**Supplementary Tables**

Gradual Compaction of the Nascent Peptide During Cotranslational Folding on the Ribosome

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Table 1 ACF (each average of N≥8) fits of HemK constructs in solution. All fit errors are calculated as standard error of the mean and are <10 %. Rates k1 and kd are in s-1. 1 and d1 are relaxation time constants of the respective exponents, in s, =1/k. N is the average number of molecules in the confocal volume and c1 is the amplitude of the fast relaxation time.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| HemK | c1 | 1 x10-7 | k1 x106 | N | d1 x10-5 | kd x103 |
| 0% glycerol |  |  |  |  |  |  |
| 70 W6 |  |  |  | 0.83 | 5.16 | 19.38 |
| 70 W6F |  |  |  | 0.83 | 5.42 | 18.43 |
| 70 4xA W6 |  |  |  | 0.85 | 5.78 | 17.30 |
| 70 4xA W6F |  |  |  | 0.83 | 5.59 | 17.89 |
| 14 W6 |  |  |  | 0.84 | 5.88 | 17.00 |
| 14 W6F |  |  |  | 0.86 | 6.61 | 15.13 |
| 50% glycerol |  |  |  |  |  |  |
| 70 W6 |  |  |  | 0.94 | 30.78 | 3.25 |
| 70 W6F |  |  |  | 0.95 | 33.87 | 2.95 |
| 70 4xA W6 |  |  |  | 0.95 | 30.40 | 3.29 |
| 70 4xA W6F |  |  |  | 0.95 | 29.10 | 3.44 |
| 14 W6 | 0.15 | 5.13 | 1.95 | 0.97 | 45.09 | 2.22 |
| 14 W6F |  |  |  | 0.97 | 60.31 | 1.66 |

Table 2 Results of empirical fits of PET-FCS ACF (each ACF an average of N≥8) for RNCs. All fit errors are calculated as standard error of the mean and are indicated in the table. Rates (kx) are in s-1. 1, 2, f and d are relaxation time constants of the respective exponents, in s, =1/k.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | c1 | k1  x106 | 1 x10-7 | c2 | k2 x105 | 2 x10-6 | F | kf x104 | f  x10-5 | N | kd x103 | d |
| 70 W6 | 0.17 ± 0.01 | 2.58  ± 0.21 | 3.87 | 0.68 ± 0.01 | 4.55 ± 0.09 | 2.20 | 0.18 ± 0.003 | 2.29 ± 0.09 | 4.38 | 0.93 ± 0.003 | 1.05 ± 0.008 | 0.001 |
| 70 W6F | 0.14 ± 0.01 | 2.29 ± 0.19 | 4.36 | 0.62 ± 0.01 | 4.59 ± 0.09 | 2.18 | 0.13 ± 0.002 | 2.45 ± 0.10 | 4.09 | 0.93 ± 0.002 | 0.95 ± 0.005 | 0.001 |
| 70 4xA W6 | 0.18 ± 0.01 | 2.67 ± 0.16 | 3.74 | 0.69 ± 0.01 | 4.51 ± 0.07 | 2.22 | 0.16 ± 0.002 | 2.45 ± 0.09 | 4.08 | 0.93 ± 0.002 | 0.99 ± 0.006 | 0.001 |
| 70 4xA W6F | 0.13 ± 0.01 | 2.61  ± 0.23 | 3.84 | 0.61 ± 0.01 | 4.68 ± 0.09 | 2.13 | 0.12 ± 0.002 | 2.86 ± 0.14 | 3.49 | 0.92 ± 0.002 | 0.93 ± 0.005 | 0.001 |
| 102 W6 | 0.20 ± 0.01 | 3.30  ± 0.19 | 3.03 | 0.61 ± 0.01 | 4.29 ± 0.07 | 2.33 | 0.18 ± 0.002 | 2.36 ± 0.09 | 4.23 | 0.94 ± 0.002 | 0.95 ± 0.007 | 0.001 |
| 102 W6F | 0.14 ± 0.01 | 2.91 ± 0.23 | 3.43 | 0.56 ± 0.01 | 4.66 ± 0.09 | 2.15 | 0.13 ± 0.002 | 2.54 ± 0.11 | 3.94 | 0.93 ± 0.002 | 0.93 ± 0.005 | 0.001 |
| 102 loop | 0.13 ± 0.01 | 2.89 ± 0.24 | 3.46 | 0.57 ± 0.01 | 4.33 ± 0.08 | 2.31 | 0.14 ± 0.002 | 2.54 ± 0.12 | 3.93 | 0.93 ± 0.002 | 0.86 ± 0.005 | 0.001 |
| 112 loop | 0.14 ± 0.01 | 2.72 ± 0.21 | 3.68 | 0.54 ± 0.01 | 4.24 ± 0.08 | 2.36 | 0.13 ± 0.002 | 2.47 ± 0.11 | 4.05 | 0.93 ± 0.002 | 0.88 ± 0.005 | 0.001 |
| 112 W6 | 0.19 ± 0.01 | 3.61 ± 0.19 | 2.77 | 0.48 ± 0.01 | 4.41 ± 0.08 | 2.27 | 0.10 ± 0.002 | 2.79 ± 0.16 | 3.59 | 0.93 ± 0.002 | 0.84 ± 0.004 | 0.001 |
| 112 W6F | 0.14 ± 0.01 | 2.94 ± 0.22 | 3.40 | 0.52 ± 0.01 | 4.45 ± 0.09 | 2.25 | 0.11 ± 0.002 | 2.51 ± 0.13 | 3.98 | 0.93 ± 0.002 | 0.91 ± 0.005 | 0.001 |
| 112 4xA W6 | 0.20 ± 0.01 | 2.16 ± 0.13 | 4.63 | 0.59 ± 0.01 | 3.73 ± 0.08 | 2.68 | 0.21 ± 0.003 | 1.76 ± 0.06 | 5.68 | 0.95 ± 0.003 | 1.00 ± 0.008 | 0.001 |
| 112 4xA W6F | 0.12 ± 0.01 | 2.52 ± 0.23 | 3.97 | 0.43 ± 0.01 | 3.94 ± 0.97 | 2.54 | 0.11 ± 0.002 | 2.30 ± 0.13 | 4.35 | 0.93 ± 0.002 | 0.86 ± 0.005 | 0.001 |

Table 3 Results of global fitting of the free Trp titration (dataset A) to model 5e-H. Rates that were linked during global fit are shown in the same cell shades. All reported rates (k) are in μs⁻¹, except the Wd and Wc k on rates that are in mM⁻¹ μs⁻¹, rates where SEM exceeds value are given as not significant (n.s.). A covariance matrix derived using nonlinear regression algorithms is used to estimate the standard errors (SEM) by the Kintek Explorer software.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Construct | k | D ↔ Rd | C ↔ Rc | D ↔ Wd | C ↔ Wc | D ↔ C |
| 70 W6F | on | 139 ± 14 | n.s. | 0.010 ± 0.004 | ~ 0 | n.s. |
| off | n.s. | n.s. | 2.2 ± 0.2 | 2.2 ± 0.2 | 0.50 ± 0.07 |
| 102 W6F | on | 461 ± 69 | n.s. | 0.03 ± 0.01 | ~ 0 | n.s. |
| off | n.s. | 0.51 ± 0.09 | 2.2 ± 0.2 | 2.2 ± 0.2 | 1.9 ± 0.2 |

Table 4 Results of global fitting of the free Trp titration (dataset A) to model 5e-O. Legend as in Supplementary Table 3.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Construct | k | D ↔ R | C ↔ R | D ↔ W | C ↔ W | D ↔ C |
| 70 W6F | on | 83 ± 17 | 0.5 ± 0.06 | 0.006 ± 0.003 | ~ 0 | n.s. |
| off | n.s. | n.s. | 2 ± 0.1 | 2 ± 0.1 | n.s. |
| 102 W6F | on | 85 ± 15 | 0.5 ± 0.05 | 0.007 ± 0.003 | ~ 0 | n.s. |
| off | n.s. | n.s. | 2 ± 0.1 | 2 ± 0.1 | n.s. |

Table 5 Results of global fitting of the dataset B to the model 5e-H. Rates (k) are reported in μs⁻¹, rates linked during global fit are shown in the same cell shade; locked values are in red. A covariance matrix derived using nonlinear regression algorithms is used to estimate the standard errors (SEM) by the Kintek Explorer software.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Construct | k | D ↔ Rd | C ↔ Rc | D ↔ Wd | C ↔ Wd | D ↔ C |
| 70 wt | on | 9.7 ± 1.3 | 0.24 ± 0.02 | 7.1 ± 1.2 | 0.04 ± 0.02 | 1.4 ± 0.1 |
| off | 0.30 ± 0.02 | 0.30 ± 0.02 | 2.2 | 2.2 | 0.18 ± 0.01 |
| 70 4xA | on | 9.7 ± 1.3 | 0.24 ± 0.02 | 7.1 ± 1.2 | 0.04 ± 0.02 | 1.4 ± 0.1 |
| off | 0.30 ± 0.02 | 0.30 ± 0.02 | 2.2 | 2.2 | 0.18 ± 0.01 |
| 102 wt | on | 4.7 ± 0.2 | 0.24 ± 0.02 | 3.4 ± 0.2 | 0.04 ± 0.02 | 0.50 ± 0.04 |
| off | 0.30 ± 0.02 | 0.30 ± 0.02 | 2.2 | 2.2 | 0.14 ± 0.01 |
| 102 loop | on | 4.7 ± 0.2 | 0.24 ± 0.02 |  |  | 5.04 ± 0.73 |
| off | 0.30 ± 0.02 | 0.30 ± 0.02 |  |  | 1.4 ± 0.2 |
| 112 loop | on | 11.5 ± 0.5 | 0.24 ± 0.02 |  |  | 3.7 ± 0.4 |
| off | 0.30 ± 0.02 | 0.30 ± 0.02 |  |  | 0.41 ± 0.03 |
| 112 wt | on | 11.5 ± 0.5 | 0.24 ± 0.02 | 8.4 ± 0.4 | 0.04 ± 0.02 | 0.04 ± 0.11 |
| off | 0.30 ± 0.02 | 0.30 ± 0.02 | 2.2 | 2.2 | 0.005 ± 0.018 |
| 112 4xA | on | 11 ± 2.9 | 0.22 ± 0.08 | 8.1 ± 2.5 | 0.04 ± 0.07 | 2.2 ± 0.1 |
|  | off | 0.30 ± 0.02 | 0.30 ± 0.02 | 2.2 | 2.2 | 0.23 ± 0.05 |

Table 6 Results of global fitting of the dataset B to the model 5e-O. The legend is the same as in Supplementary Table 5.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Construct | k | D ↔ R | C ↔ R | D ↔ W | C ↔ W | D ↔ C |
| 70 wt | on | 22 ± 3.3 | 0.37 ± 0.02 | 4.2 ± 3 | 0.07 ± 0.03 | 0.975 ± 0.3 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 | 2 | 2 | 0.0167 ± 0.02 |
| 70 4xA | on | 22 ± 3.3 | 0.37 ± 0.02 | 4.2 ± 3 | 0.07 ± 0.03 | 0.975 ± 0.3 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 | 2 | 2 | 0.0167 ± 0.02 |
| 102 wt | on | 25 ± 1.2 | 0.37 ± 0.02 | 4.8 ± 1 | 0.07 ± 0.03 | 0.13 ± 0.3 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 | 2 | 2 | 0.002 ± 0.02 |
| 102 loop | on | 25 ± 1.2 | 0.37 ± 0.02 |  |  | 4.39 ± 0.5 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 |  |  | 0.0653 ± 0.03 |
| 112 loop | on | 29 ± 1.3 | 0.37 ± 0.02 |  |  | 3.44 ± 0.5 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 |  |  | 0.0442 ± 0.03 |
| 112 wt | on | 29 ± 1.3 | 0.37 ± 0.02 | 5.6 ± 1 | 0.07 ± 0.03 | 0.0002 ± 0.3 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 | 2 | 2 | 0.000002 ± 0.02 |
| 112 4xA | on | 24 ± 8.2 | 0.35 ± 0.02 | 4.7 ± 8 | 0.07 ± 0.01 | 1.62 ± 0.4 |
| off | 0.3 ± 0.02 | 0.3 ± 0.02 | 2 | 2 | 0.0232 ± 0.1 |

Table 7 Upper and lower boundaries of each rate parameter computed with a χ2/minχ2 threshold: 0.8333. Rates linked during global fit are shown in the same cell shade; locked values are in red.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Construct | Model 5e-O | | | **Elemental Rate** | Model 5e-H | | |
|  | Best-fit Value | Lower Boundary | Upper Boundary | Best-fit Value | Lower Boundary | Upper Boundary |
| 70wt | 21.8 | 17.4 | 28.9 | kon D ↔ R(d) | 9.7 | 6.6 | 16.3 |
|  | 0.37 | 0.35 | 0.39 | kon C ↔ R(c) | 0.24 | 0.15 | 0.30 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 4.2 | 2.6 | 6.3 | kon D ↔ W(d) | 7.1 | 5.4 | 9.4 |
|  | 0.07 | 0.04 | 0.10 | kon C ↔ W(c) | 0.04 | 0.001 | 0.13 |
|  | 2 | n/a | n/a | koff D/C ↔ W(d/c) | 2.2 | n/a | n/a |
|  | 0.98 | 0.45 | 2.83 | kon D ↔ C | 1.4 | 0.56 | 2.8 |
|  | 0.02 | 0.01 | 0.04 | koff D ↔ C | 0.18 | 0.07 | 0.35 |
|  |  |  |  |  |  |  |  |
| 70 4xA | 21.8 | 17.4 | 28.9 | kon D ↔ R(d) | 9.7 | 6.6 | 16.3 |
|  | 0.37 | 0.35 | 0.39 | kon C ↔ R(c) | 0.24 | 0.15 | 0.30 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 4.2 | 2.6 | 6.3 | kon D ↔ W(d) | 7.1 | 5.4 | 9.4 |
|  | 0.07 | 0.04 | 0.10 | kon C ↔ W(c) | 0.04 | 0.001 | 0.13 |
|  | 2 | n/a | n/a | koff D/C ↔ W(d/c) | 2.2 | n/a | n/a |
|  | 0.98 | 0.45 | 2.83 | kon D ↔ C | 1.4 | 0.56 | 2.8 |
|  | 0.02 | 0.01 | 0.04 | koff D ↔ C | 0.18 | 0.07 | 0.35 |
|  |  |  |  |  |  |  |  |
| 102 wt | 25 | 20 | 35.2 | kon D ↔ R(d) | 4.7 | 3.0 | 6.7 |
|  | 0.37 | 0.35 | 0.39 | kon C ↔ R(c) | 0.24 | 0.15 | 0.30 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 4.9 | 2.97 | 7.2 | kon D ↔ W(d) | 3.4 | 2.7 | 4.1 |
|  | 0.07 | 0.04 | 0.10 | kon C ↔ W(c) | 0.04 | 0.001 | 0.13 |
|  | 2 | n/a | n/a | koff D/C ↔ W(d/c) | 2.2 | n/a | n/a |
|  | 0.13 | 8x10-7 | 1.8 | kon D ↔ C | 0.50 | 0.08 | 0.88 |
|  | 0.002 | 1x10-8 | 0.025 | koff D ↔ C | 0.14 | 0.03 | 0.24 |
|  |  |  |  |  |  |  |  |
| 102 loop | 25 | 20 | 35.2 | kon D ↔ R(d) | 4.7 | 3.0 | 6.7 |
|  | 0.37 | 0.35 | 0.39 | kon C ↔ R(c) | 0.24 | 0.15 | 0.30 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 4.4 | 3.5 | 7.7 | kon (D ↔ C) | 5.04 | 1.8 | 69.8 |
|  | 0.065 | 0.056 | 0.089 | koff (D ↔ C) | 1.4 | 0.54 | 21.1 |
|  |  |  |  |  |  |  |  |
| 112 loop | 29 | 23.2 | 40.7 | kon D ↔ R(d) | 11.5 | 7.8 | 20.2 |
|  | 0.37 | 0.35 | 0.39 | kon C ↔ R(c) | 0.24 | 0.15 | 0.30 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 3.4 | 2.8 | 6.0 | kon D ↔ C | 3.7 | 0.91 | 8.1 |
|  | 0.044 | 0.038 | 0.066 | koff D ↔ C | 0.41 | 0.11 | 0.71 |
|  |  |  |  |  |  |  |  |
| 112 wt | 29 | 23.2 | 40.7 | kon D ↔ R(d) | 11.5 | 7.8 | 20.2 |
|  | 0.37 | 0.35 | 0.39 | kon C ↔ R(c) | 0.24 | 0.15 | 0.30 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 5.6 | 3.4 | 8.8 | kon D ↔ W(d) | 8.4 | 6.35 | 11.8 |
|  | 0.07 | 0.04 | 0.10 | kon C ↔ W(c) | 0.04 | 0.001 | 0.13 |
|  | 2 | n/a | n/a | koff D/C ↔ W(d/c) | 2.2 | n/a | n/a |
|  | 0.0002 | 2x10-8 | 1.6 | kon D ↔ C | 0.04 | 5x10-5 | 0.66 |
|  | 2x10-6 | 2x10-10 | 0.02 | koff D ↔ C | 0.005 | 6x10-6 | 0.06 |
|  |  |  |  |  |  |  |  |
| 112 4xA | 24.1 | 17.4 | 40 | kon D ↔ R(d) | 11 | 7.5 | 19.4 |
|  | 0.35 | 0.33 | 0.36 | kon C ↔ R(c) | 0.22 | 0.14 | 0.28 |
|  | 0.31 | 0.25 | 0.46 | koff D/C ↔ R(d/c) | 0.30 | 0.17 | 0.45 |
|  | 4.7 | 2.9 | 8.3 | kon D ↔ W(d) | 8.1 | 6.1 | 10.1 |
|  | 0.067 | 0.041 | 0.095 | kon C ↔ W(c) | 0.04 | 0.001 | 0.12 |
|  | 2 | n/a | n/a | koff D/C ↔ W(d/c) | 2.2 | n/a | n/a |
|  | 1.6 | 0.66 | 4.7 | kon D ↔ C | 2.2 | 1.6 | 3.4 |
|  | 0.023 | 0.012 | 0.045 | koff D ↔ C | 0.2 | 0.18 | 0.34 |

Table 8 Free energy calculations for all RNC constructs using rates derived from the 5e-H model. Elemental rate SEM from the kinetic fits are propagated through equation 2 (Methods).

|  |  |  |  |
| --- | --- | --- | --- |
| Construct | ΔG°D–ΔG‡, kJ mol-1 | ΔG°C–ΔG‡, kJ mol-1 | ΔG°D–ΔG°C, kJ mol-1 |
| 70 wt | 37.5 ± 0.0001 | 42.5 ± 0.0001 | 5.0 ± 0.0001 |
| 70 4xA | 37.5 ± 0.0001 | 42.5 ± 0.0001 | 5.0 ± 0.0001 |
| 102 wt | 40.0 ± 0.0001 | 43.2 ± 0.0001 | 3.1 ± 0.0001 |
| 102 loop | 34.4 ± 0.0001 | 37.5 ± 0.0001 | 3.1 ± 0.0001 |
| 112 loop | 35.1 ± 0.0001 | 40.5 ± 0.0001 | 5.4 ± 0.0001 |
| 112 wt | 46.2 ± 0.003 | 51.3 ± 0.004 | 5.1 ± 0.005 |
| 112 4xA | 36.4 ± 0.00005 | 42.0 ± 0.0002 | 5.5 ± 0.0002 |

Table 9 Free energy calculations for all RNC constructs from the 5e-O model rates. Elemental rate SEM from the kinetic fits are propagated through equation 2 (Methods).

|  |  |  |  |
| --- | --- | --- | --- |
| Construct | ΔG°D–ΔG‡, kJ mol-1 | ΔG°C–ΔG‡, kJ mol-1 | ΔG°D–ΔG°C, kJ mol-1 |
| 70 wt | 38.4 ± 0.0003 | 48.4 ± 0.001 | 10.0 ± 0.001 |
| 70 4xA | 38.4 ± 0.0003 | 48.4 ± 0.0000 | 10.0 ± 0.0003 |
| 102 wt | 43.3 ± 0.002 | 53.6 ± 0.01 | 10.3 ± 0.01 |
| 102 loop | 34.7 ± 0.0001 | 45.0 ± 0.0005 | 10.3 ± 0.0005 |
| 112 loop | 35.3 ± 0.0001 | 46.0 ± 0.0007 | 10.7 ± 0.0007 |
| 112 wt | 59.2 ± 1.5 | 70.5 ± 10 | 11.3 ± 10.1 |
| 112 4xA | 37.2 ± 0.0002 | 47.6 ± 0.004 | 10.4 ± 0.004 |

Table 10 PET-FCS constructs aa sequences N- to C-terminus.

|  |  |
| --- | --- |
| **HemK** | **N- to C-terminus 112 aa constructs** |
| **wt** | MEFQHWLREA ISQLQASESP RRDAEILLEH VTGKGRTFIL AFGETQLTDE QCQQLDALLT RRRDGEPIAH LTGVREFFSL PLFVSPATLI PRPDTECLVE QALARLPEQP CR |
| **wt W6F** | MEFQHFLREA ISQLQASESP RRDAEILLEH VTGKGRTFIL AFGETQLTDE QCQQLDALLT RRRDGEPIAH LTGVREFFSL PLFVSPATLI PRPDTECLVE QALARLPEQP CR |
| **looped** | MEFQHFLREA ISQLQASESP RRDAEILLEH VTGKGRTFIL AFGGGGGGET QLTDEQCQQL DALLTRRRDG EPIAHLTGVR EFFSLPLFVS PATLIPRPDT ECLVEQALAR LPEQPCR |
| **4xA** | MEFQHWLREA ISQLQASESP RRDAEIAAEH VTGKGRTFIL AFGETQLTDE QCQQADAALT RRRDGEPIAH LTGVREFFSL PLFVSPATLI PRPDTECLVE QALARLPEQP CR |
| **4xA W6F** | MEFQHFLREA ISQLQASESP RRDAEIAAEH VTGKGRTFIL AFGETQLTDE QCQQADAALT RRRDGEPIAH LTGVREFFSL PLFVSPATLI PRPDTECLVE QALARLPEQP CR |

Table 11 Force profile construct of wt HemK full-length, aa sequence N- to C-terminus; numbers indicate construct truncations in HemK aa. Positions for proline substitutions for the HemK Pro variant are shown in red.

|  |  |  |
| --- | --- | --- |
| **HemK** | **SecM** | **CspA** |
| MEY**Q**HWL**R**EA ISQLQASESP R**R**22 DA24 EI26 **L**L28 EH30 VT32 **G**K34 GR36 TF38 I**L**40 AF42 GE44 TQ46 LT48 DE50 QC52 QQ54 LD56 AL58 LT RR62 RD64 GE66 PI68 AH L71 TG73 VR75 E76 F77 W78 S79 L80 P81 L82 F83 V84 S85 P86 A87 T88 L89 I90 P91 RP93 DT95 EC97 LV99 E Q101 | FSTPVWIS QAQGIRAGP | MSGKMTGIVK WFNADKGFGFITP |