

Dada-tV_OL

Stem D-arm Anticodon arm T-arm Stem

tRNA-Val-AAC-1-1 **GTTC**CGTA **AGT**GGTTAT **AGC** **CTAACAC** **AGGTC** **CCCGG**TCGAAA **CCCGG**CGGAAACA

Dada-tV_OL --TCCGTA**GT**AGT**GGTTAT**CAC**GTTC**GCCT**TACA****CGCGAAGG**GGCCAGCCGTATATACCTGTAA**AC**CGGAACAGCCAATCAAAT**TGCAGCTA**//

CM014820.1_[3380803-3387985] --AGTTAAGAGAGTTAAGCTTA**ACCATT**TTTC**GGCTCC****CGCGCGGG**AGGTCCCGGTT**CGAA**ACCGGGCGGAACACTTATATTTCTTTTTTTTATT

Stem D-arm Anticodon arm T-arm Stem

tRNA-Val-TAC-8-1 **GTTC**CGTA **AGT**GGTTAT **AGC** **CTAACAC** **AGGTC** **CCCGG**TCGAAA **CCCGG**CGGAAACA

Dada-tV_OL GTTCTGTAGT**AGTGGTTAT**CAC**GTTC**GCCT**TACA****CGCGAAGG**GGCCAGCCGTATATACCTGTAA**AC**CGGAACAGCCAATCAAAT**TGCAGC**//

CM014819.1_[31653287-31660457] AGTTAAGAGAGTTAAGCTTA**ACCATT**TTTC**GGCTCC****CGCGAAGG**AGCCAGCTCGAACCTGGGAGAGACAGGACTTCCCTTCTTAAATTGAAG

Stem D-arm Anticodon arm T-arm Stem

tRNA-Gly-GCC-1-1 **GCATT**GGT**AGT**GGTTAT **AGC** **CTGCCAT** **AGACC**CCGGTTCGATT **CCCGG**CCAATGCA

Dada-tV_OL TGCATTGGTGGTTCAGTGGTAGAATTCTCGCT**TCCA****CGCGAAG**GGCCAGCCGTATATACCTGTAA**AC**CGGAACAGCCAATCAAAT**TGCAGCTACT**//

CM014819.1_[2908526-2901344] AGTTAAGAGAGTTAAGCTTA**ACCATT**TTTC**GGCTCC****CGCGGG**AGGCCCGGGTTCGATTCCCGGCCAATGCA**AGT**ATCTCTTTTCTCTCGATCCTG

Dada-tV_OL TGCATTGGTGGTTCAGTGGTAGAATTCTCGCT**TCCA****CGCGGG**GGCCAGCCGTATATACCTGTAA**AC**CGGAACAGCCAATCAAAT**TGCAGCTACT**//

CM014819.1_[4779104-4771935] AGTTAAGAGAGTTAAGCTTA**ACCATT**TTTC**GGCTCC****CGCGGG**AGGCCCGGGTTCGATTCCCGGCCAATGCA**AGT**ATCTCTTTTCTCAACCCCTCAA

hAT-N16_OL AGGTGTAACGCCTCAGGCACGGCAAATGCCGCCCTTATGAAGTGCCGCCCTGGGCGACCGCCACATCGCCCATATCAAAAACCGCCACTG

Dada-tV_OL AGGTGTAACGCCTCAGGCACGGCAAATGCCGCCCTT**CGCGCG**GGCCAGCCGTATATACCTGTAA**AC**CGGAACAGCCAATCAAAT**TGCAGCT**//

CM014830.1_[17201095-17193896] AGTTAAGAGAGTTAAGCTTA**ACCATT**TTTC**GGCTCC****CGCGCG**-----ACCGCCACATCGCCCATATCAAAAACCGCCACTG

Dada-tV_CaAu

Stem D-arm Anticodon arm T-arm Stem

tRNA-Ala-TGC-15-1 **GGGAT**CTA **AGT**GGTTAT **AGC** **TTTGCG**--T **AGGTC** **CTGGG**TTCAATC **CCAG**CATCTCA

Dada-tV_CaAu TGGGATGTAGCTCAGTGGTAGAGCGCATGCTT**TCCAGCGG**GGGGCCAGTCA**CGGATAGGTGTAGAGCGCTAACTAGCCAATAGGAACGAAG**//

QPKE01005959.1_[12699-862] GTTAAGAGAAGTTAAGCTTA**ACTATT**TTTC**GGCTCC****CGCGTG**TATGAGGTCCTGGGTTCAATCCCGAGCATCTCCA**AACT**GTGTTGCTGAGTTAAG

Dada-tV_CaAu TGGGATGTAGCTCAGTGGTAGAGCGCATGCTT**TCCAGCGG**GGGGCCAGTCA**CGGATAGGTGTAGAGCGCTAACTAGCCAATAGGAACGAAG**//

QPKE01003285.1_[32671-20852] GTTAAGAGAAGTTAAGCTTA**ACTATT**TTTC**GGCTCC****CGCGTG**TATGAGGTCCTGGGTTCAATCCCGAGCATCTCCA**AACT**GTGTTGCTGAGTTAAG

Stem D-arm Anticodon arm T-arm Stem

tRNA-Val-TAC-4-1 **GGTCC**ATA **AGT**GGTTAT **AGC** **TTTACAC** **AGGTC** **CTGGG**TCGAGC **CCAG**TGGAAACA

Dada-tV_CaAu GGTTCCATAGT**AGTGGTTAT**CAC**GTCTGCTTT****TACAGCGA**AGGCCCGAGAGGCCAGTCA**CGGATAGGTGTAGAGCGCTA**//

CM010445.1_[16586481-16598298] GTTAAGAGAAGTTAAGCTTA**ACTATT**TTTC**GGCTCC****CGCGCA**GAAGGTCCTGGGTT**CGAG**CCCAAGTGGAAACCAAGCGTTTTTAGAAAAGATTC

Dada-tV_GyAc

Stem D-arm Anticodon arm T-arm Stem

tRNA-Asp-GTC-1-1 **TCCTCG**TTA **AGT**GGTTAA **AGC** **CTGTAC** **AGAC** **CCGGG**TTTCGATT **CCCG**ACGGGGAG

Dada-tV_GyAc TCCTCGTTAGTATAGTGGTCA**GTATCCCGCCTGT****TACAGCGG**GGGTAAGCCGTGTATACCCATAGAAGACTTTCTATTGGCCAG//

CADEHN010000867.1_[122816-115008] AGTTAAGAGAGTTAGTCTTACTATACCCGGTCC**CGCGCGG**-AGACCGGGTTCAAT**TC**CCGACGGGGAGAGTACGCACTTTTTTGTGTATG

CADEHN010001009.1_[31883-39662] TCCTCGTTAGTATAGTGGTCA**GTATCCCGCCTGT****TACAGCGG**GGGTAAGCCGTGTATACCCATAGAAGACTTTCTATTGGCCAG//

Stem D-arm Anticodon arm T-arm Stem

tRNA-Val-TAC-4-1 **GGTCC**ATA **AGT**GGTTAT **AGC** **CTTACAC** **AGGTC** **CTGGG**TTTCGAGC **CCAG**TGGAAACA

Dada-tV_GyAc GGTTCCATATAGTAGTGGTTATCAC**GTCTGCTTT****TACAGCGA**AGGTAAGCCGTGTATACCCATAGAAGACTTTCTATTGGCCAG//

CADEHN010001981.1_[101031-110975] AGTTAAGAGAGTTAGTCTTACTATACCCGGTCC**CGCGCA**AAAGTCCCTGGGTTCAAT**TC**CCGAGGAACCTGATGCTGTCTTGTGT

Stem D-arm Anticodon arm T-arm Stem

tRNA-Val-CAC-1-1 **GTTC**CGTA **AGT**GGTTAT **AGC** **CTACAC** **AGGTC** **CCCGG**TTTCGAAA **CCGG**CGGAAACA

Dada-tV_GyAc GTTTCGTA**GTAGTGGTTAT**CAC**GTCTGCTT****TACAGCGA**AGGTAAGCCGTGTATACCCATAGAAGACTTTCTATTGGCC//

CADEHN010000507.1_[133765-141575] AGTTAAGAGAGTTAGTCTTACTATACCCGGTCC**CGCGCG**AAAGTCCCGGTT**CGAG**ACCGGGCGGAAACACAT**Tatgtctt**gtt

Dada-tV_PeFlu

Stem D-arm Anticodon arm T-arm Stem

tRNA-Asp-GTC-1-1 **TCCTCG**TTA **AGT**GGTTAA **AGC** **CTGTAC** **AGAC** **CCGGG**TTTCGATT **CCCG**ACGGGGAG

Dada-tV_PeFlu TCCTCGTTAGTATAGTGGACATCTCCGCCTGT**CA****CGCGGA**GGCCAGTCCGCTATAGGTGTAGAAGACTTTTTCG//

CM020910.1_[3366611-3358464] GTTAAGAGAATTAAGCCCTACTATTACCGCTCTGGC**CGCGGA**AGACCGGGGTCGATTCCCGACGGGGAGAAATATCTACCTCTTAATTATT

Stem D-arm Anticodon arm T-arm Stem

tRNA-Val-AAC-1-1 **GTTC**CGTA **AGT**GGTTAT **AGC** **CTAACAC** **AGGTC** **CCCGG**TTTCGAAA **CCGG**CGGAAACA

Dada-tV_PeFlu GTTTCGTA**GTAGTGGTTAT**CAC**GTTC**GCCT**TACA****CGCGGA**GGCCAGTCCGCTATAGGTGTAGAAGACTTTTTCG//

CM020924.1_[3435000-3443166] GTTAAGAGAATTAAGCCCTACTATTACCGCTCCGGGCGGAAACATTGTGGCTTTTCCCTACGGTAGGAAGCTCCCGTGTGGTGCAAGT

Figure S1. Targets and flanking sequences of *Dada-tV_OL*, *Dada-tV_CaAu*, *Dada-tV_GyAc*, and *Dada-tV_PeFlu*. Zebrafish tRNA genes are based on GtRNA-DB (<http://gtRNAdb.ucsc.edu/>). Accession numbers and locations are shown below the *Dada* family name. Sequences of base pairing in the tRNA secondary structure are highlighted in the same color. tRNA gene sequences are in blue, while *Dada* sequences are in red. TSDs are in bold. Anticodons are underlined.

Stem D-arm Anticodon arm (intron) T-arm Stem

tRNA-Tyr-GTA-5-1 CCTTCGA-TAAGTTGGTAAGCTGTAGgtgggatgttgcaAAGGTCCTGGTTCGACTCCGGCTTGAAGGA
Dada-tY_CaAu CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGATGAGTTGTTGGGTATCCTTAGGTCGCTGGTTCATTCGGCTCGAAGGA

CM010449.1_[24158038-24166466]
CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGATGAGTTGTTGGGTATCCTTAGGTCGCTGGTTCATTCGGCTCGAAGGA

QPKE01004703.1_[17626-9309]
CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGATGAGTTGTTGGGTATCCTTAGGTCGCTGGTTCATTCGGCTCGAAGGA

QPKE01008127.1_[3793-12211]
CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGATGAGTTGTTGGGTATCCTTAGGTCGCTGGTTCATTCGGCTCGAAGGA

CM010449.1_[24118929-24127125] (This insertion has a duplication of the 5' ~300 bp sequence)
tRNA-Tyr-GTA-2-1 CCTTCGA-TAAGTTGGTAAGCTGTAGgtgggatgatgcaAAGGTCCTGGTTCGACTCCGGCTCGAAGGA
CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGGTGGAGTGTGGCCATCCTTAGGTCGCTGGTTCATTCGGCTCGAAGGA

QPKE01004295.1_[22555-14199]
CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGGTGGAGTGTGGCAATCCTTAGGTCGCTGGTTCGACTCCGGCTCGAAGGA

QPKE01005872.1_[9228-909]
tRNA-Tyr-GTA-1-2 CCTTCGA-TAAGTTGGTAAGCTGTAGcggattatcactgaaAAGGTCCTGGTTCGAATCCGGCTCGAAGGA
CCTTCGA-TGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGGAGGACTGTAGCGGA--ATCACTGTAATCCTTAGGTCGCTGGTTCGAATCCGGCTCGAAGGA

QPKE01004906.1_[62158-53971]

Stem D-arm Anticodon arm T-arm Stem

tRNA-Phe-GAA-1-1 GCCGAAATAGTTGGGAAGCTGAAGAAGGTCCTGTTTCGATCCGGCTTTCGGCA
GCCGAAATGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGTTAGACTGAAGATCTAAAGGTCCTGGTTCGATCCCGGGTTTCGGCA

QPKE01003480.1_[8408-16882]
GCCGAAATGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGAGCTGGTAGAGCGTTAGACTGAAGATCTAAAGGTCCTGGTTCGATCCCGGGTTTCGGCA

QPKE01008138.1_[17460-25669]
GCTCCCCCAGTGGCGGTACCTGACAACCACAAGTCTGTAAATTAATCCAATAGTATGCCGACTTCTATCTTTAAAAACCAATCA//
CCACAGCTTGGCGGTACCGCGCTCCATCTGACCGCGTCTTGACGCATGCTGTTTGGAGTCACAAACAGCAATCGTTATGGCCATCGGAGAAATTA

CM010472.1_[10857147-10848814]

Figure S2. Targets and flanking sequences of *Dada-tY_CaAu*. Zebrafish tRNA genes are based on GtRNA-DB (<http://gttnadb.ucsc.edu/>). Accession numbers and locations are shown below the *Dada* family name. Sequences of base pairing in the tRNA secondary structure are highlighted in the same color. tRNA gene sequences are in blue, while *Dada* sequences are in red. TSDs are in bold. Anticodons are underlined.