| G | G | G |
| :---: | :---: | :---: |
| T + G | T + G | T+G |
| G-C | G-C | G-C |
| C-G | C-G | C-G |
| G • A | G • A | A A |
| A - T | A-T | A - T |
| C-G | C-G | C-G |
| $\mathrm{T}^{\text {T-A }}$ CTC ${ }^{\text {T }}$ | $\mathrm{T}^{\mathrm{T}-\mathrm{A}}$ | $\mathrm{T}^{\text {T-A }}$ CTC ${ }^{\text {T }}$ A |
| $\mathrm{T}^{\mathrm{A}} \mathrm{TTTG}{ }^{\mathrm{A}}$ | $\mathrm{T}^{\mathrm{A}} \mathrm{TTTG}{ }^{\mathrm{A}}$ | $\mathrm{T}^{\text {A TTTG }}{ }^{\text {a }}$ |
| $T+11+\quad G A G A C$ | $T+1+\quad G A G A C$ |  |
| $T_{A}{ }^{G A A T} A_{G-C} A_{G}^{G}$ | $T_{A}{ }^{G A A T} A{ }_{G-C} A_{G}^{G}$ | $T_{A}{ }^{G A A T} A-C A_{G}^{G}$ |
| T-A | T-A | T-A |
| C-G | C-G | C-G |
| A-T | A-T | A-T |
| A - T | A-T | A-T |
| $C \quad C$ | C C | $C \quad C$ |
| ${ }^{T} \mathrm{TGCC}^{\text {A }}$ | $\mathrm{T}_{\mathrm{TGGC}}{ }^{\text {a }}$ | $\mathrm{T}_{\mathrm{T} G \mathrm{C}} \mathrm{~A}^{\mathrm{A}}$ |
| tRNA-Ala (A2_France) | tRNA-Ala (A3_Finland) | tRNA-Ala (A1_UK) |


| G | G | G |
| :---: | :---: | :---: |
| T + G | T+G | T+G |
| G-C | G-C | G-C |
| C-G | C-G | C-G |
| A A | A A | A A |
| A - T | A - T | A - T |
| C-G | C-G | C-G |
| $T^{\text {T-A }} \mathrm{CTC}^{\text {T }}$ | $T^{\text {T-A }}$ | $T^{\text {T-A }}$ CTC ${ }^{\text {T }}$ |
| $T^{A} T T T G^{A}$ | ${ }_{\mathrm{T}}{ }^{\mathrm{A}} \mathrm{TTTGG}^{\mathrm{T}^{\top}} \quad \mathrm{CTCC}^{\top} \mathrm{A}$ |  |
| $\mathrm{T}+11+\quad G \quad G A G A C$ | $T+11+\quad G^{1}+A_{A}^{C}$ | $T+1+\quad G A G A C$ |
| $T_{A}^{G A A T A} \quad A_{G}^{G}$ | $T_{A} G A A T A \quad{ }_{A}^{G}$ | $T_{A} G_{A A T}^{G} \quad A_{G}^{G}$ |
| ${ }^{A} G-C^{A} G$ | A ${ }^{\text {a }}$ G-C $C^{A} G$ | A $\quad$ G-C ${ }^{\text {A }}$ G |
| T-A | T-A | T-A |
| C-G | C-G | C-G |
| A-T | A-T | A-T |
| A - T | A - T | A-T |
| C C | C C | $C \quad C$ |
| ${ }^{\text {T }}$, ${ }^{\text {a }}$ | T ${ }^{\text {A }}$ | T ${ }^{\text {a }}$ A |
| TG | T G C | T G C |
| tRNA-Ala (A1_Hungary) | tRNA-Ala (C_Serbia) | tRNA-Ala (D_Hungary) |


| G | G |
| :---: | :---: |
| T+G | T+G |
| G-C | G-C |
| C-G | C-G |
| A A | A A |
| A - T | A - T |
| C-G | C-G |
| T-A | $\mathrm{T}^{\mathrm{T}-\mathrm{A}} \mathrm{CT}^{\text {T }}$ |
| $\mathrm{T}^{\mathrm{A}} \mathrm{TTTG}^{\mathrm{A}}$ | $\mathrm{T}^{\mathrm{A}} \mathrm{TTTGG}^{\mathrm{T}}{ }^{\mathrm{T}} \quad \mathrm{CTCN}^{\top} \mathrm{A}$ |
| $T+11+G A G A$ | $T+11+G A G A C$ |
| TA GAAT ${ }^{\text {G }}$ | TA GAAT ${ }^{\text {G }}$ |
| A $A_{G-C}{ }^{\text {a }}{ }^{\text {G }}$ | A $A_{G-C}{ }^{\text {a }} \mathrm{G}^{\text {a }}$ |
| T-A | T-A |
| C-G | C-G |
| A-T | A - T |
| A - T | A - T |
| C C | C C |
| T A | T ${ }^{\text {A }}$ |
| T G C | T G C |
| tRNA-Ala (F_Spain) | tRNA-Ala (B) |



tRNA-Asn (A2_France)

tRNA-Asn (A1_Hungary)

tRNA-Asn (A3_Finland)

tRNA-Asn (C_Serbia)

tRNA-Asn (A1_UK)
tRNA-Asn (D_Hungary)

tRNA-Asn (F_Spain)

tRNA-Asn (B)

tRNA-Asp (A2_France)

tRNA-Asp (A3_Finland)

tRNA-Asp (A1_UK)

tRNA-Asp (A1_Hungary)

tRNA-Asp (C_Serbia)

tRNA-Asp (D_Hungary)

tRNA-Asp (F_Spain)

tRNA-Asp (B)




tRNA-Gln (A1_Hungary)

tRNA-Gln (C_Serbia)

tRNA-GIn (D_Hungary)


tRNA-Glu (A2_France)

tRNA-Glu (A3_Finland)

tRNA-Glu (A1_UK)

| A | A | A |
| :---: | :---: | :---: |
| G - C | G-C | G-C |
| T-A | T-A | T-A |
| G - C | G-C | G-C |
| T-A | T-A | T-A |
| A - T | A - T | A - T |
| T-A | T-A | T-A |
| A-T ${ }^{\text {a }}{ }^{\text {a }}$ | $\mathrm{G}+\mathrm{T} \mathrm{T}^{\text {T }}$ | G + ${ }^{\text {a }}{ }^{\text {a }}$ |
|  |  |  |
|  | ${ }_{T}^{A^{A} T G T G} \quad{ }^{\text {ATATA }}{ }^{\top}{ }^{\top}$ |  |
| $\mathrm{T}_{\mathrm{A} A C A C} \mathrm{~T}^{\text {T }}$ | $\mathrm{T}_{\mathrm{A} A C A C} \mathrm{~T}^{\text {a }}$ | $\mathrm{T}_{\mathrm{A}} \mathrm{ACAC}$ T |
| ${ }^{C-G}{ }^{\top}$ A | ${ }^{\text {C-G }}{ }^{\top} \mathrm{A}$ | ${ }^{C}{ }_{C-G}{ }^{\top} \mathrm{A}$ |
| T-A | T-A | T-A |
| A-T | A- T | A- T |
| G-C | G-C | G-C |
| C-G | C-G | C-G |
| T T | T T | T T |
| T ${ }^{\text {a }}{ }^{\text {A }}$ | T ${ }^{\text {A }}$ | T ${ }^{\text {A }}$ |
| tRNA-Glu (A1_Hungary) | tRNA-Glu (C_Serbia) | tRNA-Glu (D_Hungary) |







tRNA-His (A1_Hungary)

tRNA-His (C_Serbia)

tRNA-His (D_Hungary)


tRNA-Ile (A2_France)

tRNA-Ile (A3_Finland)


A-T
A-T
C-G
$C^{T-C}$
$T_{G A T}{ }^{G}$
tRNA-Ile (A1_UK)

tRNA-Ile (A1_Hungary)

tRNA-Ile (C_Serbia)

tRNA-Ile (D_Hungary)


| A | A | A |
| :---: | :---: | :---: |
| A - T | A - T | A - T |
| G-C | G-C | G-C |
| T-A | T-A | T-A |
| A-T | A - T | A-T |
| A C | A C | A C |
| G-C | G-C | G-C |
| T-A | T-A | T-A |
| $G^{\top} C^{\top} C C C^{\text {a }}$ | $\mathrm{G}^{\top} \mathrm{CCCOG}^{\text {a }}$ | T ${ }^{-1} \mathrm{CCC}^{\text {G }} \mathrm{A}$ |
| $A A G A C G{ }^{\text {a }}$ ( ${ }^{\text {GGGG }}$, ${ }^{\prime}$ | $A A G A C G{ }^{\text {a }}$ ( GGGTA | $A^{\text {AGACG }}{ }^{\text {G }}$ GGG TA |
| $\begin{array}{llll}\text { A } \\ T & 11 & \text { T }\end{array}$ | $\begin{array}{llll}\text { A } \\ T & 11 & \text { T }\end{array}$ |  |
| $A G T G C C \quad C^{A}$ | $A G T G C C_{C}^{A}$ | ${ }^{\top} A G T G C \quad \text { A }$ |
| A-T | A-T | A - T |
| C-G | C-G | C-G |
| C-G | C-G | C-G |
| G-C | G-C | G-C |
| A - T | A-T | A - T |
| C A | C A | C A |
| T G | T G | T G |
| T A G | T A G | T A G |
| tRNA-Leu (CUN) (A2_France) | tRNA-Leu (CUN) (A3_Finland) | tRNA-Leu (CUN) (A1_UK) |


tRNA-Leu (CUN) (A1_Hungary)

tRNA-Leu (CUN) (C_Serbia)

tRNA-Leu (CUN) (D_Hungary)

| A | A |
| :---: | :---: |
| A-T | A - T |
| G-C | G-C |
| T-A | T-A |
| A - T | A-T |
| A C | A C |
| G-C | G - C |
| $\mathrm{T}^{\mathrm{T}-\mathrm{A}} \mathrm{CCO}$ | $T^{\text {T-A }} \mathrm{CCC}{ }^{\text {T }}$ |
| $G^{\top}$ | AGG $\mathrm{G}^{\top}$ |
| $A^{\text {AGACG }}$, GGG $\mathrm{T}^{\text {A }}$ | $A^{\text {AGACG }} \quad \quad G G G T{ }^{\text {A }}$ |
| T ${ }^{\prime} \mathrm{I}^{\prime} \mathrm{C}$ T | T ${ }^{\prime} 111$ |
| $\mathrm{AGTGC}_{C} \quad \mathrm{TC}^{\mathrm{A}}$ | $\mathrm{AGTGC}^{\text {C }}$ T C ${ }^{\text {A }}$ |
| A-T | A |
| C-G | C-G |
| C-G | C-G |
| G-C | G-C |
| A - T | A-T |
| C A | C A |
| T G | T G |
| T A G | T A G |
| tRNA-Leu (CUN) (F_Spain) | tRNA-Leu (CUN) (B) |



tRNA-Leu (UUR) (A1_Hungary)

tRNA-Leu (UUR) (C_Serbia)

tRNA-Leu (UUR) (D_Hungary)

| A | A |
| :---: | :---: |
| A - T | A - T |
| C A | C T |
| C-G | C-G |
| A-T | A - T |
| $A^{-1}$ | $A^{-1}$ |
| G - C | G-C |
| A-T | A-T |
| T CTCAA T | T CTCAT ${ }^{\text {T }}$ |
| $A^{\text {AGACGG }}{ }^{\text {G }}$ ' ${ }^{\prime} \mathrm{AGTA}^{\text {A }}$ | $A^{\text {AGACGG }}$ G ${ }^{\text {GAGIAAC }}$ |
| $\begin{array}{llll}\text { a } & 111 & \text { T }\end{array}$ | A 111 |
| $\mathrm{AGTGC}_{C}, T \mathrm{C}^{\mathrm{A}}$ | $\mathrm{AGTGC}_{\mathrm{C}} \quad-\mathrm{C}^{\mathrm{A}}$ |
| A-T | A-T |
| T-A | T-A |
| A-T | A-T |
| G-C | G-C |
| G-C | G-C |
| T C | T C |
| T A | T A |
| T A A | T A A |
| tRNA-Leu (UUR) (F_Spain) | tRNA-Leu (UUR) (B) |


| A | A | A |
| :---: | :---: | :---: |
| G + T | G + T | G + T |
| A - T | A - T | A - T |
| C-G | C-G | C-G |
| T-A | T-A | T-A |
| A - T | A - T | A - T |
| G-C | G-C | G-C |
| $A^{-T}$ | A-T | A-T |
| $\mathrm{TGT}_{\mathrm{A}} \mathrm{G}^{\mathrm{M}} \quad \text { TTATTC }$ | $\mathrm{TGTA}^{\mathrm{G}^{\mathrm{M}}} \quad \text { TTATTC }$ | $\text { TGTTCG }{ }^{\mathrm{G}^{n}} \text { TTATTC }$ |
| $A^{T G T T C G} \text { A A'A'ATTT }$ | $A^{T G T T C G}{ }^{\text {A }} \quad \text { A'A'ATT }$ | $A^{T G T T C G} \text { A A'TATT }$ |
|  |  |  |
| $A_{A} C^{A G C} A G^{A}$ | $A_{A}{ }^{C A G C} A G^{A}$ | $A A B C_{A B C A}^{A}$ |
| T-A | T-A | T-A |
| T-A | T-A | T-A |
| G-C | G-C | G-C |
| A - T | A-T | A - T |
| C A | C A | C A |
| T A | T A | T A ${ }^{\text {a }}$ |
| TTT | T T T | TTT |
| tRNA-Lys (A2_France) | tRNA-Lys (A3_Finland) | tRNA-Lys (A1_UK) |

tRNA-Lys (A1_Hungary)

tRNA-Lys (C_Serbia)

tRNA-Lys (D_Hungary)

tRNA-Lys (F_Spain)

tRNA-Lys (B)

| A | A | A |
| :---: | :---: | :---: |
| $\mathrm{G}+\mathrm{T}$ | G + T | G + T |
| G-C | G-C | G-C |
| T-A | T-A | T-A |
| A-T | A-T | A-T |
| A - T | A-T | A - T |
| G-C | G-C | G - C |
| A-T | A-T | A-T |
| T CTCTT | T CTCTT | T CTCTT |
| $\mathrm{T}^{\mathrm{A} T C G A} \begin{aligned} & \mathrm{A} \\ & \mathrm{GAGGG} \end{aligned}$ | $\mathrm{T}_{\mathrm{ATCGA}} \begin{aligned} & \text { A } \\ & \text { GAGGGT} \end{aligned}$ | $\mathrm{T}_{\mathrm{ATCGA}} \begin{aligned} & \text { A } \\ & \text { GAGGGT } \end{aligned}$ |
|  |  | TA ' ' ' ' ' |
| $C_{A} A G C T A, A A^{A}$ | $C_{A} A_{A C T} \quad A A^{A}$ | $\mathrm{C}_{\mathrm{A}} \mathrm{AGCT}_{A} \quad A A^{A}$ |
| $G \cdot A$ | $G \cdot A$ | $G \cdot A$ |
| T + G | T + G | T + G |
| G-C | G-C | G-C |
| G-C | G-C | G-C |
| G-C | G-C | G-C |
| T C | T C | T C |
| T A | T A | T A |
| C A T | C A T | C A T |
| tRNA-Met (A2_France) | tRNA-Met (A3_Finland) | tRNA-Met (A1_UK) |


tRNA-Met (A1_Hungary)

tRNA-Met (C_Serbia)

tRNA-Met (D_Hungary)

tRNA-Met (F_Spain)

tRNA-Met (B)





| A | A | A |
| :---: | :---: | :---: |
| C-G | C-G | C-G |
| A - T | A - T | A - T |
| G-C | G-C | G-C |
| A - T | A - T | A - T |
| A A | A A | A A |
| A - T | A-T | A - T |
| A-T | A - T | A-T |
| T GTGA ${ }^{\text {T }}$ | T GTGA ${ }^{\text {T }}$ | T GTG ${ }^{\text {T }}$ |
|  |  | $A^{A A T T G} \quad{ }^{\text {CAC }}{ }_{T}{ }^{\top}$ |
|  |  |  |
| $\mathrm{T}_{\mathrm{A}} \mathrm{AAAC}_{\mathrm{T}} \quad \mathrm{AG}^{\mathrm{A}}$ | $\mathrm{T}_{\mathrm{A}} \mathrm{AAAC}_{\mathrm{T}} \quad \mathrm{AG}^{\mathrm{A}}$ | $\mathrm{T}_{\mathrm{A}} \mathrm{AAAC}_{\mathrm{T}} \quad \mathrm{GG}^{\mathrm{A}}$ |
| C A | $C^{\prime} A^{\text {a }}$ | $C^{\prime} A^{G G}$ |
| T-A | T-A | T-A |
| G-C | G-C | G-C |
| G-C | G-C | G-C |
| C-G | C-G | C-G |
| T T | T T | T T |
| T ${ }_{\text {TGG }}{ }^{\text {G }}$ | T ${ }_{\text {GGG }}{ }^{\text {a }}$ | T ${ }^{\text {TGG }}{ }^{\text {G }}$ |
| T G G | T G G | T G |
| tRNA-Pro (A1_Hungary) | tRNA-Pro (C_Serbia) | tRNA-Pro (D_Hungary) |


tRNA-Pro (F_Spain)

> C-G
> A - T
> G-C
> A-T
> A A
> A - T
tRNA-Pro (B)

tRNA-Ser-AGN (A2_France)

tRNA-Ser-AGN (A1_Hungary)

tRNA-Ser-AGN (A3_Finland)

tRNA-Ser-AGN (C_Serbia)

tRNA-Ser-AGN (A1_UK)
tRNA-Ser-AGN (D_Hungary)

tRNA-Ser-AGN (F_Spain)


tRNA-Ser-UCN (A2_France)

tRNA-Ser-UCN (A1_Hungary)

tRNA-Ser-UCN (A3_Finland)

tRNA-Ser-UCN (C_Serbia)

tRNA-Ser-UCN (A1_UK)

tRNA-Ser-UCN (D_Hungary)

tRNA-Ser-UCN (F_Spain)

tRNA-Ser-UCN (B)


tRNA-Thr (A1_Hungary)

tRNA-Thr (C_Serbia)

tRNA-Thr (A1_UK)

tRNA-Thr (D_Hungary)

tRNA-Thr (F_Spain)

tRNA-Thr (B)


tRNA-Trp (A1_Hungary)

tRNA-Trp (C_Serbia)

tRNA-Trp (D_Hungary)


tRNA-Trp (B)


tRNA-Val (A2_France)

tRNA-Val (A3_Finland)



tRNA-Val (A1_UK)

> tRNA-Val (C_Serbia)
> tRNA-Val (A1_Hungary)

tRNA-Val (D_Hungary)


