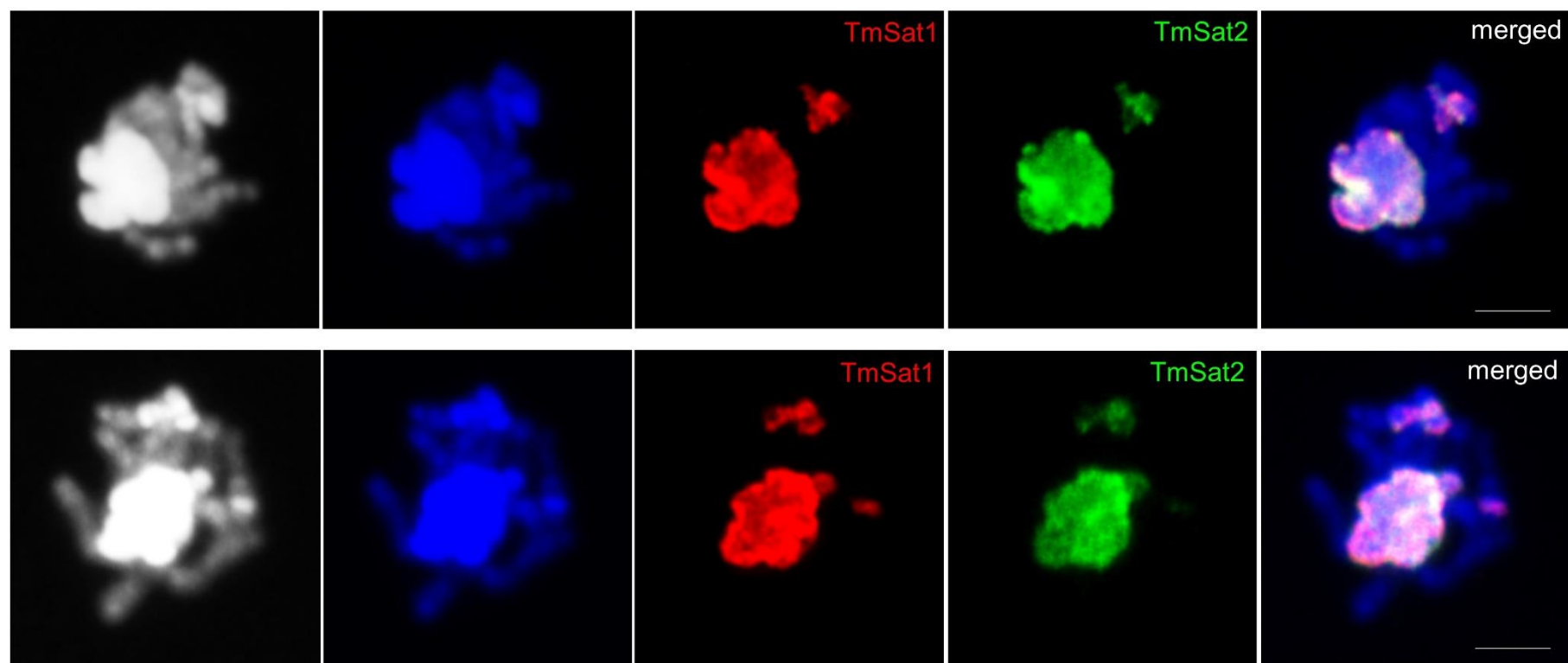


Fig. S14. Meiotic bouquet-like configurations showing associations among non-homologous chromosomes of *T. madens*. The first panels display chromosomes in black and white to better visualize their contours. DAPI-stained chromosomes (blue) were analyzed by two-color FISH using TmSat1 (red) and TmSat2 (green) probes. The final panels show the overlap of the signals. Scale bar = 3 μm .

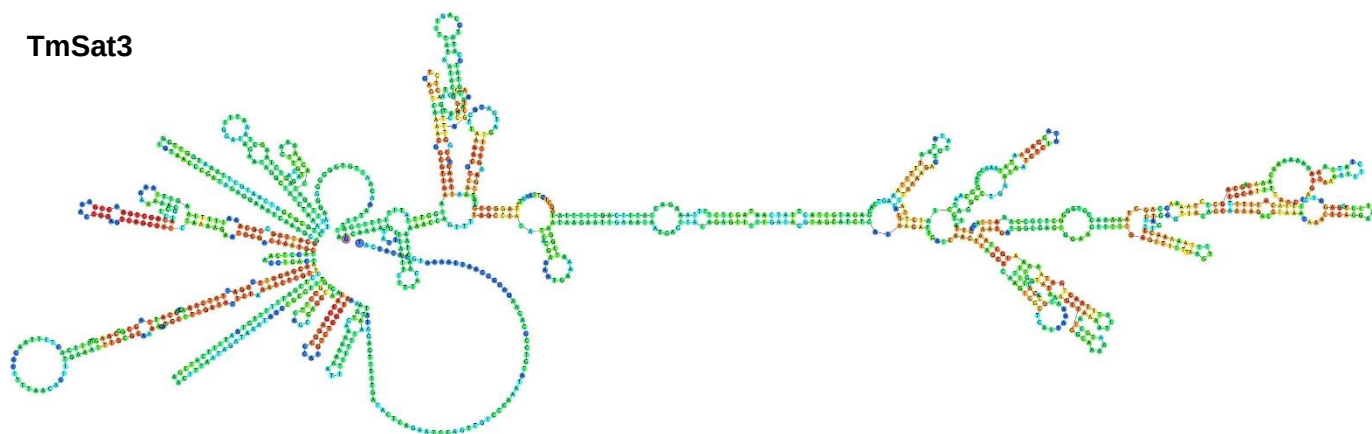
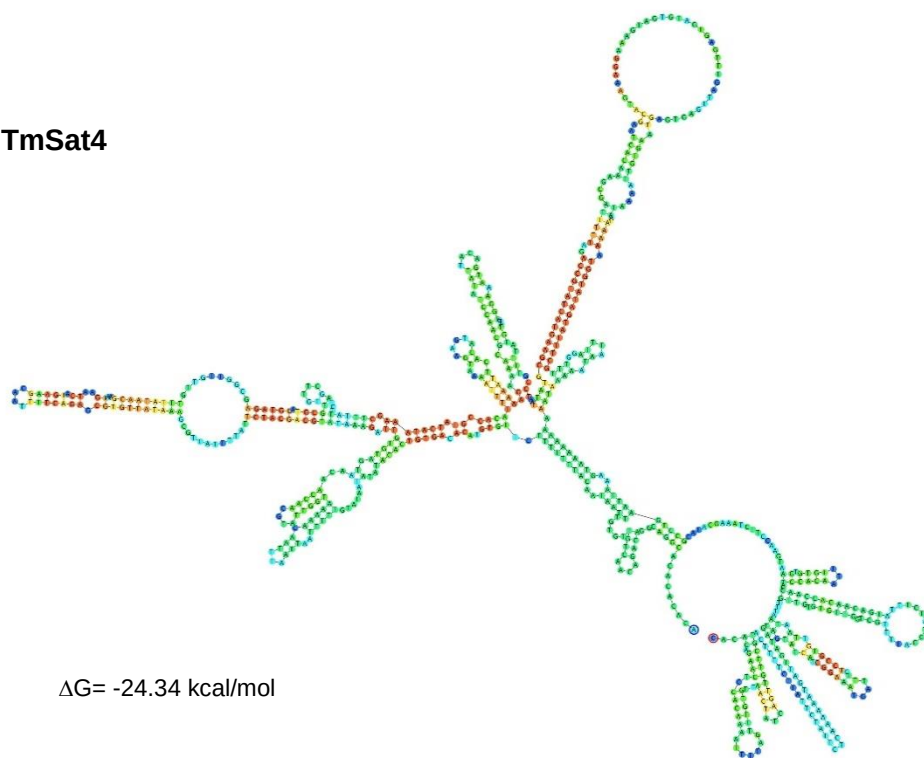
A**TmSat3** $\Delta G = -56.45$ kcal/mol**B****TmSat4** $\Delta G = -24.34$ kcal/mol

Fig. S15. Predicted secondary structures of TmSat3 **(A)** and TmSat4 **(B)** repeat units. Potential DNA secondary structures were predicted using the RNAfold tool [63] and DNA Matthews 2004 energy model.

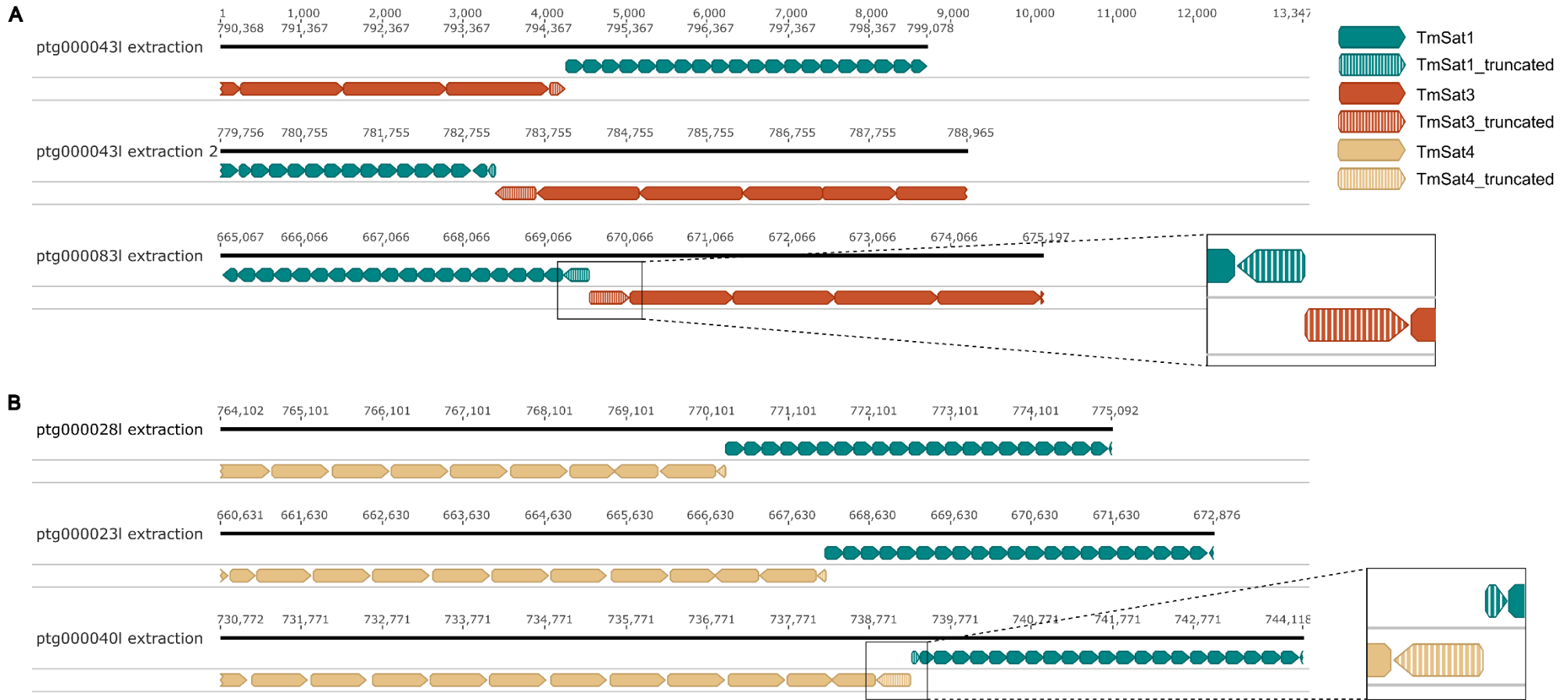


Fig. S16. The abrupt transitions between **(A)** TmSat1 and TmSat3 arrays, and **(B)** TmSat1 and TmSat4 arrays. The transitions represent the junctions of truncated repeats (marked by vertical stripes) from the juxtaposed satDNAs.

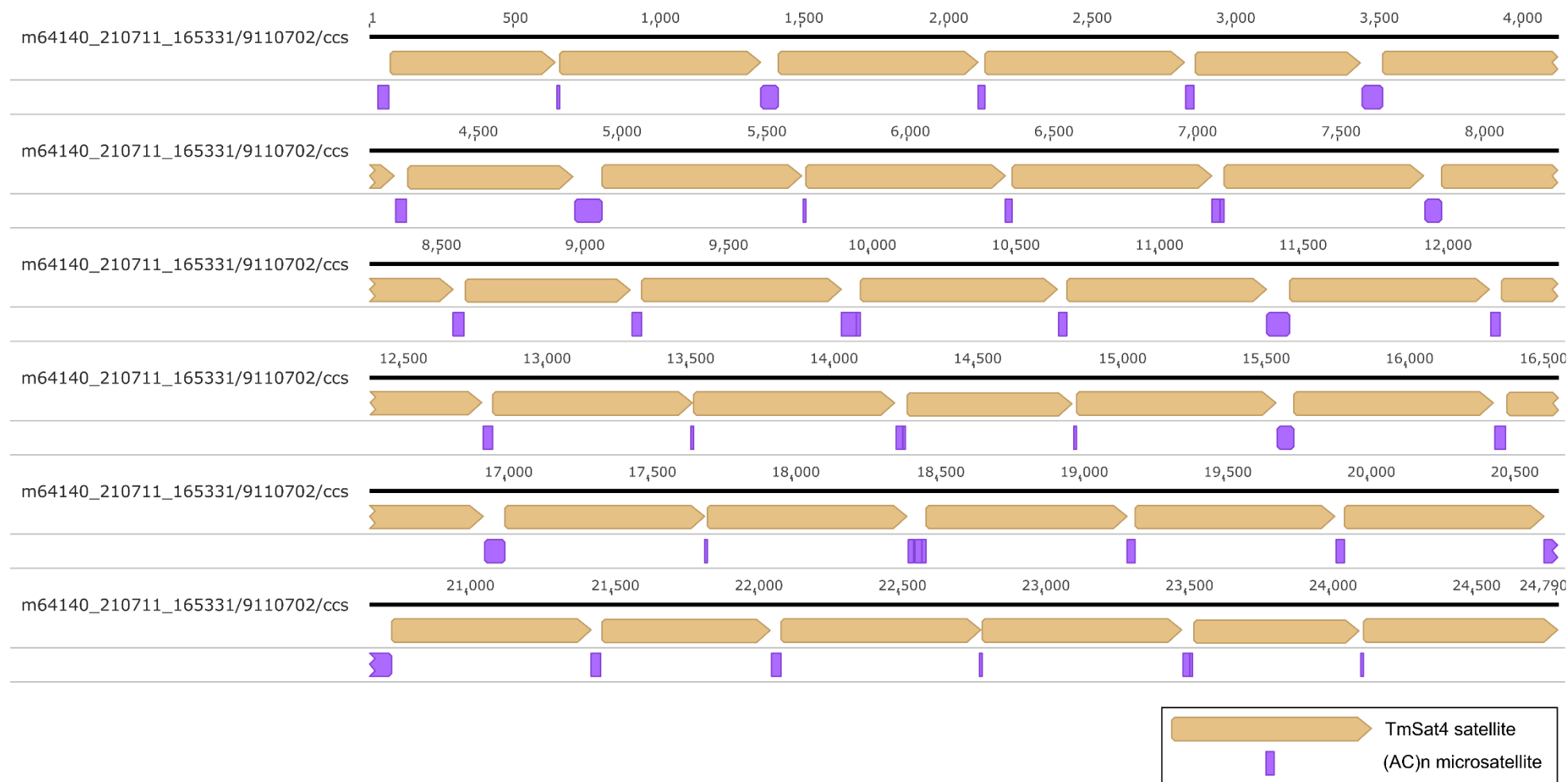


Fig. S17. A raw PacBio HiFi read consisting entirely of TmSat4 repeats separated by microsatellite (AC)_n arrays of different lengths.

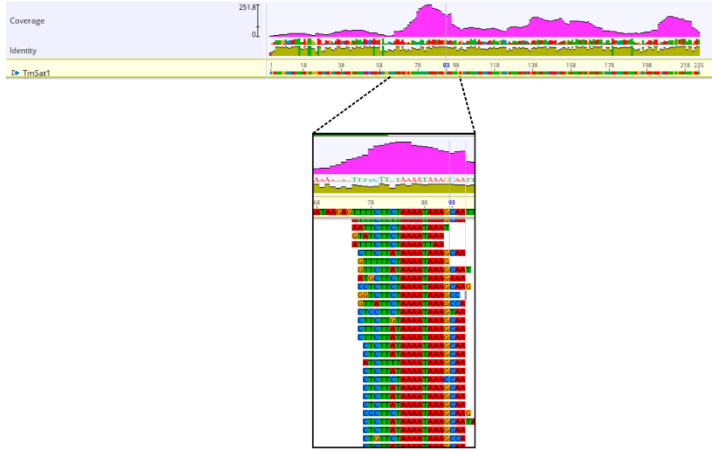
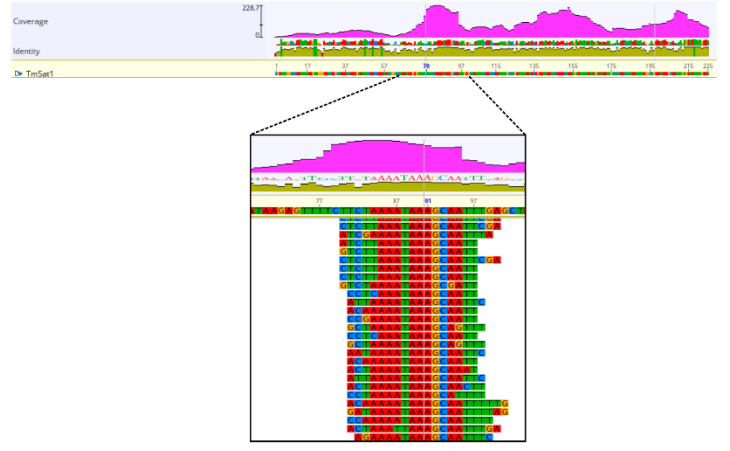
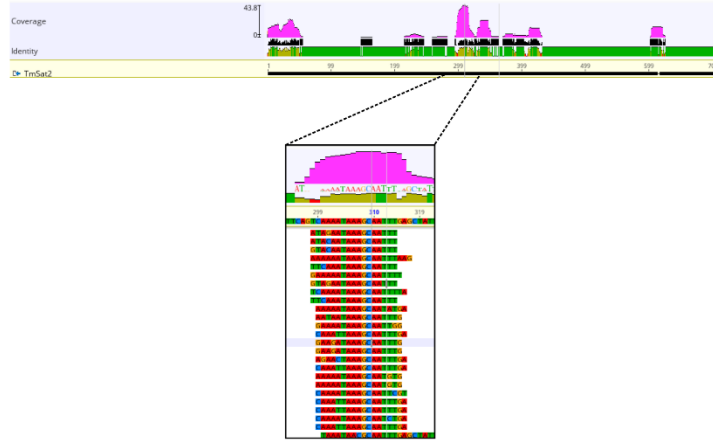
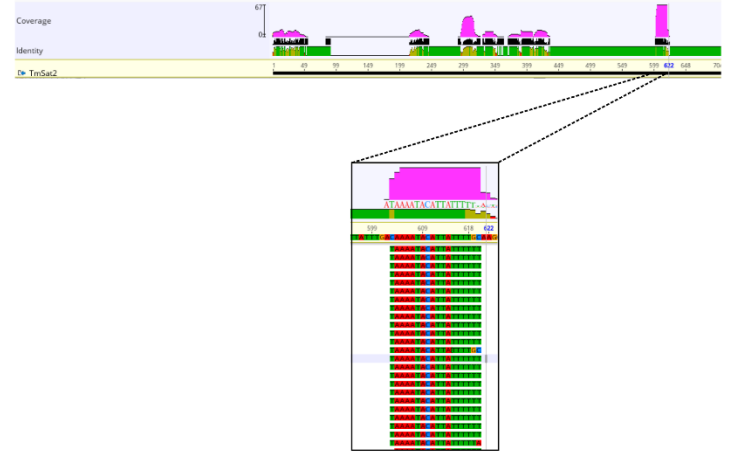
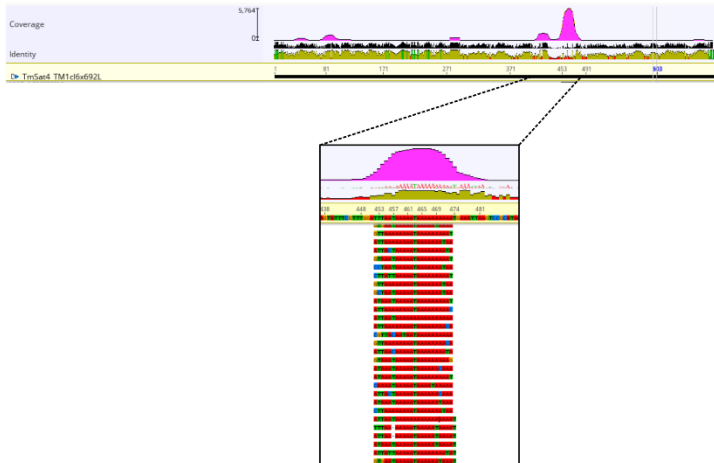
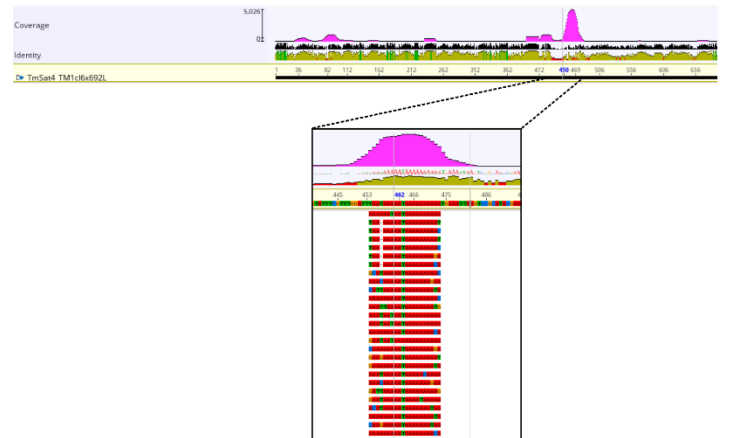
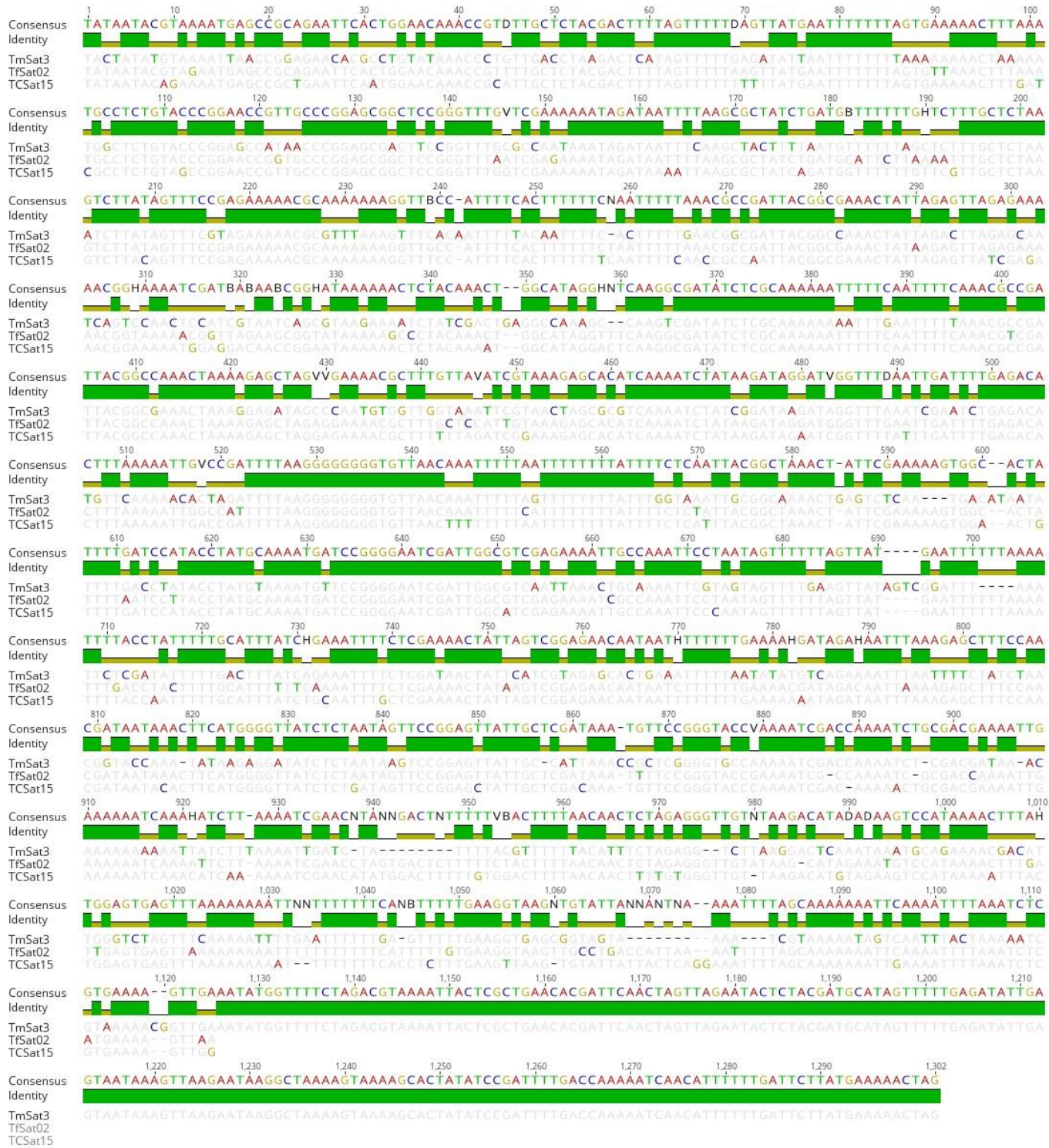
ATmSat1 - *T. castaneum*TmSat1 - *T. freemani***B**TmSat2 - *T. castaneum*TmSat2 - *T. freemani***C**TmSat4 - *T. castaneum*TmSat4 - *T. freemani*

Fig. S18. K-mer analysis of the satDNAs TmSat1, TmSat2 and TmSat4, performed to investigate the possible presence of the orthologous satDNAs in the congeneric species *T. castaneum* and *T. freemani*. Representative k-mers derived from each satDNA were used as queries in a search against the genome assemblies of *T. castaneum* (TcasONT) and *T. freemani* (Tfree1.0). The resulting matching sequences, representing hits from each genome, were then aligned to the corresponding satDNA consensus using the Bowtie algorithm implemented in the Geneious software. This approach revealed that the primary mappings of the TmSat-derived k-mers are mainly to the A+T-rich regions of TmSat1 (**A**), TmSat2 (**B**) or TmSat4 (**C**) consensus sequences.

A



B

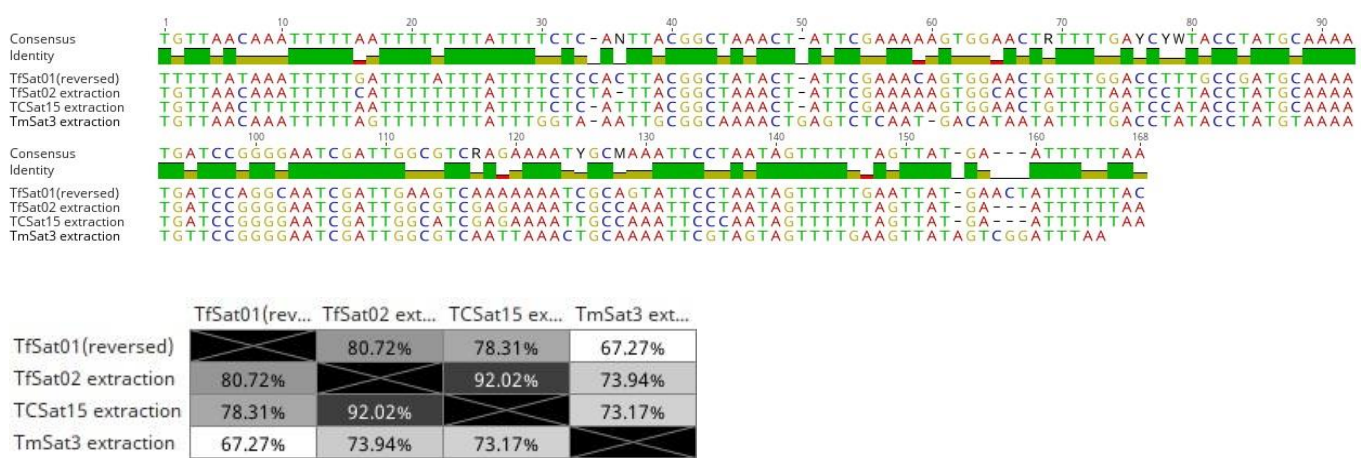
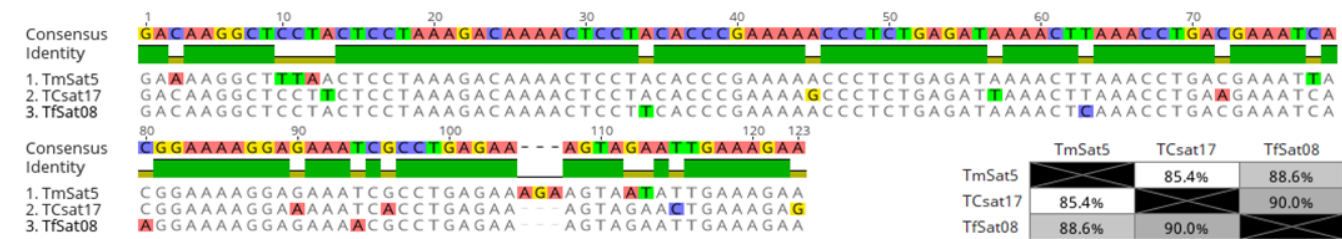
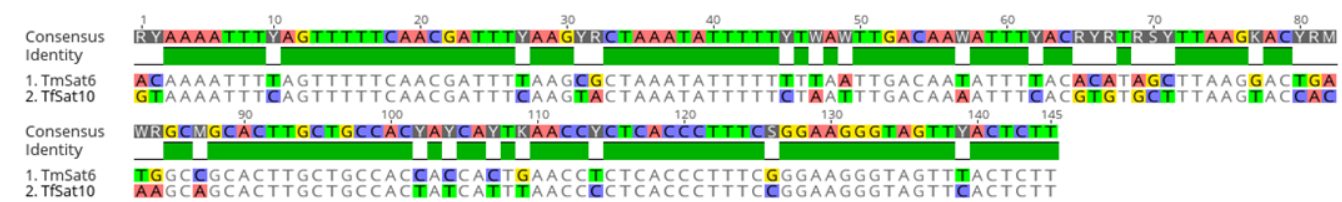


Fig. S19. The relationships between the orthologous satDNAs TmSat3 from *T. madens*, TfSat02 from *T. freemani*, and TCsat15 from *T. castaneum*. **(A)** The alignment between TmSat3, TfSat02 and TCsat15, and the corresponding pairwise similarity matrix. **(B)** The alignment between the *T. freemani* major satDNA TfSat01 and the corresponding TfSat01-like segments extracted from TmSat3, TfSat02 and TCsat15. The pairwise similarity matrix is also shown.

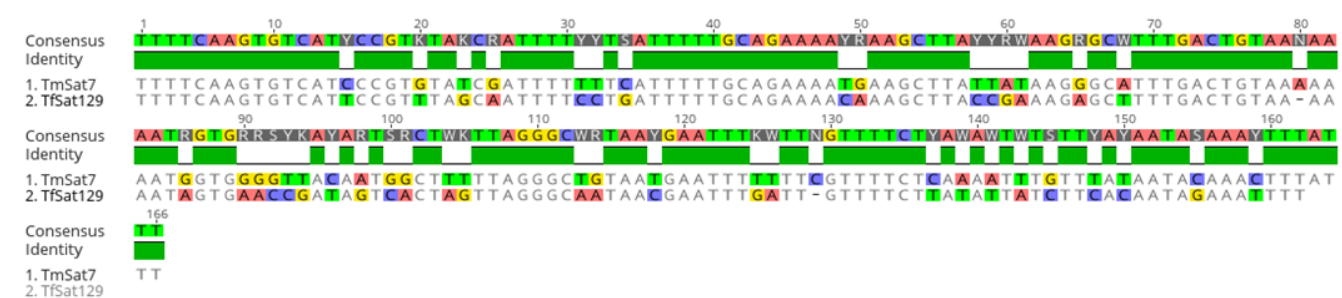
A TmSat5 – TCsat17 – TfSat08



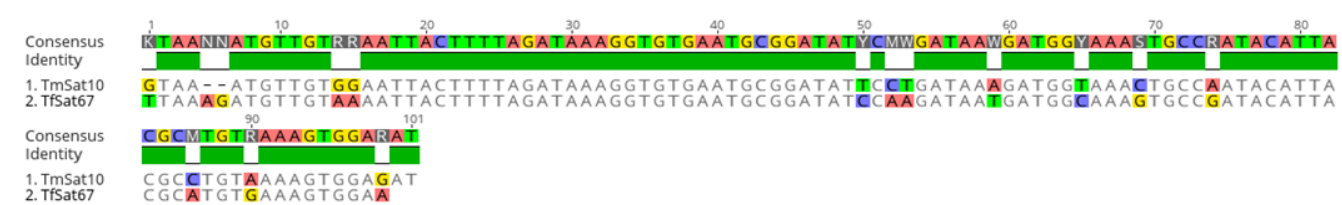
B TmSat6 – TfSat10 (pairwise identity: 78.6%)



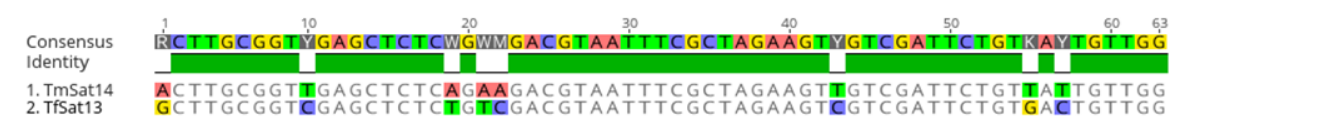
C TmSat7 – TfSat129 (pairwise identity: 73.5%)



D TmSat10 – TfSat67 (pairwise identity: 84.8%)



E TmSat14 – TfSat13 (pairwise identity: 87.3%)



F TmSat15 – TCsat30 – TfSat76

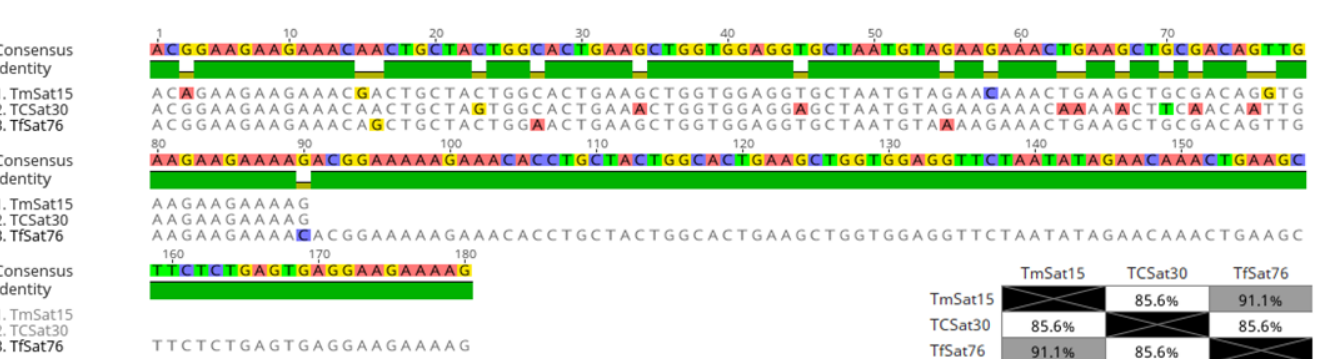


Fig. S20. Alignments of the *T. madens* low-copy-number satDNAs and their orthologs among the known *T. castaneum* and *T. freemani* satDNAs. Pairwise identities between the consensus sequences are indicated.

A



B

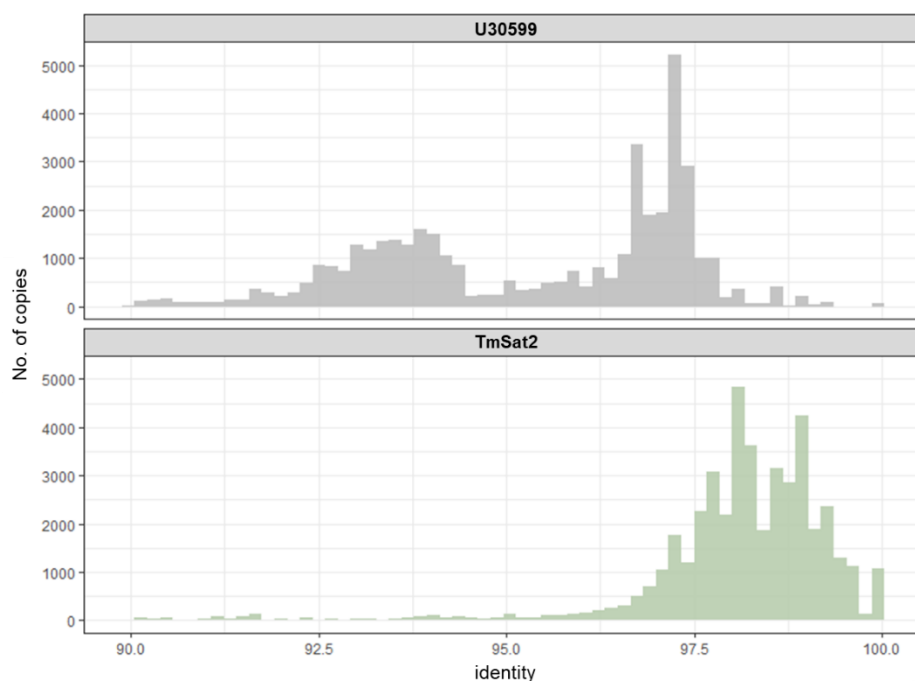


Fig. S21. Comparison of the TmSat2 consensus sequence defined in this work and the GenBank entry U30599 [23]. **(A)** The alignment of the consensus sequences, showing 90.4% of pairwise similarity. **(B)** Distribution of nucleotide sequence similarities between monomers annotated in the *T. madens* genome assembly Tmad1.0 and the sequence U30599 (upper panel), and the consensus sequence TmSat2 (bottom panel). The similarities above 90% are shown.