

**Figure S2.** Secondary structures of 1<sup>st</sup> round screening of differentially expressed novel miRNAs from *Malus domestica* buds

noveliR\_3627dG=-21.5

```

----- 10      20      30
          tg g      tga  --  a---|  g      g
          ag gt tttttc tcca acg  agcag agccga a
          TC CG GGAAG AGGT tgc  tcggt ttggtt g
taatatccat CT A      TC-  Tc actg^  a      g
.          80      70      60      50      40

```

noveliR\_3803dG=-21.5

```

----- 10      20      30
          tg g      tga  --  a---|  g      g
          ag gt tttttc tcca acg  agcag agccga a
          TC CG GGAAG AGGT tgc  tcggt ttggtt g
taatatccat CT A      TC-  Tc actg^  a      g
.          80      70      60      50      40

```

noveliR\_384dG=-101.4

```

----- 10      20      30      40      50
c----- g      CG      C      c-|  c
          gggac gaaCGCCICGICC TICCGT CCGTcccggtcccacgtaccaaaacg acc t
          cctgt tttgctggagcagg gaggca ggcagggtagggtgcatggttgc tgg a
          ttgta a      at      a      ta^  c
          120      110      100      90      80      70      60

```

noveliR\_2819dG=-49.3

```

----- 10      20      30      40      50      60      70
cccccttc T-|  A      c      tatacctattacttttctg      tat
          tgt IGTGTG ICACGGTTAAGCCa gtcaacatttta      ttttat \
          aca acacac agtgccaattcggt cagttgtaaaat      aaaata t
gt----- ct^  c      a      ttaattaa-----      tct
.          120      110      100      90      80

```

noveliR\_493dG=-49.3

```

----- 10      20      30      40      50      60      70
cccccttc T-|  A      c      tatacctattacttttctg      tat
          tgt IGTGTG ICACGGTTAAGCCa gtcaacatttta      ttttat \
          aca acacac agtgccaattcggt cagttgtaaaat      aaaata t
gt----- ct^  c      a      ttaattaa-----      tct
.          120      110      100      90      80

```

noveliR\_1008dG=-21.4

```

----- 10      20      30      40
attagc| g TCCCA GG      aaat-  gaccctaa
          act GG      CC GCGTGCCA      gtt      \
          tga cc      gg cgcgcggt      cga      a
a-----^ g ----- a-      gcatc  accatcta
          70      60      50

```

noveliR\_2036dG=-21.4

```

      10      20      30      40
attagc| g TCCCA GG      aaat- gaccctaa
      act GG      CC GCGIGCCA      gtt \
      tga cc      gg cgcgcggt      cga a
a-----^ g ----- a-      gcatc accatcta
                        70      60      50

```

noveliR\_2195dG=-21.4

```

      10      20      30      40
attagc| g TCCCA GG      aaat- gaccctaa
      act GG      CC GCGIGCCA      gtt \
      tga cc      gg cgcgcggt      cga a
a-----^ g ----- a-      gcatc accatcta
                        70      60      50

```

noveliR\_2361dG=-13.1

```

----- 10      20      30
----- a ta ct ttc--- -| a
      gca gttt tgg tttc      tttga ct g
      CGT CGAG ACC Ggag      aaact ga c
ttgtatcaaaAC G      CC CT      taaaca a^ g
      70      60      50      40

```

noveliR\_4826dG=-14.1

```

      10      20      30      40
atcttc      G A T GA      tt----| ag
      cggaTC AACT CG AGT CGTATT      atata \
      gtttag ttgg gt tta gtatag      tatat t
ta----      g a c a-      ctatct^ at
      80      70      60      50

```

noveliR\_3990dG=-30.7

```

      10      20      30      40      50      60      70
ttaatcacatCCGTT|      c ttt cag ctatttatattc      aaa
      CATCGIACATCGTIGCGGT ag tcgt gta      aatfff t
      gtagcatgtagcatgcta tc agta cat      ttaaaa a
-----^      a ttt a-- -----
      110      100      90      80

```

noveliR\_2855dG=-21.7

```

      10      20      30      40
ggactggactA|      AAGG      C A      tac
      GCTTC      ACTAAG IGG CTggctta t
      tgaag      tgattc atc gatcgaat a
tg-----^      a a      cag
      70      60      50

```

noveliR\_786dG=-28.2

```

      10      20      30      40
t-----|tg aa t t      aa cat tg g g
      g a tga gc caactag gtagca gt cgag ct c
      t I ACT CG GTTGGTT CGTGTI      cg gttc gg t
gttgtgg^gt CG - -      C-      att gt - c
      90      80      70      60      50

```

noveliR\_2661dG=-28.2

```

          10      20      30      40
t-----|tg aa  t t      aa      cat tg  g g
          g a tga gc caactag gtagca  gt cgag ct c
          t I ACT CG GTTGGT  CGTGT  cg gttc gg t
gttgtgg^gt CG  - -      C-      att gt  - c
          90      80      70      60      50

```

noveliR\_4520dG=-28.2

```

          10      20      30      40
t-----|tg aa  t t      aa      cat tg  g g
          g a tga gc caactag gtagca  gt cgag ct c
          t I ACT CG GTTGGT  CGTGT  cg gttc gg t
gttgtgg^gt CG  - -      C-      att gt  - c
          90      80      70      60      50

```

noveliR\_940dG=-17.5

```

          10      20      30
tt----- --| c  a  ttgttaa
          actcgataac gac tga cac      t
          IGGGCTATTG  CTG GCT GTg      t
taaggactgtAC      GG^ I  -  ctgtret
          70      60      50      40

```

noveliR\_4937dG=-30.7

```

          10      20      30      40      50      60      70
ttaatcacatCCGTT|      c ttt  cag  ctatttatattc  aaa
          CAICGTACAICGTGCGGT ag  tcgt  gta      aatttt  t
          gtagcatgtagcatgcta tc  agta  cat      ttaaaa  a
-----^
          a ttt  a--  -----  aaa
          110      100      90      80

```

noveliR\_4037dG=-30.7

```

          10      20      30      40      50      60      70
ttaatcacatCCGTT|      c ttt  cag  ctatttatattc  aaa
          CAICGTACAICGTGCGGT ag  tcgt  gta      aatttt  t
          gtagcatgtagcatgcta tc  agta  cat      ttaaaa  a
-----^
          a ttt  a--  -----  aaa
          110      100      90      80

```

noveliR\_4703dG=-26.4

```

          10      20      30      40
attc  -  -  --| IG      G  Cagtcgaat  ac
          ttg agg CCC IGA  AGGTTTT CGGAG      ctttgt  \
          aac ttc ggg gct tcaaaa gcttc      gagacg  a
ga--  g  a  tc^ ca  -  cat-----  cc
          90      80      70      60      50

```

noveliR\_378dG=-26.4

```

          10      20      30      40
attc  -  -  --| IG      G  Cagtcgaat  ac
          ttg agg CCC IGA  AGGTTTT CGGAG      ctttgt  \
          aac ttc ggg gct tcaaaa gcttc      gagacg  a
ga--  g  a  tc^ ca  -  cat-----  cc
          90      80      70      60      50

```

noveliR\_4659dG=-26.4

```

      10      20      30      40
attc  -  -  --|  TG      G      Cagtcgaat      ac
      ttg agg CCC TGA AGGTTTT CGGAG      ctttgt \
      aac ttc ggg gct tocaaaa gcctc      gagaag a
ga--  g  a  tc^ ca      -      cat-----      cc
      90      80      70      60      50

```

noveliR\_2398dG=-43.1

```

      10      20      30      40      50
-----|  a  t      a      ttattataacttta  g
      gtgg cggtt gatgaaaattcaacg ctataa      aagg a
      cacC GGCAA CTACTTTTAGGTTgc gatggt      ttcc c
ttactca^  C  C      c      tg-----      c
      .      90      80      70      60

```

noveliR\_1799dG=-17.1

```

      10      20      30      40
--  ct--|  a  tc  c  a  tttttct  t
      cgtggt  gca gtct tgg at tctg      atc t
      gatatca  CGT CGGG ACC TG agat      tag c
tt  aaAC^  G  TC  C  A  -----  t
      70      60      50

```

noveliR\_331dG=-49.1

```

      10      20      30      40
c-----  t      -      a-|  rc  t  ct  ag
      atg tgacagaag agagagagcaca ccc ca cgg aaag \
      taC ACTIGICTIC TTTCTCTCGtgt ggg gt gcc ttcc a
acatcctc  T      T      ga^  tt  t  t-  tg
      .      90      80      70      60      50

```

noveliR\_4164dG=-37.4

```

      10      20      30      40      50
gagaaa  a  TG--  A-|  T      g  tog  a  ggtg  ttog
      gcc ICC  CT  GGGGTC GGCTCTCga at  gat gc  tctc  a
      cgg agg  ga  tctcgg ctgaggggtt ta  cta tg  agag  t
gg----  g  ctta gc^  t      g  ---  a  aa--  tttt
      110      100      90      80      70      60

```

noveliR\_3146dG=-93.2

```

      10      20      30      40      50      60
--  c      c      agc      -|  c
      tc agcttagtccttgaagctagtcagtc gagatagtc  gcaacaaacgc ccc t
      ag togaatCAGGGACTTCGATCAGGTCAG ctttgcagg  cgttgtttgcg ggg t
tc  a      A      cca      t^  a
      120      110      100      90      80      70

```

noveliR\_2736dG=-16.4

```

      10      20      30
taa--|  aat      aaa  a  a  aa
      ttg  aaatggata  act ggga cttt \
      agc  TTTACTTGT  TGG CCCT GAAa  c
caaaa^  aaT      CA-  -  C  ag
      70      60      50      40

```

noveliR\_5130dG=-40.9

```

      10      20      30      40
ctca|      a      g      ttatatatt
tatttctgtg tcacggttaag tacgttaatat t
ataaagataT AGTGCCAATTC GTGCAGTTGtaa c
g---^      C      G      tttcgtta
      90      80      70      60      50

```

noveliR\_4051dG=-13.4

```

      10      20      30      40      50
gaatcac    ---  tt-| t  a  gtttaaa tt ccagtt
ttgat      ttcg  gag attg agaac  gg ac  t
aactg      AGGC CTI TGAC TTIIG  cc tg  t
tttc---    aCC  ICC^ T C  aacgg-- tt agagac
      100      90      80      70      60

```

noveliR\_4399dG=-49.5

```

      10      20      30      40      50      60
aaa        a  a  aaa---| tt  aattt  t  a
tcacgtccgtttcatcgtacatcgt cg ttag  tca gta  ttt tattta a
agtgtaggcaAGTAGCATGTAGCA GC AGTC  agt cat  aaa ataagt a
---        C  C  Aaaagc^ c-  gat--  t  t
      120      110      100      90      80      70

```

noveliR\_4405dG=-29

```

      10      20      30
---  --  at -  a  --|  aa
tatgt  gagg  ga gagcttttgg ttgt  gagggg  g
gtaca  TICC CT CICGGAATC GAta  ttcccg  g
taa    tt  C- C  A  tt^  ga
      80      70      60      50      40

```

noveliR\_4255dG=-29

```

      10      20      30
---  --  at -  a  --|  aa
tatgt  gagg  ga gagcttttgg ttgt  gagggg  g
gtaca  TICC CT CICGGAATC GAta  ttcccg  g
taa    tt  C- C  A  tt^  ga
      80      70      60      50      40

```

noveliR\_1122dG=-49.4

```

      10      20      30      40      50      60
tgccc ty      ATC      C  -|      tt  aaagataa
t  tgTTTGTGTG  ACGGTTAAG ca  gtcaacattttatattatt tttat  t
a  acaaacacat  tgccaattc  gt  cagttgtaaaatataataa  aagta  a
----- gt      caa      a  g^      t-  aaaacaga
      130      120      110      100      90      80      70

```

noveliR\_1077dG=-37

```

      10      20      30      40
gag|  atg  cg  g  tta  -  g  g  at--  tc
gct  ctcg  gcgag  cgt  ctc  ggctg  ag  cg  gc  \
cgg  gagc  CGCTC GTA  GAG TCGGC Tc  gc  cg  a
---^  cg-  aT  -  TCG A  -  g  ggag  tt
      90      80      70      60      50

```

noveliR\_2426dG=-28

```
      10      20      30      40      50
acagta ttG      --|      CCCTa      a      atg
      cc      GGCTTTTC      GTTAAAACT      gtttttaaagt cat \
      gg      ccgaaaag      taatTTTgg      taagagtttta gta a
gta--- ttg      at^      tgttc      g      gca
100      90      80      70      60
```

noveliR\_1424dG=-19.7

```
      10      20      30      40
catc ag a- - a t -| ata atattctca
      gcct gg agtg g tctg aa gcctt tgt t
      tgga tt ICAC C AGGGT TT CGGAG Aca c
---- ct gg I A I C^ C-- aatccatrt
      90      80      70      60      50
```

noveliR\_1225dG=-28

```
      10      20      30      40      50
acagta ttG      --|      CCCTa      a      atg
      cc      GGCTTTTC      GTTAAAACT      gtttttaaagt cat \
      gg      ccgaaaag      taatTTTgg      taagagtttta gta a
gta--- ttg      at^      tgttc      g      gca
100      90      80      70      60
```

noveliR\_175dG=-35.1

```
      10      20      30
-| tcc g IG I G a t
cggt gat GGCC G CAGGAG ATCCCTCtc to a
gct tta ttgg t gttctc taggagagg ag c
t^ --- g gt - - - c
70      60      50      40
```

noveliR\_1983dG=-58.9

```
-----|      10      20      30      40      50      60
      cacatcttaa C      aaa t attt      aaaaat
      gtgtaggatt CGTTCATCGTATATCGIGCGGtag tcatt ga tattattt t
      cctagga^ a      gtaagtagtatatagcacgccagtt agtag ct atgataaa a
130      120      110      100      90      80      70
```

noveliR\_4672dG=-57.1

```
      10      20      30      40      50
ttc c I C -| y ay
gg ct tcCGG ICCT TTIGIGAGGAIctgg gatc ctttatg c
cc ga aggcc agga aaacactcctagggcc ctag gaaatac g
tat t t t t^ t ag
.      90      80      70      60
```

noveliR\_198dG=-12.3

```
      10      20      30
a act-- t a- g tt--| tt
tgattg ttttaatg aaa at tggt ttcg a
attaat GAAATIGC ITT IA GCCA aagt a
a cccTT I CG G taac^ ga
80      70      60      50      40
```

noveliR\_3686dG=-16.1

```
      10      20      30      40      50
---  c - aa      aaa      aaactgccagt-|  cttc  act
      tgg tt ag cttaat  ttaattaaagagt      ttga  tga  a
      atc aa TC GAATTA  GGTTAATTtttca      agct  act  t
      tta  t t AG      AAA      aytccrctcttt^  ttca  cac
      .      110      100      90      80      70      60
```

noveliR\_2828dG=-17.4

```
      10      20      30      40
tatatt| c  C AA G CCT      a  a--  t  g
      ggg TTC GC CT GG  CATGAA  aat  ct gg g
      ctc aag cg ga tc  gtattt tta  ga tc g
      t-----^  -  -  ag  g  at-  a  acc  t  a
      80      70      60      50
```

noveliR\_4495dG=-18.5

```
      10      20      30      40
att  att      -|  A CT ACT      tcat
      gcca  GGTITTAIG GTGG AC CA  ttct  g
      cggg  ccgaagtgt tate tg  gt  aaga  g
      ac-  aat      g^  c  tt  ac-  ttat
      80      70      60      50
```

noveliR\_3959dG=-40.1

```
      10      20      30      40
ac-----  tt -      --  -----|  gcatccatcc
      ggg  c acccgttagc  gacct  gaccogttaa  \
      CCT G IGGGCAATTG  CTGGg  ttgggcaatt  a
      gaccgtaaaa  GG T      GG  ttgag^  ataacataa
      100      90      80      70      60      50
```

noveliR\_1316dG=-51.1

```
      10      20      30      40
-----  -|  C  T      Caccg  aagc
      gtgcctt cccGIGCTCTC IGTT GIGGGT  gtt  c
      cacggaa gggcacgggag acaaa cacacca  caa  a
      gaagta      g^  a  -  ata-  ctgc
      90      80      70      60      50
```

noveliR\_4201dG=-22.1

```
      10      20      30      40
ttttagca      C  -|  G  CCAaaat  gacc
      ctGTGT CCAC TGGGC TG  gtt  \
      gacgcg ggtg atccg ac  caa  c
      atgagcca      c  c^  a  cat-----  aaat
      70      60      50
```

noveliR\_5060dG=-46.9

```
      10      20      30      40      50
cat| tttgg      T  T  -  ct  tc  ----  tg
      tg  TAGCCAAGGA GACT GCCTg c  ccaa  acatgaat  ggcat  t
      ac  atoggttcc  ctga  cggac  g  gggt  tgtactta  ctgta  c
      c--^  tcta-  -  -  c  tc  --  aaat  tg
      .      100      90      80      70      60
```

noveliR\_4700dG=-20.2

```

          10      20      30
a-----| g g      agatc a      ag - agaga
      gag c agttcag      ga aaggca c tc      t
      ctc g ICGGGTC      CT TTTCGT g ag      c
caaata^ - -      GAAAA C      Ct c agaag
      80      70      60      50      40

```

noveliR\_1504dG=-20.2

```

          10      20      30      40
ctttg      -      CCT A TC      ta----- aa -| ga
      tcaagAAT IGAA      AAG TC TCACTta      ggt ag gg \
      agttttta attt      ttt ag ggtgaat      cca tc cc a
gtgta      t      tt-      a tt      tatgatg ga a^ at
      100      90      80      70      60      50

```

noveliR\_3314dG=-38.2

```

          10      20      30      40      50
c---      cga      CGAC      -| GG      aggg--      g t aac
      tgtg      gtGTGC      AAGG ACGTC GCCCcta      tggt gat gt a
      acac      tacatg      ttcc tgtag tgggggt      acca cta ca t
actt      ccg      tata      g^      --      gaagca      a - ccc
      110      100      90      80      70      60

```

noveliR\_1002dG=-25.3

```

          10      20      30      40
t---      --      G C      -| C      ctgacga      ga
      ttcgcaaa      gCTGA TTIG GTGT GA GGGTG      ggct \
      gagtgttt      tggct agat tata ct ctcac      tcga g
gaac      gg      a      t      g^ t      ag-----      aa
      90      80      70      60      50

```

noveliR\_866dG=-61.9

```

          10      20      30      40      50
-|      C      ttattataa      t
      ggatccgggcCGTTGAATTTGATC AACGGCTacag      ctt t
      cctaggcctggcaacttaaaactag ttgtcgatggt      gaa a
c^      a      tgtccctgg      a
      100      90      80      70      60

```

noveliR\_734dG=-28.6

```

          10      20      30      40      50      60
aaaagg c      - t      -- gt      -|      taatat      agactag
      g cttataa tg tagtaggt      g gtcg gtttaata      agtgtc \
      c gaatatt AC GTCATTIA C CAGT CAagttat      tcacag      a
g-----      c I      GG TG      A^      -----      cgttaac
      110      100      90      80      70

```

noveliR\_5043dG=-32.2

```

          10      20      30      40
cattc      ra-      a      a y      -----|      attt
      tctct      tttgtgtggctcag ttga tc cgt      caac \
      agaga      aaACACGCCAGTGT AATT AG GCa      gttg      t
-----      ata      C C I      attatagttacaat^      aata
      100      90      80      70      60      50

```



noveliR\_4392dG=-25.2

```
----- 10 20 30 ca
         tt ---| GICI A TT
         tcac tga aGIGAGAG TAG TTCGA Ctcgt \
         agtg act tcattcct atc aagtt gagcg a
atcgg tt cga^ ac-- - t- ta
      80 70 60 50
```

noveliR\_1224dG=-40.5

```
10 20 30 40 50
gat tg a GG- C- G c--| accgc tt
gg a tA GATGGG AACGGTAT GCggg aggta ggttgt a
cc t at ttgccc ttgccaata cgtcc ttcgt ccaata c
at- gt a aga at - ata^ attta tc
110 100 90 80 70 60
```

noveliR\_3675dG=-51.2

```
10 20 30 40 50
--| a ttt caggtac a aa
gtccgttcacgttatatcgtgc atcag tcat tattt tattt t
caggttaagTAGCATGTAGCAGC TAGTC agta ataaa ataaa t
ca^ C TTT aaattt- a at
110 100 90 80 70 60
```

noveliR\_692dG=-40.5

```
10 20 30 40 50
gat tg a GG- C- G c--| accgc tt
gg a tA GATGGG AACGGTAT GCggg aggta ggttgt a
cc t at ttgccc ttgccaata cgtcc ttcgt ccaata c
at- gt a aga at - ata^ attta tc
110 100 90 80 70 60
```

noveliR\_2578dG=-59.7

```
10 20 30 40 50
gatc C acaggg-| ctt
aagtgaICCGGACCGTTGAAATTTGATC aacggttacaa ggct c
tttactaggcctggtaactttaaattag ttgccgatggt ttga t
----- t aataata^ aaa
110 100 90 80 70 60
```

noveliR\_3945dG=-60.8

```
10 20 30 40
tttaa-| C aaa a
tatgtGCTTATATGGT ITGGGCTIACCCcata cc a
atcacgaatatacca aaccgatgaggggtat gg t
taaacg^ t aac t
90 80 70 60 50
```

noveliR\_284dG=-28.3

```
10 20 30 40
ggtaa--- t - act-| t g
agtгаа agtaccgg attg ttttagtg aaaaat \
ttACTT ICGTGGCC IGAC gaaattgc tttttg t
ccttgaaa T A AAGT^ - g
90 80 70 60 50
```

noveliR\_1330dG=-22.2

```
          10      20      30      40
ggtaa---   t    a  -  act-|    t    g
          agtgaa agtacc gg attg  ttttagtg aaaaat \
          ttACTI TCGTGG CC TGAC  gaaattgc tttttg t
ccttgaaa   T    G  A  AAGT^    -    g
          90     80     70     60     50
```

noveliR\_3897dG=-46.9

```
          10      20      30      40      50
cat| tttgg          T    I    - ct  tc  ----  tg
          tg  TAGCCAAGGA GACT GCCTg c  ccaa  acatgaat  ggcat t
          ac  atcggttcct ctga cggac g  ggtt  tgtactta  ctgta c
c--^ tcta-          -    -    c tc  --  aaat  tg
.          100     90     80     70     60
```

noveliR\_4687dG=-23.1

```
          10      20      30      40
t- g  tt--|  ct  g  tg  a  aaataaag
          g gatt  tcca  aagcg ttattttc  gcg tg  a
          c ttaa  GGGT  TTTGC AGTGAAAG  Cgt ac  a
tg g  ttIC^  T-  -  GT  g  acgtgacg
          90     80     70     60     50
```

noveliR\_790dG=-40.5

```
          10      20      30      40      50
gat  tg a  GG-  C-  G  c--|  accgc  tt
          gg a tA  GAITGG  AACGGTTAT GCggg  aggta  ggttgt a
          cc t at  ttgccc  ttgccaata cgtcc  ttcgt  ccaata c
at-  gt a  aga  at  -  ata^  attta  tc
          110    100    90    80    70    60
```

noveliR\_2998dG=-101.1

```
          10      20      30      40      50      60
aca|  ta          ac          a          a  g
          tgggac  aagcctcgtcct  tccgttcogtccc  tcccacgtaccaaag  tacc t
          gccctg  TIGCGGAGCAGGG  AGGCAGGGCaggg  aggggtgcatggtttgc  gtgg a
c--^  cc          CA          c          -  g
          120    110    100    90    80    70
```

noveliR\_1586dG=-16.1

```
          10      20      30      40      50
---  c  -  aa  aaa          aaactgccagt-|  cttc  act
          tgg tt ag  cttaat  ttaattaaagagt          ttga  tga  a
          atc aa  IC  GAATTA  GGTTAATTtttca          agct  act  t
          tta  t  t  AG  AAA          aytccrctcttt^  ttca  cac
          .          110    100    90    80    70    60
```

noveliR\_3292dG=-30.8

```
          10      20      30      40      50      60
at|  ta  aac  a  ac  a  -  taa  taataattwtat  a
          ttt  tcc  ggct  caa  agagga  tcc  ctt  agtta          ccggtgy t
          agg  agg  TCGG  GTI  TCTCCT  AGG  GGA  ttagt          ggcaact t
t-^  yg  aC-  -  CC  -  A  ---  tcttcacactc-  t
          120    110    100    90    80    70
```

noveliR\_4245dG=-32.1

```

          10      20      30      40
cctc-----| a at          aga-      tt t      t r
          gg tc tcaggcagt      tgatcg c cagcca ct t
          cC AG AGTCTGTIG      ACIGgt g gtcggg ga t
tcaaccctt^ - AC          GCAC      yg -      c c
          90      80      70      60      50

```

noveliR\_4924dG=-39.2

```

          10      20      30      40      50
agct      c      --      at-- -| tccaat ca      tat
          ggctggtt aggactc tctggc      tc agcg      gtg ggctcat c
          tcggtag tICTGAG GGACTG      AG tcgt      cgc ccgggta a
g---      t      TT      CTCT C^      ttttc- aa      caa
          110     100     90      80      70      60

```

noveliR\_4213dG=-33.7

```

          10      20      30      40      50
--| cc ga      CGA      CG GG      aaga g at t
          gg g agtGIGC IGAGGA ICG CCCct ga gtgg tg \
          cc c ttatatg attcct agt gggga ct cacc ac a
tc^ ta tc      taa      -- ga      ccog a ct a
          100     90      80      70      60

```

noveliR\_2179dG=-31.4

```

          10      20      30      40      50
atcacacaaa| G      A GAAG      acc      g agaga
          ACAG AGGGC CGG      GGC      taaatgg agggc \
          tgtc ttcog gtc      ccg      atttatt tctg a
-----^ g      - aca-      gt-      -      aacct
          90      80      70      60

```

noveliR\_4983dG=-57.2

```

          10      20      30      40      50      60
| a t          a          ca      tt      aggtac      a      a
ctgt aatt tgtccggttcac tacatcgtgc tcaga ttatt      tgttt tgttta t
ggca ttag ACAGGCAAGTAG ATGTAGCAGC agtct agtaa      ataaa ataaat t
^ c c          C          cc      tt      gattt-      a      t
          130     120     110     100     90      80      70

```

noveliR\_5045dG=-30.6

```

-----
          10      20      30
          ggtcttttcattcaaaaatatc      agc      gaca a
          TCGGAAAGTAAAGTTTTIGtatag      tcg      ttgt g
agcgtcgtgtGTAC          t---      tacta^      tat
          90      80      70      60      50      40

```

noveliR\_3641dG=-49

```

      10      20      30      40      50
---- aa          a tcayaag-| ttc
  tattattg actccaaaaatctcattctac ctcc tgtattt t
  ataataAC IGAGGTTTTAGAGTAAGtg gagg atataaa t
  cttta CG y tttgaaag^ cct
  110 100 90 80 70 60

```

noveliR\_5039dG=-29.4

```

      10      20      30      40      50
cttatgtt| GGC GC GC ag t g t ttat
  gcTTTGGTT ICG TTGTG gttga g gag gag ccctt \
  tgagatcgg agt aatac taact c ctt ctc gggaa a
-----^ gt- a- a- -- - g - taag
  100 90 80 70 60

```

noveliR\_4444dG=-49

```

      10      20      30      40      50
---- aa          a tcayaag-| ttc
  tattattg actccaaaaatctcattctac ctcc tgtattt t
  ataataAC IGAGGTTTTAGAGTAAGtg gagg atataaa t
  cttta CG y tttgaaag^ cct
  110 100 90 80 70 60

```

noveliR\_2265dG=-52.2

```

      10      20      30      40      50      60
cctca          a a aaa---| tt aattt t a
  aatcacgtccggttcacatcgtacatcgt cg ttag tca gta ttt tattta a
  ttagtTAGGCAAGTAGCATGTAGCA GC agtc agt cat aaa ataagt a
gaaa- C c aaaagc^ c- gat-- t t
  130 120 110 100 90 80 70

```

noveliR\_3679dG=-24

```

      10      20      30      40      50
-| t g          ata aaaa taaaattaaac
  gtgta ct tttattgtacattgt gtta ttatt a
  cacat ga agATAGCATGTAGCA CAGT aatag c
g^ - - CGC CAAa tccataayaaa
  100 90 80 70 60

```

noveliR\_4959dG=-45.8

```

      10      20      30      40      50
gaag a c          tc aag-| ttc
  tgttatt gtact taaaaatctcattctacacttc ac tgtattt t
  acaataa cgTGA GTTTTAGAGTAAGATGTGagg tg atataaa t
---- c A tt aaag^ cct
  110 100 90 80 70 60

```

noveliR\_2990dG=-36

```

-----|          a a cg t tttcgtcag ctg- a caa
  aatcacattcgttcctc tacatt tg gt agt gta ttt tatt t
  TTAGTGTAGGCAAGTAG ATGTAa ac ca tca cat gaa ataa t
ctttagaagt^ C a at - ttttaataa- ttaa a att
  130 120 110 100 90 80 70

```

noveliR\_1687dG=-49

```

      10      20      30      40      50
---- aa          a tcayaag-| ttc
  tattattg actccaaaaatctcattctac ctcc tgtattt t
  ataataAC IGAGGTTTTAGAGTAAGtg gagg atataaa t
  cttta CG y tttgaaag^ cct
  110 100 90 80 70 60

```

noveliR\_677dG=-46.1

```

      10      20      30      40      50      60      70
  tcgttt ta-| a c ctatttcctttttg tat
  ttctgttt tg tcacggttaag cgggtcaatattttatatta ttttat \
  aggacaaaa AC AGTGCCAATTC GTGCAGttataaaatataat aaaata t
  ----- cAC^ C A aa----- ttt
  130 120 110 100 90 80

```

noveliR\_3790dG=-21.3

```

      10      20      30      40
  t| tt tac t tt c g - aa
  tg ccaa g cact tac gtgtggg ttgt gca a
  ac ggtt C GTGA GTG CGTATTT AGCa cgt g
  c^ t- ttC - I- I G a ca
  80 70 60 50

```

noveliR\_3756dG=-33.6

```

      10      20      30      40      50      60
  ccta a a gt ata -| cact a cttat
  ttt tgcgggtcac gttaa cac aaca tttatat att tttttgt t
  aaa acgCCAGTG CAATT GTG TTGt aaatata taa aaaaata a
  ata- c C IG CAG a^ ac-- - tatct
  120 110 100 90 80 70

```

noveliR\_1837dG=-33.6

```

      10      20      30      40      50      60
  ccta a a gt ata -| cact a cttat
  ttt tgcgggtcac gttaa cac aaca tttatat att tttttgt t
  aaa acgCCAGTG CAATT GTG TTGt aaatata taa aaaaata a
  ata- c C IG CAG a^ ac-- - tatct
  120 110 100 90 80 70

```

noveliR\_4571dG=-30.1

```

      10      20      30      40      50
  cactcc----- a ag t aa ---| t aaaa tat
  gg acgt tgg tg acc atgt gag atcatgaaca \
  CC IGCG GCC AC TGG tata ctc tagtacttgt g
  cgtttgtaaaaA G G- - CC gaa^ c aatc tag
  100 90 80 70 60

```

noveliR\_551dG=-49

```

      10      20      30      40      50
---- aa          a tcayaag-| ttc
  tattattg actccaaaaatctcattctac ctcc tgtattt t
  ataataAC IGAGGTTTTAGAGTAAGtg gagg atataaa t
  cttta CG y tttgaaag^ cct
  110 100 90 80 70 60

```

noveliR\_170dG=-55.2

```

      10      20      30      40      50      60
|   c       c   a       a               c   a   t   gtttg   a
tcct atatct atcc tttatcg acattgtgtgaccagaaat att tg att   tgttta t
agga tgtaga TAGG AAGTAGC TGIAGCACGctggttttta taa ac taa   ataaat t
^   -       A   C       A               a   a   t   aaa--   t
      130      120      110      100      90      80      70

```

noveliR\_838dG=-43.1

```

      10      20      30      40      50
-----|   a       t               a       ttattataacttta   g
      gtgg ccggtt gatgaaaattcaacg ctataa       aagg a
      cacC GGCAA CTACTTTTAGGTTgc gatgtt       ttcc c
ttactca^   C       C               c       tg-----   c
      .       90      80      70      60

```

noveliR\_5038dG=-29.4

```

      10      20      30      40      50
cttatgtt|   GGC   GC       GC       ag t   g   t       ttat
      gcTTTGGTT TCG TIGTG gttga g gag gag ccctt \
      tgagatcgg agt aatac taact c ctt ctc gggaa a
-----^   gt-   a-   a-   --   -   g   -   taag
      100      90      80      70      60

```

noveliR\_220dG=-30.6

```

      10      20      30      40      50
c--- att       G-   -   CT-|   atatgtacy   carct
      ac gcccAGGG AGTGGG TCCT AAGCCTt       tgct \
      tg tgggtttc tcactt aggg ttcggag       acga c
agga cct       gy       g       ttt^   c-----   mcctt
      100      90      80      70      60

```

noveliR\_3054dG=-24.4

```

      10      20      30
caggttccga| G   GC       C       gca
      CT ATT TICCTTT ICCTtgtttct \
      gg tag aaggaaa gggaacgaga g
g-----^ a   ga       c       acg
      .       60      50

```

noveliR\_1748dG=-49

```

      10      20      30      40      50
----   aa               a       tcayaag-|   ttc
      tattattg actccaaaaatctcattctac ctcc       tgtattt t
      ataataAC TGAGGTTTTAGAGTAAGAtg gagg       atataaa t
ctta       CG               y       tttgaaag^   cct
      110      100      90      80      70      60

```

noveliR\_2233dG=-49

```

      10      20      30      40      50
----   aa               a       tcayaag-|   ttc
      tattattg actccaaaaatctcattctac ctcc       tgtattt t
      ataataAC TGAGGTTTTAGAGTAAGAtg gagg       atataaa t
ctta       CG               y       tttgaaag^   cct
      110      100      90      80      70      60

```

noveliR\_4470dG=-58.1

```

      10      20      30      40      50      60
gt-|          a          cttattac          tttat
   tttgtgtggtcacggttaagc acgtcaacattttatatt          tttttgt t
   aaacacaCCAGTGTCAATTTCG TGCAGTTGtaaaatataa          aaaaata a
tac^          G          cwaa-----          ttttt
   120      110      100      90      80      70

```

noveliR\_607dG=-21.4

```

      10      20      30      40
attagc| g TCCCA GG          aaat- gaccctaa
   act GG CC GCGTGCCA          gtt \
   tga cc          gg cgcgcggt          cga a
a-----^ g ----- a-          gcatc accatcta
          70          60          50

```

noveliR\_1136dG=-49

```

      10      20      30      40      50
----          aa          a          tcayaag-|          ttc
   tattattg actccaaaaatctcattctac ctcc          tgtattt t
   ataataAC TGAGGTTTTAGAGTAAtg gagg          atataaa t
ctta          CG          y          tttgaaag^          cct
   110      100      90      80      70      60

```

noveliR\_145dG=-52.2

```

      10      20      30      40      50      60
cctca          a a          aaa---| tt          aattt t a
   aatcacgtcogttcatogttacatcgt cg ttag          tca gta          ttt tattta a
   ttagtgTAGGCAAGTAGCATGTAGCA GC agtc          agt cat          aaa ataagt a
gaaa-          C c          aaaagc^ c-          gat-- t t
   130      120      110      100      90      80      70

```

noveliR\_2853dG=-49.7

```

      10      20      30      40      50      60
tcttg| a          a          ctattca          cttat
   tttgt tggttatg ttaagccacggttaacattttatatta          tttttgt t
   aaaca aCCAGTAC AATTCGGTGCAGTTGtaaaatataat          aaaaata a
cca--^ c          C          -----          tctct
   120      110      100      90      80      70

```

noveliR\_4373dG=-23.1

```

      10      20      30      40
t----- ac-| CCC G -- C aa          tgac          aaaa
   ttagc ttAGT ACT GGC GIGC A atgt          ctta \
   aatcg aatca          tga ccg cacg t taca          gaat a
tgcac          agt^          a-- g ga          - gg          tcc-          catc
          90          80          70          60          50

```

noveliR\_4832dG=-21

```

      10      20      30
ac-----| a tg g c-          cgt tta
   ac c cgag ctg tcggct          ggc \
   tg G GTTC GAC GGTGG          ccg t
tggaagtt^ C GT - TC          Tt-          ttg
.          60          50          40

```

noveliR\_248dG=-21.3

```
      10      20      30      40
t| tt  tac t  tt  c      g  -  aa
tg  ccaa  g  cact  tac  gtgtggg  ttgt  gca  a
ac  gggt  C  GTGA  GTG  CGTATT  AGCa  cgt  g
c^ t-  ttC -  I-  I      G  a  ca
80      70      60      50
```

noveliR\_249dG=-21.3

```
      10      20      30      40
t| tt  tac t  tt  c      g  -  aa
tg  ccaa  g  cact  tac  gtgtggg  ttgt  gca  a
ac  gggt  C  GTGA  GTG  CGTATT  AGCa  cgt  g
c^ t-  ttC -  I-  I      G  a  ca
80      70      60      50
```

noveliR\_2345dG=-21.3

```
      10      20      30      40
t| tt  tac t  tt  c      g  -  aa
tg  ccaa  g  cact  tac  gtgtggg  ttgt  gca  a
ac  gggt  C  GTGA  GTG  CGTATT  AGCa  cgt  g
c^ t-  ttC -  I-  I      G  a  ca
80      70      60      50
```

noveliR\_2346dG=-21.3

```
      10      20      30      40
t| tt  tac t  tt  c      g  -  aa
tg  ccaa  g  cact  tac  gtgtggg  ttgt  gca  a
ac  gggt  C  GTGA  GTG  CGTATT  AGCa  cgt  g
c^ t-  ttC -  I-  I      G  a  ca
80      70      60      50
```

noveliR\_1281dG=-37

```
      10      20      30      40
gag| atg  cg  g  tta  -  g  g  at--  tc
gct  ctgc  ggcag  cgt  ctc  ggctg  ag  cg  gc  \
cgg  gagc  CGCTC  GTA  GAG  TCGGC  Tc  gc  cg  a
---^  cg-  aT  -  TCG  A  -  g  ggag  tt
90      80      70      60      50
```

noveliR\_2963dG=-46.4

```
      10      20      30      40      50
taacgag      G  AT--      t  tat  ----|  ca
      taaCGGGTCG  GTCAT  TACCTGTTaa  at  cgggt  tgattt  g
      attgcccagc  cagta  gtgggcaatt  ta  gccca  actggg  g
taga---      a  catt      t  ttt  tttt^  ct
110      100      90      80      70      60
```

noveliR\_3243dG=-38.7

```
-----      10      20      30      40
cacggttaagctacgtcaacat
      GIGCCAATTCGGTGCAGTTGtaaaa
acaaaaacgcgTCA      gaaaaatayaataa^  a
100      90      80      70      60      50
```

noveliR\_3142dG=-45.8



```

      10      20      30      40      50
gaag      a      c      tc aag-|      ttc
      tgttatt gtact taaaaatctcattctacacttc ac tgtattt t
      acaataa cgTGA GTTTTAGAGTAAAGATGTGagg tg atataaa t
----      c      A      tt aaag^      cct
      110      100      90      80      70      60

```

noveliR\_4887dG=-37.1

```

----|      10      20      30      40      50
      ac      a      w      aa tttc      gaa
      tgttattg actttaaaaa ttt ttttacattcc ac tatattt a
      acaataAT TGAGGTTTT GAG AAGAtgtgagg tg atataaa a
cttc^      CA      A      T      ag tta-      aag
      110      100      90      80      70      60

```

noveliR\_1516dG=-20.2

```

      10      20      30      40      50
cgcgcaaaatA| GG TGGA      a- c ga agaca
      GGAG CA AGGGCACc caa tag gggc \
      tttt gt tcttgtgg gtt att cctg a
-----^      aa ttg-      ga a aa aacct
      90      80      70      60

```

noveliR\_9896dG=-36.7

```

ca-----|      10      20      30      40      50
      a      a      gttttgtcaagt      g      a
      tcgt cattgtacatcgtgcg tca      agtgttt tgttta t
      GGCA GIAGCATGTAGCATGt agt      ttataaa ataaat t
ggcagttagaACA^ A      c atttaaawaaawt      a      t
      120      110      100      90      80      70      60

```

noveliR\_662dG=-57.2

```

|      a      t      a      ca      tt      aggtac      a      a
ctgt aatt tgtccgttcac tacatcgtgc tcaga ttatt      tgttt tgttta t
ggca ttag ACAGGCAAGTAG AIGTAGCAGC agtct agtaa      ataaa ataaat t
^      c      c      C      cc      tt      gattt-      a      t
      130      120      110      100      90      80      70

```

noveliR\_1163dG=-40.3

```

-      10      20      30      40      50      60      70      80      90      100      110      120
      c a      atc      a      -----|      t
      attttgtgtgg ca ggttaa      acgtcaacat ttatattg      atttt t
      taaaacacgCC GT CCAATT      TGCAGTTGta aatataat      tagaga a
a      A G      CGA      a      gataacaaaaaacagaataa^      t
      120      110      100      90      80      70      60

```

noveliR\_2507dG=-25.8

```

      10      20      30      40      50
gaag      a      c      tc aag-|      ttc
      tgttatt gtact taaaaatctcattctacacttc ac tgtattt t
      acaataa cgTGA GTTTTAGAGTAAAGATGTGagg tg atataaa t
----      c      A      tt aaag^      cct
      110      100      90      80      70      60

```

noveliR\_317dG=-17.4

```
          10      20      30
t----- aa agtg- aga ca---| ga
      cttcatc cca atc tgtct ggaact t
      gAGGTGG GGT TGG acgga ttttga g
tacgggggtt A- GGAGG aa- ttaag^ ac
      80      70      60      50      40
```

noveliR\_964dG=-45.8

```
          10      20      30      40      50
gaag a c tc aag-| ttc
      tgttatt gtact taaaaatctcattctacacttc ac tgtattt t
      acaataa cgTGA GTTTTTAGAGTAAGATGTGagg tg atataaa t
---- c A tt aaag^ cct
      110      100      90      80      70      60
```

noveliR\_1409dG=-45.1

```
          10      20      30      40      50      60
| c a a c c caattt cyagt a a a
cct aaate tg cgttcatcg atatcgtg ygt tcat yta ttt tattta t
gga tttag AC GGCAAGTAGC TGTAGCAC cca agta tat gaa ataaat t
^ a c A A atrrtrt aaatt - a t
      130      120      110      100      90      80      70
```

noveliR\_2572dG=-36.7

```
          10      20      30      40      50
ca-----| a a gttttgtcaagt g a
      tcgt cattgtacatcgtgog tca agtgttt tgttta t
      GGCA GTAGCATGTAGCATGt agt ttataaa ataaat t
ggcagttagaACA^ A c atttaawaaawt a t
      120      110      100      90      80      70      60
```

noveliR\_1399dG=-45.8

```
          10      20      30      40      50
gaag a c tc aag-| ttc
      tgttatt gtact taaaaatctcattctacacttc ac tgtattt t
      acaataa cgTGA GTTTTTAGAGTAAGATGTGagg tg atataaa t
---- c A tt aaag^ cct
      110      100      90      80      70      60
```

noveliR\_24dG=-49

```
          10      20      30      40      50
---- aa a tcayaag-| ttc
      tattattg actccaaaaatctcattctac ctcc tgtattt t
      ataataAC TGAGGTTTTTAGAGTAAGAtg gagg atataaa t
ctta CG y tttgaaag^ cct
      110      100      90      80      70      60
```

noveliR\_3193dG=-26.8

```
          10      20      30      40
atgtttggttA - -- C- G at---| c
      GGAGGATC CTC TC TTGG CTC gaggggat c
      ctttttag gag ag aact gag tttcccta a
cgtatga---- a tt tt g gatat^ a
      90      80      70      60      50
```

noveliR\_3071dG=-18

```
      10      20      30      40
tacactaagg  GG - CCTc ag--| at
      GGAG GGTGG GCTTAG  ataatttggt ca a
      tctc ttatt tgaatt  tgttgaataa gt a
ta-----  tt a att-  ctta^ gt
.          80      70      60      50
```

noveliR\_39dG=-49

```
      10      20      30      40      50
----  aa a tcayaag-| ttc
      tattattg actccaaaaatctcattctac ctcc  tgtattt t
      ataataAC TGAGGTTTTAGAGTAAAGtg gagg  atataaa t
ctta  CG y tttgaaag^ cct
110   100   90   80   70   60
```

noveliR\_2221dG=-17.9

```
      10      20      30
tggaaac---- - ----| aa t
      ggtgtcg ttgt agtaa ttg t
      CCGCGGC GACA TCgtt gac a
gtagttgtaaA A CCCT^ ac g
60     50     40
```

noveliR\_4196dG=-49.1

```
      10      20      30      40      50      60      70
tggttt ta-| a c ctatttctttttg tat
      ttctgtttt tg tcacggttaag cgcgtcaatattttatatta ttttat \
      aggacaaaa AC AGIGCCAATTC GTGCAGttataaaatataat aaaata t
-----  cAC^ C A aa----- ttt
130     120     110     100     90
```

noveliR\_4454dG=-16.1

```
      10      20      30      40
cctcagamttC| T C T - Ctat aag g
      GT CA IGT TITCAIG GCC tgg attca a
      ca gt ata aaggat cgy gcc tgggt t
a-----^ - - t t c--- gtg a
80     70     60     50
```

noveliR\_5013dG=-44.5

```
      10      20      30      40      50
tccc a ----- g- tt-| cta
      gtgatcat accgtttattgtatatcgt tca ttagttt gttaggta \
      cactagta TGGCAAGTAGCATGTAGCA agt aattaa taatttat t
c--- c CGCCatttttt aa ttt^ att
120     110     100     90     80     70     60
```

noveliR\_1028dG=-17.7

```
      10      20      30      40
-- ct--| a tc c a tttttct t
      cgtgggt gca gtct tgg at tctg atc t
      gtatca CGT CGGG ACC TG agat tag c
tt aaAC^ G TC C A ----- t
70     60     50
```

noveliR\_3369dG=-58.1

```
      10      20      30      40      50      60
gt-|          a          cttattac      tttat
   tttgtgtggtcacggttaagc acgtcaacattttatatt      tttttgt t
   aaacacaCCAGTGTCAATTCG TGCAGTTGtaaaatataa      aaaaata a
tac^          G          cwaa----      ttttt
   120      110      100      90      80      70
```

noveliR\_3306dG=-19.4

```
      10      20      30      40
a--- gr tg ta c      tttt-      -----| t
   gt tt accga gt acctctat      taaaa      ttaaaa a
   cg ag TGGTT CG TGGAGATA      atttt      agtttt a
tgaa gt CG CA C      cgtct      actattta^ t
.      90      80      70      60      50
```

noveliR\_936dG=-52.2

```
      10      20      30      40      50      60
cctca          a a      aaa---| tt aattt t a
   aatcacggtccggttcacgtacatcgt cg ttag      tca gta      ttt tattta a
   ttagtgTAGCAAGTAGCATGTAGCA GC agtc      agt cat      aaa ataagt a
gaaa-          C c      aaaagc^ c-      gat-- t t
   130      120      110      100      90      80      70
```

noveliR\_1409dG=-63.9

```
      10      20      30      40      50      60
---|          a c ttt      aggtact      t-      tttt
   gatcgtgaccggttcacgtacatc tgcggt ag      tcggt      atta atttaa \
   ctagcacTGGCAAGTAGCATGTAG ACGCCa tc      agtaa      taagt taaatt a
gca^          C      a ttt      agttt--      tt      ttaa
   130      120      110      100      90      80      70
```

noveliR\_4144dG=-21.3

```
      10      20      30      40
t| tt tac t tt c      g - aa
   tg ccaa g cact tac gtgtggg ttgt gca a
   ac gggt C GTGA GTG CGTATT AGCa cgt g
c^ t-      ttC -      T-      T      G      a ca
   80      70      60      50
```

noveliR\_2430dG=-39.4

```
      10      20      30      40      50      60
atta a - -| ACC      CCAaaat      cc      c aga a tg
   gc ctg GATC CC      GGGCGTG      gttagt tagaaa tac      gcct cg \
   cg ggc ttag gg      cctgcat      caatog atcttt atg      cgga gc g
tg-- g g      t^ ctt      -----      a-      t agc c gc
   110      100      90      80      70
```

noveliR\_3740dG=-68.9

```
      10      20      30      40      50      60
ga---- t          a ag      a--- aa- c-| c g
   cgaa gcccaacttccaacaacacc at      tgtcccaact      gat      aacc caca tt a
   gctt CGGGTGAAGGTTGTTGGG TA      ataggggttga      tta      ttgg gtgt ag t
tgcccg      C      C gg      acca      atg      ac^ t a
   130      120      110      100      90      80      70
```

noveliR\_2573dG=-42.7

```

      10      20      30      40
aac g  --|    T    T    -    Tcaaccc    a
   gg tgc gGTTTA IGGGT GGGT CGGGT    gacctgtta \
   ct ggc tcgaat gcccaa ccca gccca    ctgggcaat g
ca- g  aa^    t    -    a    -----    t
      90      80      70      60

```

noveliR\_631dG=-42.8

```

      10      20      30      40      50
ta----|    a    c                                c aa  tttta    gga
      ttatta cact caaaaatctcattctacac cc  aca    tattt  a
      aataAT GIGA GTTTTAGAGTAAAGatgtg gg  tgt    ataaa  a
cttcac^    C    A                                a ag  tcac-    aag
      110     100     90     80     70     60

```

noveliR\_3714dG=-23.8

```

      10      20      30      40
aac----- t-  -  -  g  -|  cag  aacc  tag
      tcttg gct tc agcat ggt gcct  catg  cttcag  \
      AGGGC TGA GG ICGTG Cta tgga  gtat  gaagtt  g
tatgaaatagTT  TT  T  T  G  g^  a--  a---  cct
      100     90     80     70     60     50

```

noveliR\_315dG=-17.7

```

      10      20      30      40
--      ct--| a  tc  c  a  tttttct  t
      cgtggt  gca gtct  tgg at tctg  atc t
      gtatca  CGT CGGG  ACC IG  agat  tag c
tt      aaAC^ G  TC  C  A  -----  t
      70      60      50

```

noveliR\_3544dG=-22.1

```

      10      20      30      40
ttttagca  C  -|  G  CCAaaat  gacc
      ctGIGI CCAC IGGGC IG  gtt  \
      gacgcg ggtg atcog ac  caa  c
atgagcca  c  c^  a  cat----  aaat
.      70      60      50

```

noveliR\_4379dG=-26.8

```

      10      20      30      40
a--|  ag  IG  GIA  C-  cg  gaa
      agcggg cTIIG CACIGG  CGA  GACT  at  \
      tcgtct gggat gtgac  gct  ctga  tg  c
ctg^  a-  ta  gaa  ac  at  taa
      80      70      60      50

```

noveliR\_4038dG=-51.4

```

      10      20      30      40      50      60
--      t    aa  a    ca    at----|  agaga
      ctcccta tttgtgc  ttac gttaag  atgtcaacatttttatattg  ttttttat  t
      gaggat aaACACG AGTG CAATC  IGCagttgtaaaaatataat  aaaaaata  a
gg      -    CC  C    AG                                gataac^  gaata
      130     120     110     100     90     80     70

```

noveliR\_4582dG=-40.5

```

      10      20      30      40      50
gat  tg a GG-      C-      G      c--|      accgc      tt
      gg a tA      GATGGG      AACGGTTAT      GCggg      aggta      ggttgt a
      cc t at      ttgccc      ttgccaata      cgtcc      ttcgt      ccaata c
at-  gt a aga      at      -      ata^      attta      tc
      110      100      90      80      70      60

```

noveliR\_924dG=-19.4

```

      10      20      30
ttgaagttgt      atca-      --      ---|      c      ca
      tggc      gtc      gccat      ggct      cta a
      accg      CAG      CGGTA      TCGA      GAT g
ct-----      gttoC      AA      GCC^      A      tc
      70      60      50      40

```

noveliR\_2852dG=-12.8

```

      10      20      30
tct t t a ag      --|      c      atac
      ct tta aga ta      ggctc      gctc      tca \
      gg aat tCT AT      TTGAG      CGGG      AGT a
gt-  t t C AG      AT^      T      aaat
      70      60      50      40

```

noveliR\_918dG=-19

```

      10      20      30
cag|      caa      att      a      tc
      ttc      aaatatcgcgata      ttgg      aata g
      aag      tttatAGTGTCTAT      AGCT      TTAT c
---^      cag      AAT      A      tg
      70      60      50      40

```

noveliR\_1315dG=-13

```

      10      20      30
tgatt      -| T      T A      GCIC      aaga
      gatg gA      GATTG      CC CT      GCGCGT a
      ttac      ct      ttaat      gg      ga      tgtgta t
ttt--      t^ t      - -      actc      accc
      70      60      50      40

```

noveliR\_5090dG=-19

```

      10      20      30
cacatagt      aa---|      tcc t      gtt
      actc      attgg      ca      ggtctagtg \
      tgag      TGACC      GT      ICAGGTTAC a
t-----      cccaa^      TAA C      Agg
      70      60      50      40

```

noveliR\_3822dG=-50.6

```

      10      20      30      40
-----|      tt      a      ctaa      act
      gg      ggcca      agggctaaaac      ggccatctcca g
      cc      CCGGT      ICCCGATTTTG      ICGGTtagaggt a
ctagaa^      tc      C      C---      ggt
      80      70      60      50

```

noveliR\_4248dG=-32.1

```

      10      20      30      40      50      60
ag-- -   a  g-|   gagc      ttatttta   aa  t  atttc  tac
      gc aaca cga  gtgat   tgttggacga      tccat  tag gc   ctga  g
      cg ttgT GTT  TACTA   ACAACTTGTt      aggta  att tg   gact  t
ccaa t   C  AG^   AA--      tacaaca-   ag  t  ctgca  tca
      130     120     110     100     90     80     70

```

noveliR\_57dG=-32.1

```

      10      20      30      40      50      60
ag-- -   a  g-|   gagc      ttatttta   aa  t  atttc  tac
      gc aaca cga  gtgat   tgttggacga      tccat  tag gc   ctga  g
      cg ttgT GTT  TACTA   ACAACTTGTt      aggta  att tg   gact  t
ccaa t   C  AG^   AA--      tacaaca-   ag  t  ctgca  tca
      130     120     110     100     90     80     70

```

noveliR\_1460dG=-49.3

```

      10      20      30      40      50      60      70
ccccctc  T-|   A           c           tatacctattacttttctog  tat
      tgt  TGTGTG ICACGGTTAAGCCa  gtcaacatttta      ttttat  \
      aca acacac agtgccaattcggt  cagttgtaaaat      aaaata  t
gt-----  ct^   c           a           ttaattaa-----  tct
      .           120     110     100     90     80

```

noveliR\_569dG=-14.1

```

      10      20      30      40
atcttc      G  A T  GA      tt----|   ag
      cggaTC AACT CG AGT  CGTATT      atata  \
      gtttag ttgg gt tta  gtatag      tatat  t
ta----      g  a c  a-      ctatct^   at
      80     70     60     50

```

noveliR\_4729dG=-45.8

```

      10      20      30      40      50
gaag      a  c           tc aag-|   ttc
      tgttatt gtact taaaaatctcattctacacttc  ac  tgtattt  t
      acaataa cgTGA GTTTTTAGAGTAAAGATGTGagg  tg  atataaa  t
----      c  A           tt  aaag^   cct
      110     100     90     80     70     60

```

noveliR\_3860dG=-20.5

```

      10      20      30
tttattatta  t-   ct  -   --|   a
      tacatg  ggtcg  ttc  gtgta  aagt  g
      gtgtat  CCAGC  GGG  CACGT  TTCG  g
ctg-----  tT   AT  T   GT^   a
      70     60     50     40

```

noveliR\_1203dG=-17.4

```

      10      20      30
t-----  aa  agtg-  aga  ca---|   ga
      cttcatc  cca  atc  tgtct  ggaact  t
      gAGGTGG  GGT  TGG  acgga  ttttga  g
tacgggggtt  A-  GGAGG  aa-  ttaag^  ac
      80     70     60     50     40

```

noveliR\_406dG=-17.9

```

      10      20      30
ggctctgctcgtag aa a aga--| g
      gccg ccgg cgga catt t
      cggt GGIC GTTT GTGg t
ttaca----- gG G GAGGG^ a
      60      50      40

```

noveliR\_1025dG=-17.4

```

      10      20      30
t----- aa agtg- aga ca---| ga
      cttcatc cca atc tgtct ggaact t
      gAGGTGG GGT TGG acgga ttttga g
tacgggggtt A- GGAGG aa- ttaag^ ac
      80      70      60      50      40

```

noveliR\_4745dG=-13.2

```

      10      20      30      40
gttgggtttt| A AT T- A taca--- a cg
      GITT TGCAG GGAT TGG gc tc tca \
      cgga acgtc ctta gcc cg ag agt a
-----^ - -- ct - ttattag g at
      80      70      60      50

```

noveliR\_269dG=-9

```

      10      20      30
cttcaaagct| ACA CC Ca- gc
      ICATTT GAGCT AACTT aaa t
      ggtaaa ttoga ttgaa ttt t
tactt-----^ c-- tc aca ac
      70      60      50      40

```

noveliR\_2647dG=-10.4

```

      10      20      30      40
agaag t t ct -| atttggttc
      aaat attca tatatt ta ctct g
      ttt TGGGT ATGTGGG AT GAGA t
ttggg t T IT C^ Gtgtgtggt
      80      70      60      50

```

noveliR\_2737dG=-11.4

```

      10      20      30      40
ta aata -- -| attttctctttatt t
      aaga aagtat tcacatt ttaa ct c
      ttt tTCAIG AGGTGAG AGTT ga a
g- gaag IC T^ GIItttgtgtttat a
      90      80      70      60      50

```

noveliR\_1067dG=-14.1

```

      10      20      30      40
atcttc G A T GA tt----| ag
      cggaIC AACT CG AGT CGIATT atata \
      gtttag ttgg gt tta gtatag tatat t
ta---- g a c a- ctatct^ at
      80      70      60      50

```

noveliR\_5107dG=-22



```

      10      20      30
----   c      gg      -      -| aa      at      t
      ataga gctggt ctgga gact tca ttca cca g
      tgttt IGGCGG GGCTT TTGG GGT aagt ggt t
caga   c      A-      G      C^      A-      cg      a
      80      70      60      50      40

```

noveliR\_4794dG=-22.8

```

      10      20      30      40
tatta c----|      CT      G      AT-      ga      tc
      gag      cTACA GAT CAG TGGGCTggt tc \
      ctc      ggtgt ttg gtc atctggccg ag a
gg--- tttat^      t-      -      acc      tc      ta
      80      70      60      50

```

noveliR\_2173dG=-18.6

```

      10      20      30      40      50
gactctac| C      G      AGC      AG      tcat      acgcttattc      aca
      ga AGG IGIG ICTIG CT      gg      aggat      a
      ct tcc acac agaac ga      cc      tccta      c
ca-----^ -      m      aca      ca      ct--      ccaaytac--      aac
      .      90      80      70      60

```

noveliR\_18dG=-32.1

```

      10      20      30      40      50      60
ag-- -      a      g-|      gagc      ttatttta      aa      t      atttc      tac
      gc aaca cga gtgat      tgttggaaga      tccat      tag gc      ctga      g
      cg ttgT GTT TACTA ACAACTTGTt      aggta      att tg      gact      t
ccaa t      C      AG^      AA--      tacaaca-      ag      t      ctgca      tca
      130      120      110      100      90      80      70

```

noveliR\_1892dG=-42.6

```

      10      20      30      40      50      60
aattcg      t      a      ta      gttt      a-|      gttg      gttca
      tgaa cgtgt tgttcattgtatattgtg      gtta      tcatt      ggt      tttgt      a
      actt ytaca GCAAGTAGCATGTAGCAC CAat      agtaa      tta      aaata      t
-----      t      A      GC      attt      aa^      aaaa      aattt
      130      120      110      100      90      80      70

```

noveliR\_1270dG=-33.1

```

      10      20      30      40      50
----|      ac      a      w      aa      tttc      gaa
      tgttattg actttaaaaa ttt ttttacattcc      ac      tatattt      a
      acaataAT IGAGGTTTT GAG AAGAtgtgagg      tg      atataaa      a
cttc^      CA      A      T      ag      tta-      aag
      110      100      90      80      70      60

```

noveliR\_3337dG=-29.3

```

      10      20      30      40      50
-----      -      tg      t      c      cc      t      --      gg      cc      -      t      --|      aa
      ttttta aat tctc ag tadc actaa cc      ag      gct      ac      caa      gaca      gca \
      aaaaaT TTA GGAG TC AIGG TGGTt      gg      tc      tga      tg      gtt      ctgt      tgt      t
ataaa      C      GT      -      -      TT      c      at      aa      at      t      -      tt^      ga
      120      110      100      90      80      70      60

```

noveliR\_3761dG=-19.3

```

      10      20      30      40
atgattcgal      C G GTT Gtag gc
      tTTCITC TTG TTG CAG ggctca \
      gaagagg gat gac gtc tcggggg t
acctta----^      t g --- agcg ag
80      70      60      50

```

noveliR\_5095dG=-25.8

```

      10      20      30      40      50
----- g g a- gt - - ctac t-| tt a
      gat aac ttgc tgg ttat aag aagttgag tc ttata gcc a
      ctg TTG GACG ACT GGTA TTC ttcaactc ag ggtat tgg t
gttcacc - - AG AT C T ccca tt^ tt t
110      100      90      80      70      60

```

noveliR\_3944dG=-15.6

```

      10      20      30
attttgatcal      g tt a aaaa
      ttttgtaaag gaac ta cg \
      aaaACAATTIC CTIG AT GC g
acaccaa----^      A TC G CCAC
70      60      50      40

```

noveliR\_4647dG=-34.8

```

      10      20      30      40
g---- tg-| c - TT GA ca t - t
      gc gagg GAIGCT CG GC GGCTGCT gc ag aggc \
      cg ctcc ttatgg gc cg tcggcgg cg tc ttcg a
atgaa tta^ - t t- gc aa - g t
90      80      70      60      50

```

noveliR\_3809dG=-27.1

```

      10      20      30      40      50      60
ct| aaa g t aa t a g gca gggttaatatt g
      tgtgg ttt gttg gg gaa ca tgc tgggagt tcg ag a
      atacc aAA TAAT IC CTT GT ATG GCCctcg agc tc a
tt^ aa- G T A- - C - aaa aatt----- a
110      100      90      80      70

```

noveliR\_4442dG=-40

```

      10      20      30      40
ttgtt| ag C TIAG gcatccaccc
      aac GTT ACCCG CGACCCGACCcgttaa \
      ttg caa tgggc gctgggttgggcaatt a
-----^ gg t tgg- ataacataa
90      80      70      60

```

noveliR\_4982dG=-19.9

```

      10      20      30
cgac---- ---| GGA T CCttt c
      ggcagg CTT TTGACT AGACT at t
      ccgtcc ggg gagctgg tttga ta a
tagtaata tgt^ aa- - cgtat g
80      70      60      50      40

```

noveliR\_5035dG=-19.9

```
          10          20          30
cgac----   ---|  GGA          I          CCttt  c
          ggcagg  CTT  TTIGACT  AGACT          at t
          ccgctc  ggg  gagctgg  tttga          ta a
tagtaata   tgt^  aa-          -          cgtat  g
80          70          60          50          40
```

noveliR\_2122dG=-38

```
          10          20          30          40
taa        a          C          -|  aag  gga
          gattg  cATAACTC  TCACTTTGGTCC  Ct  att  \
          ctaac  gtattgag  agtgaaaccagg  ga  taa  a
---        c          r          t^  aga  ata
80          70          60          50
```

noveliR\_1177dG=-19.4

```
          10          20          30          40
ttttaaca   C          -|  CG  CCAaaat  gacc
          ctGTGT  CCAC  TGGG  TG          gtt  \
          gacgcg  ggtg  atcc  ac          caa  c
atgagccg   c          c^  aa  cat----  aaat
.           70          60          50
```

noveliR\_2552dG=-11.7

```
          10          20          30          40
ttca-      t--  a  -|  at  -  aa  tttctg  tg
          tttc  ttg  acc  ca  tagat  gtctt  aca  att  \
          aaag  AAC  TGG  GT  ATCTA  TAGGA  tgt  taa  g
gttaa      tTC  G  A^  --  G  a-  tttt--  tc
90          80          70          60          50
```

noveliR\_1598dG=-17.3

```
          10          20          30
a-  acaa-   -|  GGCC  --  cta
          ct  gaaG  TCAGGAT  GAGT  GGt  \
          ga  cttc  ggtcttg  ctca  ccg  a
gg  gaaag   t^  aa--  ga  cgg
60          50          40
```

noveliR\_3277dG=-21.9

```
          10          20          30          40
gacgaa|  a          AC  GCA  CC          ac  g  gg
          gag  TTGAT  CTT  CG  GGCCa  tc  cagt  t
          ctc  ggctg  gaa  gc  ccggt  ag  gtcg  t
ccg---^  a          cc  a--  t-  aa  -  gt
80          70          60          50
```

noveliR\_3889dG=-23.9

```
          10          20          30          40          50
ac----   -  aa-|  tt  t  c  -  c          tattatattt
          atg  gcc  cgatcata  tc  gac  gt  tgggt  tttttttat  t
          tac  TGG  GCTAGTGT  AG  ITG  Ca  attca  aaaaaagtg  a
aaattt  a  CAG^  CT  -  C  g  -  ttttttatt
110          100          90          80          70          60
```

noveliR\_1999dG=-24.6

```

      10      20      30      40
---      --      G IT C      -| C      ctgacga      ga
      tttcgcaaa      gCTGA I      G GIGI GA GGGIG      ggct \
      ygagtgttt      tggct a      t tata ct ctcac      tcga g
gaa      gg      a gg c      g^ t      ag-----      aa
90      80      70      60      50

```

noveliR\_3367dG=-14.1

```

      10      20      30
tc-|      ttat      a ag      --      c atac
      catt      aga ta      ggctc      gctc tca \
      gtaa      tCT GT      TTGAG      CGAG AGT      a
gta^      tt--      C AG      AT      T      aagt
70      60      50      40

```

noveliR\_4137dG=-26.7

```

      10      20      30      40      50      60
atgatcga      I C      -      -|      Tgg      tta      a      gat t
      caAAT GA TTG ATAGA GCACCAG      gca      aaaca gctgaa      ac t
      gttta tt aat tattt tgtgggt      tgt      tttgt tgattt      tg a
-----      t t      g      g^      ta-      ttg      a      att a
110      100      90      80      70

```

noveliR\_21dG=-35.9

```

      10      20      30      40
ca-----|      ca      GI      - C      G      - ta
      ccttt      gGI      CGG C      AGCACA      CTCGATTcggagt tc \
      ygaaa      cta      gtt g      ttgtgt      gggctgggtctta ag a
gttgatta^      --      tg      t a      g      c at
90      80      70      60      50

```

noveliR\_228dG=-12

```

      10      20      30      40
cata      a T      GA      G-      CC      a--| a      att
      gttgc      CG TIT      TGAGTTAA      GGA      Aata      tc caa t
      caatg      gt aaa      atttagtt      cct      ttat      ag gtt t
ac--      a t      --      aa      ca      caa^ a      gat
90      80      70      60      50

```

noveliR\_672dG=-23.9

```

      10      20      30      40      50
ac-----      -      aa-|      tt t      c      -      c      tattatttt
      atg gcc      cgatcata      tc gac      gt tgggt      tttttttat      t
      tac      TGG      GCTAGTGT      AG TTG      Ca      attca      aaaaaagtg      a
aaattt      a      CAG^      CT      -      C      g      -      ttttttatt
110      100      90      80      70      60

```

noveliR\_1404dG=-18.8

```

      10      20      30
ttcaa--      -      gt--      -|g      gttg
      ttca      tgtatgg      cgaag      t gcg      t
      aagT      ACGIACC      GTTTC      G      Cgt      t
tgtttcg      C      ATAT      T^G      aggt
70      60      50      40

```

noveliR\_1418dG=-25.6

```

      10      20      30      40      50
ttt   ct  -- g      a      atcacct  t  tg  -  a--| gg
      agcaag ag tt taaactct aaaatctta      aga ttg tg gt  cc \
      ttgttt tc  GG ATTIGGGA TTTTGAAt      ttt aac gc ca  gg t
t--   t-  TT  G      -      gtttctt  c  gt  g  aaa^ ag
.     110      100      90      80      70

```

noveliR\_2994dG=-28.5

```

      10      20      30      40      50
----   ----  a-      -|      t      ataaaaataa
      ttttgtg  tg taagccacgttaata tttatatta tatttt \
      aaaataC  GC ATTIGGTCAGTTGt aaatataat ataaag      t
gaca      CAGT CA      a^      t      aaaaacaaaa
110      100      90      80      70      60

```

noveliR\_4650dG=-49

```

      10      20      30      40      50
----   aa      a      tcayaag-|      ttc
      tattattg actccaaaaatctcattctac ctcc      tgtattt  t
      ataataAC  TGAGGTTTTAGAGTAAGAtg gagg      atataaa  t
ctta      CG      y      tttgaaag^      cct
110      100      90      80      70      60

```

noveliR\_4503dG=-58.5

```

      10      20      30      40      50
---   c      -      G -|      g a      cattttatattc
      ctcc catccCCTTTCIG TTTGT T GGTTACGGItaag ca gtcaa      t
      gaag gtaggggaggat aaaca a ccagtgccaattc gt cagtt      t
tga   a      a      g c^      g g      atttttcattta
120      110      100      90      80      70      60

```

noveliR\_1442dG=-17

```

      10      20      30      40
catatagccgACC| A  GT      A  t-  ttg
      CC CTTA  GGGATA GGCTt  gatg  t
      gg gaat ttttat ccgga ttat  t
a-----^ -  ma      -  tc  ttg
      70      60      50

```

noveliR\_3205dG=-14.5

```

      10      20      30      40
a---| g  t      ga ta  ca  g  ttag  t      a
      aa gg aaagt a  gtac  tgttt acttt  tg aaaaat \
      tt ct tTTCG  T  CATG  ACAAG  TGAAA  gc ttttg t
aaaa^ g  -      GG GC      --  -  tt--  -  g
      90      80      70      60      50

```

noveliR\_2654dG=-45.8

```

      10      20      30      40      50      60
catgt  --  g  ta--|      a      ttgtta  tgt  c  a  ctggt
      gctta  tc  ggt  cctgata  cgaccgat      tcg  cgac  cga  cac  \
      cggat  gg  CCG  GGACTGT  GCTGGGCTA      ggc  gctg  gct  gtg  a
-----  cc  a  TTAA^      -      ttg---  tgt  t  -  cttta
      120      110      100      90      80      70

```

noveliR\_1353dG=-40.2

```
          10          20          30          40          50          60
tcc----  - - -|          gccaaactc          a tcga gga - tt
          ttoggt g aat gcggggogt          gtcagccg gc ccga gtaa att \
          gagCCA C TTA CGTTCGCG          cagtccgc cg ggtt cgtt tag g
aagaaaa          G G G^          TCTT-----          g ta-- g-- g tt
          120          110          100          90          80          70
```

noveliR\_4529dG=-33.8

```
          10          20          30          40          50
--- tg aat          a --| t g ctt tt a g at
          a ttc ggttttgt ct tacc agt gtc tccg ac ggac taggg \
          t gag CCGGGATA GG GTGG TTG cag gggc tg cctg gtctt a
          ttg gt gT-          C TT^ T G c-- cc - - aa
          110          100          90          80          70          60
```

noveliR\_1507dG=-23.1

```
          10          20          30          40
t----- ac-| CCC G -- C aa tgac aaaa
          tttagc ttAGT ACT GGC GTGC A atgt ctta \
          aatcg aatca tga ccg cacg t taca gaat a
          tgcacg agt^ a-- g ga - gg tcc- catc
          90          80          70          60          50
```

noveliR\_81dG=-24

```
          10          20          30          40          50
-| t g          ata aaaa taaaattaaac
          gtgta ct tttattgtacattgt gtta ttatt a
          cacat ga agATAGCATGTAGCA CAGT aatag c
          g^ - -          CGC CAaA tccataayaaa
          100          90          80          70          60
```

noveliR\_4276dG=-14.9

```
          10          20          30          40
taaagagtaaAG T A - A-| t g
          TGAA AGTACC GG ATTG CAtttagtg aaaaat \
          gctt ttgtgg cc tgat gtgaaattgc ttttta t
aaatt----- t a a aa^ - g
          90          80          70          60
```

noveliR\_3173dG=-29

```
          10          20          30          40          50
tctta aa-- t --| ttg acg aacaca atcg
          gg gc cgga gtgcttcg gaagttttgg caaa gag \
          cc CG GCCT IACGGAGC TTTCaaggcc gttt ctt g
aggca aaaC - TT^ --- a-- gaaa-- gaaa
          .          100          90          80          70          60
```

noveliR\_385dG=-20.5

```
          10          20          30          40
gtagt          --| aa tc c ttg at- t
          aacgtggttt gca tct tgg att acat atc t
          ttgtatcaaa CGT GGG ACC TAG tgta tag c
-----          AC^ GC CC C ta- aac c
          80          70          60          50
```

noveliR\_386dG=-20.5

```

      10      20      30      40
gtagt      --| aa tc c ttg at- t
aacgtggttt gca tct tgg att acat atc t
ttgtatcaaaa CGT GGG ACC IAG tgta tag c
-----
          AC^ GC CC C ta- aac c
          80      70      60      50

```

noveliR\_1086dG=-14.3

```

      10      20      30
a-| atca GT CG A ttatca
gagc aG TT IGGIGI GTTGG \
cttg tc ga gtcaca caatc c
ag^ gcc- tg a- - tgactg
      60      50      40

```

noveliR\_4732dG=-15.4

```

      10      20      30
gatcg-- G T C- G- | aa
agagc TCGATA GT CGAGT Gtt \
tttcg ggttgt ta gctca cag g
gcgtcgcg - c aa ga^ ag
      60      50      40

```

noveliR\_152dG=-31.8

```

-----
          10      20      30      40
          tt---| tg tgtccc aaa
          gtgtg agagttt agacttt acattgggga c
          tACAC TCTCAGA TTTGaga tgtaaccott a
caaaagaagt CCTGT^ GT t----- aga
      90      80      70      60      50

```

noveliR\_29dG=-28.4

```

-----
          10      20      30      40      50
          - tg t c cc t -- gg cc - t --| aa
          tttta aat tctc ag tacc actaa cc ag gct ac caa gaca gca \
          aaaAT TTA GGAG IC AIGG IGGtt gg tc tga tg gtt ctgt tgt t
gataaaa C GT - - TT c at aa at t - tt^ ga
      120      110      100      90      80      70      60

```

noveliR\_313dG=-32.1

```

      10      20      30      40      50      60
ag-- - a g-| gagc ttatttta aa t atttc tac
gc aaca oga gtgat tgttggacga tccat tag gc ctga g
cg ttgI GTT TACTA ACAACTIGTt aggta att tg gact t
ccaa t C AG^ AA-- tacaaca- ag t ctgca tca
      130      120      110      100      90      80      70

```

noveliR\_2955dG=-29.3

```

-----
          10      20      30      40      50
          - tg t c cc t -- gg cc - t --| aa
          tttta aat tctc ag tacc actaa cc ag gct ac caa gaca gca \
          aaaaaT TTA GGAG IC AIGG IGGTt gg tc tga tg gtt ctgt tgt t
ataaa C GT - - TT c at aa at t - tt^ ga
      120      110      100      90      80      70      60

```

noveliR\_5078dG=-23.8

```
      10      20      30      40      50
cttttaatca|  TT      A  GG      gc  ataattatg  tg
      CTITGG  GGTGGTIA  TAGC  Cagggtt  cga      gagtac  \
      gggct  ttatcgt  gttg  gtccag  gtt      ttcatg  g
gtattc-----^  --      g  --      ta  -----      tg
100      90      80      70
```

noveliR\_278dG=-24.4

```
      10      20      30      40
---  cag      ----      gcac-  ta  -|  agaatt  t
      ttc  aagtcgg  ggtttggt  gtat  gct  ct  ac  a
      gag  tTTAGTC  TCAAACAA  catg  cga  ga  tg  c
acc  taa      AATA      ACTac  ga  t^  gcctat  g
.      90      80      70      60      50
```

noveliR\_2391dG=-20.5

```
      10      20      30      40
gtagt      --|  aa  tc  c  ttg  at-  t
      aacgtggttt  gca  tct  tgg  att  acat  atc  t
      ttgtatcaaa  CGT  GGG  ACC  TAG  tgta  tag  c
-----      AC^  GC  CC  C  ta-  aac  c
      80      70      60      50
```

noveliR\_75dG=-32.2

```
      10      20      30      40      50      60
gcaatcttg  --      ataa-|  a  a      taogytg  -----  ctta  a
      gcg  agtcaa  cca  cca  tccca  aatgggt  tcca  caaaat  a
      gatg-----  ca  tCGGTI  GGI  GGT  GGGGt  ttacca  gggt  gtttg  t
      .      110      100      90      80      70
```

noveliR\_3564dG=-14.6

```
      10      20      30      40
taaat-----  tt-|ta  c      atc  tt  -  ac
      agagtgct  g  gct  gtaaaat  aag  att  c  \
      ICTIACGG  I  CGA  IGITITg  ttc  tga  g  a
at ttg ttggc      CCI^GC  -      gga  tc  t  ta
      90      80      70      60      50
```

noveliR\_4726dG=-22.2

```
      10      20      30      40
ggtaa---  t      a  -  act-|  t      g
      agtgaa  agtacc  gg  attg  ttttagtg  aaaaat  \
      ttACTI  TCGTGG  CC  IGAC  gaaattgc  ttttg  t
ccttgaaa  T      G  A  AAGT^  -      g
      90      80      70      60      50
```

noveliR\_2518dG=-22.2



```

          10      20      30      40
ggtaa---   t      a -   act-|   t      g
          agtgaa agtacc gg attg   ttttagtg aaaaat \
          ttACTT ICGTGG CC IGAC   gaaattgc tttttg t
ccttgaaa   T      G A   AAGT^   -      g
          90      80      70      60      50

```

noveliR\_1294dG=-24.8

```

          10      20      30      40      50
taataa----   t -----| aca   aa   gtaa   a   c   tacta
          catgccattag cc   cc   tggt   att   ctgt   aaa   tgaat   a
          GTATGGTGAIC GG   GG   acta   taa   gacg   ttt   attta   a
tttgctcttta   T   TTTAC^ Ga-   a-   aaa-   g   c   tataa
          120     110     100     90     80     70     60

```

noveliR\_2709dG=-29.6

```

          10      20      30
taat -| GG C   C a
          tcg gttC TI GGTTTGGTTTCGGTTT Tag t
          ggc taag aa ccaagccaagccaaa atc c
gctt t^ aa -   - a
          70     60     50     40

```

noveliR\_2792dG=-10.2

```

          10      20      30      40
catatatgcaCG   G-|   A AC c   atg-   tt
          TTTTGAT AGTTA GGG CA tagtc   aat \
          gaaatta ttaat ctc gt atcag   ttg t
t-----   gg^   -   -- t   gtaa   at
          80     70     60     50

```

noveliR\_5099dG=-51.7

```

          10      20      30      40      50
tc----| t      CG TT   G --   aaccc   a
          tg aaatgGGT GG TATTGG TT TGGGTtgggttc   gaccogtta \
          ac tttgccca ct gtaatc aa gccagcccaag   ctgggcaat g
ttgcct^ -   -- gg   g tt   ccta-   t
          110     100     90     80     70     60

```

noveliR\_1901dG=-37

```

          10      20      30      40
gag| atg   cg   g   tta -   g g at--   tc
          gct   ctcg gcgag cgt   ctc ggctg ag cg   gc \
          cgg   gagc CGCTC GTA   GAG TCGGC Tc gc   cg a
---^ cg-   aT   -   TCG A   -   g ggag   tt
          90     80     70     60     50

```

noveliR\_3210dG=-55.4

```

          10      20      30      40      50      60
atta          CAC   C   wtt-   a   gcact   a-| t
          aaacacGTTGGTGTAC   TTGTGTTC gtcaca   aaa atttctt   catga ga t
          tttgtgcaccacatg   gacacaagg cagtgt   ttt taagggg   gtact tt g
-----   ata   c   tact   a   ttatt   ag^ t
          130     120     110     100     90     80     70

```

noveliR\_1124dG=-22.4

```

          10      20      30
acat---  -| t      c tg  a      t
          tccg ctc gactcg tg  tct gacttg a
          gggC GGG TTGGGI AT  GGG CTGggc a
ccaaatt  T^ I      T  IT  -      a
          70      60      50      40

```

noveliR\_3549dG=-28.2

```

          10      20      30      40
t-----|tg aa  t t      aa      cat tg  g g
          g a tga gc caactag gtagca  gt  cgag ct c
          t  T ACT CG GTTGGT  CGTGT  cg  gttc gg t
gttgtgg^gt CG  - -      C-      att gt  - c
          90      80      70      60      50

```

noveliR\_5128dG=-17.9

```

          10      20      30      40      50
aaatatcga----  -  -      tc---  gt  tt  gtt----|  aa
          gttagaat aata tacca  tttt ttg gtt  ttaggtc g
          CAATTTTA TTGT AIGGT  aaaa  aat  taa  aatttag t
ttacattaaAAG  C  C      Cttr  rc  tt  argaatt^  gg
          120      110      100      90      80      70      60

```

noveliR\_3908dG=-22.2

```

          10      20      30      40
ggtaa---  t  a -  act-|  t  g
          agtgaa agtacc gg attg  ttttagtg aaaaat \
          ttACTT TCGIGG CC IGAC  gaaattgc tttttg t
ccttgaaa  T  G A  AAGT^  -  g
          90      80      70      60      50

```

noveliR\_2369dG=-40.2

```

          10      20      30      40      50      60
tcc----  -  -  -|  gccaaactc  a tcga  gga  -  tt
          ttccgtt g aat gcggggcgt  gtcagccg gc  ccga  gtaa att \
          gagCCA C ITA CGTTCGCG  cagtccgc cg  gggt  cggt tag g
aagaaaa  G G  G^  TCTT----  g ta--  g--  g  tt
          120      110      100      90      80      70

```

noveliR\_2277dG=-22.2

```

          10      20      30      40
ggtaa---  t  a -  act-|  t  g
          agtgaa agtacc gg attg  ttttagtg aaaaat \
          ttACTT TCGIGG CC IGAC  gaaattgc tttttg t
ccttgaaa  T  G A  AAGT^  -  g
          90      80      70      60      50

```

noveliR\_2455dG=-28.4

```

          10      20      30      40      50      60
gatctaacg  -| C  C  A CG  -  tg  ttctaggatc  t  gac-  t
          gAG GA ATGA ACAA AC  AGCA  caa gcg  ata agcc  cccac \
          ttc ct tact tggt tg  ttgt gtt  tgt  tgt  tgg  ggggt t
aactg----  a^ -  -  a --  t  gt  -----  t  aaaa  a
          120      110      100      90      80

```

noveliR\_932dG=-33.8

```

      10      20      30      40      50
--- tg  aat      a  --|  t  g  ctt  tt  a  g  at
a  ttc  ggttttgt ct  tacc agt gtc  tccg  ac ggac taggg \
t  gag  CCGGGATA GG  G TGG TTG  cag  gggc  tg cctg gtctt a
ttg gt  gT-      C  TT^  T  G  c--  cc  -  -  aa
110      100      90      80      70      60

```

noveliR\_5106dG=-26.4

```

      10      20      30      40
attc  -  -  --|  TG      G      Cagtcgaat  ac
ttg agg CCC  TGA  AGGTTTT CGGAG      ctttgt \
aac ttc ggg  gct  tccaaaa gcctc      gagacg a
ga--  g  a  tc^  ca  -  cat-----  cc
90      80      70      60      50

```

noveliR\_1489dG=-28.3

```

      10      20      30      40      50      60
agaaat  g  -  T  T  A  -  a-|  atg  aa  tcatctt  cg
cgc  C  ATCG  GA  GGGG  TAGA  cg  tct  tgtoga  tttca  caaca t
gcg g  tagc  tt  cccc  gttt  gt  aga  acagtt  gaagt  gttgt t
-----  -  t  m  t  c  c  yg^  ---  g-  ttc-----  ac
110      100      90      80      70

```

noveliR\_4096dG=-12.8

```

      10      20      30
tct t  t  a  ag  --|  c  atac
ct tta aga ta  ggctc  gctc  tca  \
gg aat tCT AT  TTGAG  CGGG  AGT  a
gt-  t  t  C  AG  AT^  T  aaat
70      60      50      40

```

noveliR\_2271dG=-28

```

      10      20      30      40      50
acagta  ttG  --|  CCCTa  a  atg
cc  GGCTTTTC  GTTAAACT  gtttttaaagt cat  \
gg  ccgaaaag  taattttgg  taagagtttta gta  a
gta---  ttg  at^  tgttc  g  gca
100      90      80      70      60

```

noveliR\_2582dG=-24.8

```

      10      20      30      40
tag  -  c  t  ---  a  -  a  ---|  tt  a  tt
gc  caaa  ct  ggggt  g  agc  acg  taaatct  tgtg  attt  ca  \
cg  gttt  gA  CTCCA  C  TTG  IGC  ATTTagg  gcac  taga  gt  t
a--  t  t  C  GAA  C  T  -  ctg^  t-  c  ta
100      90      80      70      60

```

noveliR\_976dG=-22.2

```

      10      20      30      40
ggtaa---  t  a  -  act-|  t  g
agtga  agtacc  gg  attg  ttttagtg  aaaaat  \
ttACTT  TCGTGG  CC  IGAC  gaaattgc  tttttg  t
ccttgaaa  T  G  A  AAGT^  -  g
90      80      70      60      50

```

noveliR\_4094dG=-49

```

      10      20      30      40      50
---- aa          a tcayaag-| ttc
  tattattg actccaaaaatctcattctac ctcc tgtattt t
  ataataAC IGAGGTTTTAGAGTAAGAtg gagg atataaa t
ctta CG y tttgaaag^ cct
  110 100 90 80 70 60

```

noveliR\_4256dG=-34.9

```

      10      20      30
cgag - t A A - -| a
  gc ctt IG GAGCTC C TGGCTTCGG GTTcc \
  cg gag ac cttgag g attgaagcc caagg t
a--- a c g c a t^ c
  70 60 50 40

```

noveliR\_4429dG=-35.1

```

      10      20      30      40      50
gagaaagtaaTC| G T gattc gg g c tttg
  AT TTGGGAGTC GGCTCTCAa gga gcg tgc tc a
  ta aactctcgg ctgagggtt tct tgc acg ag t
ct-----^ g t gt--- aa - - tttt
  100 90 80 70 60

```

noveliR\_1141dG=-17.5

```

      10      20      30
a-----| g GA- C AT t
  ctagtaa tGA GGT TTAGGTTCG ICTT c
  gatcgtt att cca agtttaagc ggaa c
gttacc^ - aca - -- a
  70 60 50 40

```

noveliR\_2202dG=-37.8

```

      10      20      30      40
----- g ---- - - c-| a - gtgacaaa at
  gggcccga gt gt ggtg ac cc ggtc gggat tggt c
  CCCCGGTT CA CA CCGT tg gg ccgg ccta accg a
ggtgggagtc G GGAG G G aa^ - t ----- ag
  100 90 80 70 60 50

```

noveliR\_4580dG=-31.5

```

      10      20      30      40
c ttt tgt -- --| g gtt
  gtcact accg ggggttggt caagag actgca cga \
  cagtgg tggc TTTCAGCAC GTTTTC tgatgt gtt t
- --- TCC IG cg^ - gta
  90 80 70 60 50

```

noveliR\_2794dG=-32.1

```

      10      20      30      40      50      60
ag-- - a g-| gagc ttatttta aa t atttc tac
  gc aaca cga gtgat tgttggaaga tccat tag gc ctga g
  cg ttgT GTT TACTA ACAACTTGTt aggta att tg gact t
ccaa t C AG^ AA-- tacaaca- ag t ctgca tca
  130 120 110 100 90 80 70

```

noveliR\_4113dG=-33.1

```
      10      20      30      40      50
aat      TTGA-|      A      gatggtg      gtg
      gtttatgTTAA      CATGAGTG IGCTcatg      tcatga \
      taagtacagtt      gtatttcgt gtgagtac      agtact a
---      tgtaa^      a      aattgta      ggt
      100      90      80      70      60
```

noveliR\_3525dG=-23.9

```
      10      20      30      40
t|      ttt      cc      t      atag      ggtta      t
      gtact      gatca      tggttgg ggta      cggta      cggaa a
      cgtgg      ttagT ACTAATT ICAT      GICat      ggttt a
      t^      ---      CC      T      GCGG      ga---      t
      90      80      70      60      50
```

noveliR\_4810dG=-49.1

```
      10      20      30      40      50      60      70
tcgttt      ta-| a      c      ctatttctttttg      tat
      ttctgtttt      tg tcacggttaag cgcgtcaaatattttatatta      ttttat \
      aggacaaaa      AC AGTGCCAATTC GTGCAGttataaaatataat      aaaata t
-----      cAC^ C      A      aa-----      ttt
      130      120      110      100      90      80
```

noveliR\_439dG=-23.7

```
      10      20      30
ggatc      aat- t      --| t      atata
      tgtta      gc gaag      tggc gccac \
      acggt      CG CIGT ACCG CGGTG      t
aa---      gcaC T      AA^ T      Cacag
      70      60      50      40
```

noveliR\_1704dG=-29

```
      10      20      30
---      --      at -      a      --|      aa
      tatgt      gagg      ga gagcttttgg ttgt      gagggg g
      gtaca      TICC CT CICGGAATC GATA      ttcccg g
      taa      tt      C- C      A      tt^      ga
      80      70      60      50      40
```

noveliR\_4755dG=-26.4

```
      10      20      30      40
attc      - -      --| IG      G      Cagtcgaat      ac
      ttg agg CCC IGA AGGTTTT CGGAG      ctttgt \
      aac ttc ggg gct tcaaaa gcttc      gagacg a
ga--      g a      tc^ ca      -      cat-----      cc
      90      80      70      60      50
```

noveliR\_1698dG=-35.5

```
      10      20      30
g----      cTG T      ---|      G t ag
      ctgattag      GC GGTC TATACCACTIG IC ct \
      ggctgac      cg ctag      atgtggtgaac ag gg g
gaaag      ta- t      taa^      g t ac
      80      70      60      50      40
```

noveliR\_2762dG=-36.8

```
          10          20          30          40          50
taataa---- t -----| aca aa gtaa a c tacta
      catgccattag cc cc tgggt att ctgt aaa tgaat a
      GTATGGTGAIC GG GG acta taa gacg ttt attta a
tttgctctta T TTTAC^ Ga- a- aaa- g c tataa
120 110 100 90 80 70 60
```

noveliR\_3187dG=-39.2

```
          10          20          30          40          50
agct c -- at-- -| tccaat ca tat
      ggctggt aggactc tctggc tc agcg gtg ggctcat c
      tcggtag tCTGAG GACTG AG tcgt cgc ccgggta a
g--- t TT CTCT C^ ttttc- aa caa
110 100 90 80 70 60
```

noveliR\_4318dG=-17.9

```
          10          20          30
----- a - -----| c aat
      tta aag cca aat ttt tgggctaaaa t
      aat TIC GGT TTGGGA ACCCGat ttt t
ctcata a T AGAGG^ - cag
70 60 50 40
```

noveliR\_1676dG=-30

```
          10          20          30
c-----| ay act g a aattt aca
      gtgag ccc tatgg tc cacgtg cc \
      cACTIC GGG GTACC AG GTGCac gg c
gcactaacc^ A- CT- G - caac- cta
80 70 60 50
```

noveliR\_1593dG=-49

```
          10          20          30          40          50
---- aa a tcayaag-| ttc
      tattattg actccaaaaatctcattctac ctcc tgtattt t
      ataataAC IGAGGTTTTAGAGTAAGtg gagg atataaa t
ctta CG y tttgaaag^ cct
110 100 90 80 70 60
```

noveliR\_1958dG=-49

```
          10          20          30          40          50
---- aa a tcayaag-| ttc
      tattattg actccaaaaatctcattctac ctcc tgtattt t
      ataataAC IGAGGTTTTAGAGTAAGtg gagg atataaa t
ctta CG y tttgaaag^ cct
110 100 90 80 70 60
```

noveliR\_1363dG=-20.1

```

      10      20      30      40
ttgaaaaa|  CCACC      G  Aaaact      c
      tgGTC      GAGCGT CC      atgttttt t
      actag      tttgca gg      tataagga t
ca-----^  tcc--      g  gtgacc      g
              70      60      50

```

noveliR\_4508dG=-20.2

```

      10      20      30
aataaac| gT      IA      AG      TCa      tat
      ga  CCGTIG  GTCT  TTGG  gga  t
      ct  ggcggc  caga  agcc  tct  c
aa-----^  tg      c-      a-      cac  cgm
              70      60      50      40

```

noveliR\_5026dG=-14.1

```

      10      20      30      40
atcttc      G  A  T  GA      tt----|  ag
      cggaTC  AACT  CG  AGT  CGIATT      atata  \
      gtttag  ttgg  gt  tta  gtatag      tatat  t
ta----      g  a  c  a-      ctatct^  at
              80      70      60      50

```

noveliR\_1888dG=-24.7

```

      10      20      30      40
att      ---      a  a      ga  aa  at----|  agg
      ggaagc  gactaagg  ac  attt  gac  cc      ccttg  \
      tctttg  TTGGTICC  TG  TAGG  TTG  Gg      ggaac  t
g--      gag      G  A      --  AG  aaaatt^  ctt
              90      80      70      60      50

```

noveliR\_2399dG=-57.1

```

      10      20      30      40      50
ttc  c      I  C      -|  y      ay
gg  ct  toCGG  ICCT  ITTGTGAGGATTctgg  gatc  ctttatg  c
cc  ga  aggcc  agga  aaacactoctagggcc  ctag  gaaatac  g
  tat  t      t      t      t^  t      ag
.      90      80      70      60

```

noveliR\_4834dG=-23.7

```

      10      20      30
-----  a      a--      ag  c-  ttg-|  g
      gca  cagaaaagg  gccaaa  cat  att  gaagc  g
      tGT  GIIIIITIC  CGGIII  gta  tag  cttcg  t
cgaggacct  G      GTA      ag  ca  ttta^  g
              90      80      70      60      50      40

```

noveliR\_2304dG=-32.2

```

      10      20      30      40      50      60
gcaatcttg  --  ataa-|  a  a      tacgytg  -----  ctta      a
      gcg  agtcaa      cca  cca  tccca      aatggg  tcca  caaat  a
      cgc  tCGGTI      GGI  GGT  GGGGt      ttacca  gggt  gttttg  t
gatg-----  ca      GACGC^  -  -  -----  ttgat  cg--  t
.      110      100      90      80      70

```