# wwPDB EM Validation Summary Report

Feb 2, 2022 – 11:20 pm GMT

| | | |
|---|---|---|
| PDB ID | : | 7QEP |
| EMDB ID | : | EMD-13936 |
| Title | : | Cryo-EM structure of the ribosome from Encephalitozoon cuniculi |
| Authors | : | Nicholson, D.; Ranson, N.A.; Melnikov, S.V. |
| Deposited on | : | 2021-12-03 |
| Resolution | : | 2.70 Å(reported) |
| Based on initial models | : | 6RM3, 4V88 |

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The following versions of software and data (see references ⓘ) were used in the production of this report:

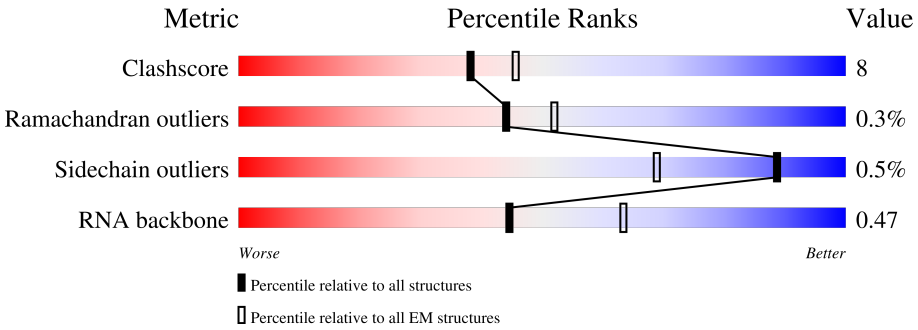
| | | |
|---|---|---|
| EMDB validation analysis | : | 0.0.0.dev97 |
| Mogul | : | 1.8.4, CSD as541be (2020) |
| MolProbity | : | 4.02b-467 |
| buster-report | : | 1.1.7 (2018) |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.26 |

# 1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
*ELECTRON MICROSCOPY*

The reported resolution of this entry is 2.70 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.




| Metric | Whole archive (#Entries) | EM structures (#Entries) |
|---|---|---|
| Clashscore | 158937 | 4297 |
| Ramachandran outliers | 154571 | 4023 |
| Sidechain outliers | 154315 | 3826 |
| RNA backbone | 4643 | 859 |

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | RA | 334 | 97% 55% 43% |
| 2 | 1 | 2486 | 66% 22% 6% 7% |
| 3 | 2 | 119 | 72% 24% |
| 4 | 3 | 1300 | 5% 63% 28% 9% |
| 5 | C0 | 96 | 72% 60% 24% 16% |
| 6 | C1 | 156 | 17% 67% 22% 10% |
| 7 | C2 | 134 | 88% 35% 53% 12% |

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| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 8 | C3 | 148 | 14% 90% 9% |
| 9 | C4 | 134 | 10% 76% 18% 6% |
| 10 | C5 | 148 | 64% 55% 23% 22% |
| 11 | C6 | 145 | 62% 74% 23% |
| 12 | C7 | 120 | 72% 64% 33% |
| 13 | C8 | 153 | 67% 59% 33% 8% |
| 14 | C9 | 137 | 64% 66% 32% |
| 15 | D0 | 120 | 54% 52% 25% 22% |
| 16 | D1 | 70 | 31% 70% 27% |
| 17 | D2 | 128 | 90% 9% |
| 18 | D3 | 140 | 16% 86% 12% |
| 19 | D4 | 131 | 58% 69% 27% |
| 20 | D5 | 109 | 76% 56% 24% 20% |
| 21 | D6 | 105 | 10% 79% 16% |
| 22 | D7 | 85 | 25% 79% 18% |
| 23 | D8 | 65 | 74% 60% 28% 12% |
| 24 | D9 | 66 | 33% 86% 12% |
| 25 | E1 | 152 | 38% 32% 6% 62% |
| 26 | L1 | 219 | 84% 81% 10% 6% |
| 27 | L2 | 239 | 85% 12% |
| 28 | L3 | 383 | 81% 14% 5% |
| 29 | L4 | 335 | 81% 17% |
| 30 | L5 | 287 | 77% 22% |
| 31 | L6 | 171 | 16% 60% 33% 7% |
| 32 | L7 | 239 | 79% 18% |

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| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 33 | L8 | 206 | 7% 62% 33% |
| 34 | L9 | 183 | 73% 25% |
| 35 | M0 | 219 | 79% 17% |
| 36 | M1 | 173 | 5% 64% 32% |
| 37 | M3 | 163 | 73% 25% |
| 38 | M4 | 106 | 6% 64% 34% |
| 39 | M5 | 204 | 87% 12% |
| 40 | M6 | 198 | 79% 20% |
| 41 | M7 | 183 | 84% 11% 5% |
| 42 | M8 | 200 | 78% 15% 7% |
| 43 | M9 | 171 | 11% 78% 21% |
| 44 | MD | 171 | 40% 61% 38% |
| 45 | MS | 73 | 12% 56% 34% 7% |
| 46 | N0 | 188 | 77% 16% 5% |
| 47 | N1 | 160 | 9% 80% 18% |
| 48 | N2 | 112 | 55% 28% 17% |
| 49 | N3 | 146 | 75% 17% 8% |
| 50 | N4 | 100 | 25% 68% 18% 11% |
| 51 | N5 | 105 | 81% 8% 11% |
| 52 | N6 | 143 | 81% 17% |
| 53 | N7 | 126 | 5% 73% 18% 6% |
| 54 | N8 | 147 | 82% 18% |
| 55 | N9 | 57 | 81% 16% |
| 56 | O0 | 108 | 67% 17% 17% |
| 57 | O1 | 111 | 78% 18% |

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| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 58 | O2 | 139 | 73% 19% 8% |
| 59 | O3 | 113 | 84% 12% |
| 60 | O4 | 110 | 77% 14% 9% |
| 61 | O5 | 122 | 86% 13% |
| 62 | O6 | 94 | 77% 23% |
| 63 | O7 | 90 | 86% 10% |
| 64 | O9 | 52 | 73% 23% |
| 65 | P0 | 131 | 30% 8% 63% |
| 66 | P2 | 104 | 75% 18% 7% |
| 67 | P3 | 89 | 83% 12% |
| 68 | S0 | 252 | 36% 54% 26% 19% |
| 69 | S1 | 239 | 29% 68% 20% 13% |
| 70 | S2 | 242 | 14% 71% 19% 10% |
| 71 | S3 | 216 | 58% 74% 24% |
| 72 | S4 | 268 | 29% 79% 17% |
| 73 | S5 | 189 | 69% 75% 24% |
| 74 | S6 | 217 | 40% 54% 38% 6% |
| 75 | S7 | 170 | 56% 51% 36% 12% |
| 76 | S8 | 173 | 9% 76% 18% 5% |
| 77 | S9 | 184 | 34% 65% 28% 7% |

# 2 Entry composition (i)

There are 80 unique types of molecules in this entry. The entry contains 166143 atoms, of which 31 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Guanine nucleotide binding protein beta subunit.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 1 | RA | 328 | Total | C | N | O | S | 0 | 0 |
| | | | 2537 | 1594 | 427 | 502 | 14 | | |

- Molecule 2 is a RNA chain called 5.8S-23S ribosomal RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 1 | 2319 | Total | C | N | O | P | 0 | 0 |
| | | | 49833 | 22195 | 9045 | 16274 | 2319 | | |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| 1 | ? | - | G | deletion | GB 13560063 |

- Molecule 3 is a RNA chain called 5S ribosomal RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 2 | 119 | Total | C | N | O | P | 0 | 0 |
| | | | 2550 | 1138 | 469 | 824 | 119 | | |

- Molecule 4 is a RNA chain called 18S ribosomal RNA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 4 | 3 | 1295 | Total | C | N | O | P | 0 | 0 |
| | | | 27838 | 12399 | 5052 | 9092 | 1295 | | |

- Molecule 5 is a protein called 40S RIBOSOMAL PROTEIN S10.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 5 | C0 | 81 | Total | C | N | O | S | 0 | 0 |
| | | | 686 | 449 | 122 | 112 | 3 | | |

- Molecule 6 is a protein called 40S RIBOSOMAL PROTEIN S11.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 6 | C1 | 141 | Total | C | N | O | S | 0 | 0 |
| | | | 1126 | 718 | 206 | 194 | 8 | | |

- Molecule 7 is a protein called 40S RIBOSOMAL PROTEIN S12.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 7 | C2 | 118 | Total | C | N | O | S | 0 | 0 |
| | | | 879 | 548 | 154 | 166 | 11 | | |

- Molecule 8 is a protein called 40S ribosomal protein S13.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 8 | C3 | 146 | Total | C | N | O | S | 0 | 0 |
| | | | 1166 | 736 | 221 | 205 | 4 | | |

- Molecule 9 is a protein called 40S ribosomal protein S14.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 9 | C4 | 126 | Total | C | N | O | S | 0 | 0 |
| | | | 942 | 583 | 192 | 163 | 4 | | |

- Molecule 10 is a protein called RIBOSOMAL PROTEIN S15.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 10 | C5 | 116 | Total | C | N | O | S | 0 | 0 |
| | | | 903 | 576 | 167 | 154 | 6 | | |

- Molecule 11 is a protein called 40S RIBOSOMAL PROTEIN S16.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 11 | C6 | 141 | Total | C | N | O | S | 0 | 0 |
| | | | 1132 | 727 | 202 | 197 | 6 | | |

- Molecule 12 is a protein called 40S ribosomal protein S17.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 12 | C7 | 117 | Total | C | N | O | S | 0 | 0 |
| | | | 962 | 611 | 166 | 180 | 5 | | |

- Molecule 13 is a protein called 40S ribosomal protein S18.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 13 | C8 | 141 | Total | C | N | O | S | 0 | 0 |
| | | | 1121 | 692 | 220 | 203 | 6 | | |

- Molecule 14 is a protein called 40S ribosomal protein S19.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 14 | C9 | 135 | Total | C | N | O | S | 0 | 0 |
| | | | 1089 | 690 | 187 | 206 | 6 | | |

- Molecule 15 is a protein called 40S RIBOSOMAL PROTEIN S20.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 15 | D0 | 93 | Total | C | N | O | S | 0 | 0 |
| | | | 779 | 498 | 137 | 140 | 4 | | |

- Molecule 16 is a protein called ECU11_0225 protein.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 16 | D1 | 68 | Total | C | N | O | S | 0 | 0 |
| | | | 518 | 323 | 89 | 103 | 3 | | |

- Molecule 17 is a protein called 40S RIBOSOMAL PROTEIN S15A (S22 in yeast).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 17 | D2 | 127 | Total | C | N | O | S | 0 | 0 |
| | | | 1012 | 639 | 190 | 176 | 7 | | |

- Molecule 18 is a protein called 40S ribosomal protein S23.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 18 | D3 | 137 | Total | C | N | O | S | 0 | 0 |
| | | | 1052 | 669 | 196 | 185 | 2 | | |

- Molecule 19 is a protein called 40S RIBOSOMAL PROTEIN S24.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 19 | D4 | 127 | Total | C | N | O | S | 0 | 0 |
| | | | 1056 | 668 | 199 | 186 | 3 | | |

- Molecule 20 is a protein called 40S ribosomal protein S25.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 20 | D5 | 87 | Total | C | N | O | S | 0 | 0 |
| | | | 691 | 424 | 141 | 123 | 3 | | |

- Molecule 21 is a protein called 40S ribosomal protein S26.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 21 | D6 | 101 | Total | C | N | O | S | 0 | 0 |
| | | | 801 | 494 | 161 | 139 | 7 | | |

- Molecule 22 is a protein called 40S RIBOSOMAL PROTEIN S27.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 22 | D7 | 82 | Total | C | N | O | S | 0 | 0 |
| | | | 633 | 391 | 117 | 117 | 8 | | |

- Molecule 23 is a protein called 40S RIBOSOMAL PROTEIN S28.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 23 | D8 | 57 | Total | C | N | O | S | 0 | 0 |
| | | | 446 | 278 | 84 | 81 | 3 | | |

- Molecule 24 is a protein called 40S ribosomal protein S29.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 24 | D9 | 65 | Total | C | N | O | S | 0 | 0 |
| | | | 524 | 334 | 96 | 88 | 6 | | |

- Molecule 25 is a protein called Similarity to monoubiquitin/carboxy-extension protein fusion.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|
| 25 | E1 | 58 | Total | C | N | O | 0 | 0 |
| | | | 276 | 168 | 58 | 50 | | |

- Molecule 26 is a protein called 60S ribosomal protein L1.

| Mol | Chain | Residues | Atoms | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|
| 26 | L1 | 206 | Total | C | N | O | 0 | 0 |
| | | | 1016 | 604 | 206 | 206 | | |

- Molecule 27 is a protein called 60S ribosomal protein L8.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 27 | L2 | 232 | Total | C | N | O | S | 0 | 0 |
| | | | 1759 | 1098 | 328 | 324 | 9 | | |

- Molecule 28 is a protein called 60S ribosomal protein L3.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 28 | L3 | 363 | Total | C | N | O | S | 0 | 0 |
| | | | 2827 | 1781 | 539 | 491 | 16 | | |

- Molecule 29 is a protein called 60S RIBOSOMAL PROTEIN L4.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 29 | L4 | 329 | Total | C | N | O | S | 0 | 0 |
| | | | 2596 | 1621 | 488 | 474 | 13 | | |

- Molecule 30 is a protein called 60S RIBOSOMAL PROTEIN L5.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 30 | L5 | 283 | Total | C | N | O | S | 0 | 0 |
| | | | 2273 | 1421 | 425 | 420 | 7 | | |

- Molecule 31 is a protein called 60S RIBOSOMAL PROTEIN L6.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 31 | L6 | 159 | Total | C | N | O | S | 0 | 0 |
| | | | 1279 | 811 | 220 | 241 | 7 | | |

- Molecule 32 is a protein called 60S ribosomal protein L7.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 32 | L7 | 231 | Total | C | N | O | S | 0 | 0 |
| | | | 1903 | 1203 | 352 | 337 | 11 | | |

- Molecule 33 is a protein called 60S ribosomal protein L7a.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 33 | L8 | 197 | Total | C | N | O | S | 0 | 0 |
| | | | 1573 | 1015 | 269 | 282 | 7 | | |

- Molecule 34 is a protein called 60S RIBOSOMAL PROTEIN L9.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 34 | L9 | 182 | Total | C | N | O | S | 1 | 0 |
| | | | 1443 | 909 | 265 | 260 | 9 | | |

- Molecule 35 is a protein called 60S ribosomal protein L10.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 35 | M0 | 211 | Total | C | N | O | S | 0 | 0 |
| | | | 1706 | 1079 | 329 | 291 | 7 | | |

- Molecule 36 is a protein called 60S ribosomal protein L11.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 36 | M1 | 167 | Total | C | N | O | S | 0 | 0 |
| | | | 1336 | 845 | 247 | 237 | 7 | | |

- Molecule 37 is a protein called 60S RIBOSOMAL PROTEIN L13.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 37 | M3 | 161 | Total | C | N | O | S | 0 | 0 |
| | | | 1308 | 825 | 253 | 225 | 5 | | |

- Molecule 38 is a protein called ECU06_1215 protein.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 38 | M4 | 104 | Total | C | N | O | S | 0 | 0 |
| | | | 848 | 537 | 150 | 160 | 1 | | |

- Molecule 39 is a protein called Ribosomal protein L15.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 39 | M5 | 203 | Total | C | N | O | S | 0 | 0 |
| | | | 1657 | 1031 | 335 | 279 | 12 | | |

- Molecule 40 is a protein called 60S RIBOSOMAL PROTEIN L13A (L16).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 40 | M6 | 196 | Total | C | N | O | S | 0 | 0 |
| | | | 1577 | 1001 | 291 | 276 | 9 | | |

- Molecule 41 is a protein called 60S RIBOSOMAL PROTEIN L17.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 41 | M7 | 174 | Total | C | N | O | S | 0 | 0 |
| | | | 1363 | 861 | 263 | 234 | 5 | | |

- Molecule 42 is a protein called 60S RIBOSOMAL PROTEIN L18.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 42 | M8 | 186 | Total | C | N | O | S | 0 | 0 |
| | | | 1470 | 929 | 266 | 266 | 9 | | |

- Molecule 43 is a protein called 60S RIBOSOMAL PROTEIN L19.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 43 | M9 | 170 | Total | C | N | O | S | 0 | 0 |
| | | | 1398 | 864 | 285 | 238 | 11 | | |

- Molecule 44 is a protein called Uncharacterized protein ECU01_0250.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 44 | MD | 170 | Total | C | N | O | S | 0 | 0 |
| | | | 1349 | 848 | 230 | 260 | 11 | | |

There is a discrepancy between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| MD | 59 | GLY | SER | variant | UNP Q8SWQ4 |

- Molecule 45 is a protein called ECU06_1135 protein.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 45 | MS | 68 | Total | C | N | O | S | 0 | 0 |
| | | | 592 | 372 | 121 | 97 | 2 | | |

- Molecule 46 is a protein called 60S ribosomal protein L20.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 46 | N0 | 178 | Total | C | N | O | S | 0 | 0 |
| | | | 1438 | 929 | 249 | 254 | 6 | | |

- Molecule 47 is a protein called 60S ribosomal protein L21.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 47 | N1 | 159 | Total | C | N | O | S | 0 | 0 |
| | | | 1288 | 812 | 249 | 220 | 7 | | |

- Molecule 48 is a protein called 60S ribosomal protein L22.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 48 | N2 | 93 | Total | C | N | O | S | 0 | 0 |
| | | | 735 | 477 | 130 | 125 | 3 | | |

- Molecule 49 is a protein called 60S ribosomal protein L23.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 49 | N3 | 135 | Total | C | N | O | S | 0 | 0 |
| | | | 1058 | 666 | 206 | 179 | 7 | | |

- Molecule 50 is a protein called Similarity to 60S RIBOSOMAL PROTEIN L24.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 50 | N4 | 89 | Total | C | N | O | S | 0 | 0 |
| | | | 709 | 443 | 136 | 126 | 4 | | |

- Molecule 51 is a protein called 60S RIBOSOMAL PROTEIN L23A.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 51 | N5 | 93 | Total | C | N | O | S | 0 | 0 |
| | | | 720 | 460 | 123 | 134 | 3 | | |

- Molecule 52 is a protein called 60S RIBOSOMAL PROTEIN L26.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 52 | N6 | 142 | Total | C | N | O | S | 0 | 0 |
| | | | 1171 | 730 | 230 | 208 | 3 | | |

- Molecule 53 is a protein called 60S RIBOSOMAL PROTEIN L27.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 53 | N7 | 118 | Total | C | N | O | S | 0 | 0 |
| | | | 938 | 617 | 162 | 154 | 5 | | |

- Molecule 54 is a protein called 60S ribosomal protein L27a.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 54 | N8 | 146 | Total | C | N | O | S | 0 | 0 |
| | | | 1196 | 763 | 232 | 198 | 3 | | |

- Molecule 55 is a protein called 60S ribosomal protein L29.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 55 | N9 | 55 | Total | C | N | O | S | 0 | 0 |
| | | | 437 | 272 | 90 | 74 | 1 | | |

- Molecule 56 is a protein called 60S RIBOSOMAL PROTEIN L30.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 56 | O0 | 90 | Total | C | N | O | S | 0 | 0 |
| | | | 692 | 442 | 122 | 124 | 4 | | |

- Molecule 57 is a protein called 60S ribosomal protein L31.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 57 | O1 | 108 | Total | C | N | O | S | 0 | 0 |
| | | | 879 | 559 | 164 | 153 | 3 | | |

- Molecule 58 is a protein called 60S ribosomal protein L32.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 58 | O2 | 128 | Total | C | N | O | S | 0 | 0 |
| | | | 1062 | 674 | 215 | 169 | 4 | | |

- Molecule 59 is a protein called 60S RIBOSOMAL PROTEIN L35A (L33).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 59 | O3 | 109 | Total | C | N | O | S | 0 | 0 |
| | | | 861 | 543 | 166 | 149 | 3 | | |

- Molecule 60 is a protein called 60S ribosomal protein L34.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 60 | O4 | 100 | Total | C | N | O | S | 0 | 0 |
| | | | 807 | 493 | 177 | 131 | 6 | | |

- Molecule 61 is a protein called 60S ribosomal protein L35-1.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 61 | O5 | 121 | Total | C | N | O | S | 0 | 0 |
| | | | 981 | 609 | 201 | 170 | 1 | | |

- Molecule 62 is a protein called 60S ribosomal protein L36.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 62 | O6 | 94 | Total | C | N | O | S | 0 | 0 |
| | | | 735 | 461 | 147 | 125 | 2 | | |

- Molecule 63 is a protein called 60S ribosomal protein L37.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 63 | O7 | 86 | Total | C | N | O | S | 0 | 0 |
| | | | 691 | 416 | 152 | 115 | 8 | | |

- Molecule 64 is a protein called 60S ribosomal protein L39.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 64 | O9 | 50 | Total | C | N | O | S | 0 | 0 |
| | | | 434 | 271 | 97 | 63 | 3 | | |

- Molecule 65 is a protein called UBIQUITIN/ L40 RIBOSOMAL PROTEIN FUSION.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 65 | P0 | 49 | Total | C | N | O | S | 0 | 0 |
| | | | 381 | 230 | 75 | 68 | 8 | | |

- Molecule 66 is a protein called 60S ribosomal protein L44.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 66 | P2 | 97 | Total | C | N | O | S | 0 | 0 |
| | | | 788 | 492 | 167 | 125 | 4 | | |

- Molecule 67 is a protein called 60S RIBOSOMAL PROTEIN L37A (L43).

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 67 | P3 | 86 | Total | C | N | O | S | 0 | 0 |
| | | | 664 | 419 | 128 | 111 | 6 | | |

- Molecule 68 is a protein called 40S ribosomal protein S0.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 68 | S0 | 203 | Total | C | N | O | S | 0 | 0 |
| | | | 1584 | 1017 | 272 | 289 | 6 | | |

- Molecule 69 is a protein called 40S ribosomal protein S1.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 69 | S1 | 209 | Total | C | N | O | S | 0 | 0 |
| | | | 1670 | 1058 | 299 | 300 | 13 | | |

- Molecule 70 is a protein called 40S RIBOSOMAL PROTEIN S2.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 70 | S2 | 217 | Total | C | N | O | S | 0 | 0 |
| | | | 1636 | 1037 | 293 | 300 | 6 | | |

- Molecule 71 is a protein called 40S ribosomal protein S3.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 71 | S3 | 210 | Total | C | N | O | S | 0 | 0 |
| | | | 1658 | 1057 | 295 | 298 | 8 | | |

- Molecule 72 is a protein called 40S ribosomal protein S4.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 72 | S4 | 259 | Total | C | N | O | S | 0 | 0 |
| | | | 2045 | 1301 | 361 | 374 | 9 | | |

- Molecule 73 is a protein called 40S ribosomal protein S5.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 73 | S5 | 188 | Total | C | N | O | S | 0 | 0 |
| | | | 1461 | 905 | 282 | 269 | 5 | | |

- Molecule 74 is a protein called 40S ribosomal protein S6.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 74 | S6 | 204 | Total | C | N | O | S | 0 | 0 |
| | | | 1680 | 1049 | 321 | 301 | 9 | | |

- Molecule 75 is a protein called 40S ribosomal protein S7.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 75 | S7 | 149 | Total | C | N | O | S | 0 | 0 |
| | | | 1173 | 745 | 212 | 208 | 8 | | |

- Molecule 76 is a protein called 40S ribosomal protein S8.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 76 | S8 | 164 | Total | C | N | O | S | 0 | 0 |
| | | | 1300 | 812 | 255 | 230 | 3 | | |

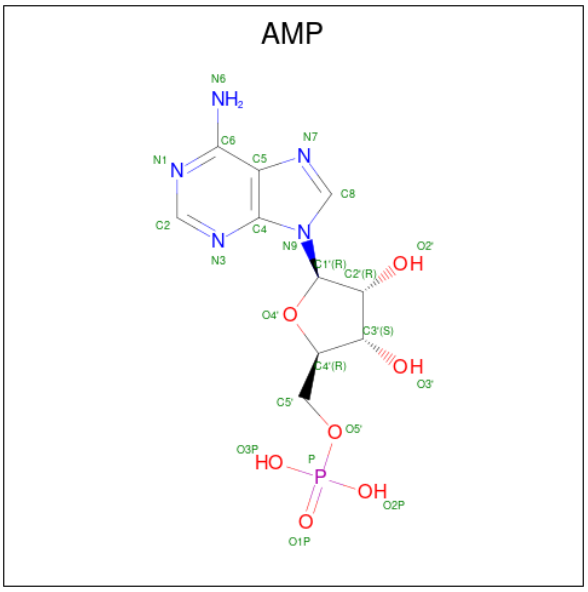
- Molecule 77 is a protein called 40S ribosomal protein S9.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 77 | S9 | 171 | Total | C | N | O | S | 0 | 0 |
| | | | 1374 | 873 | 255 | 241 | 5 | | |

- Molecule 78 is ZINC ION (three-letter code: ZN) (formula: Zn).

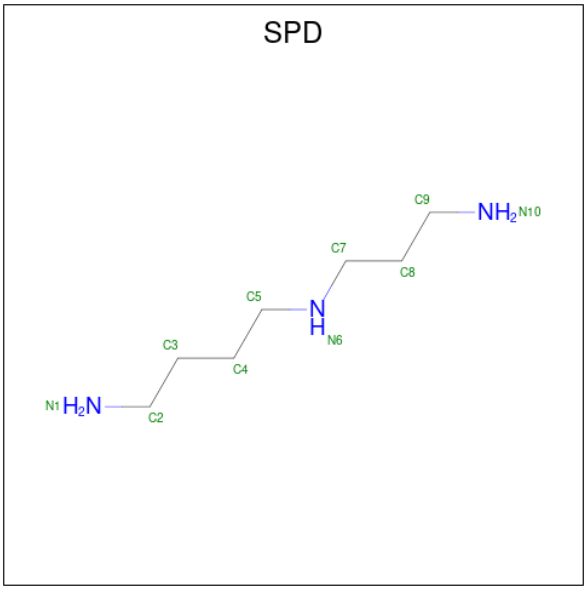
| Mol | Chain | Residues | Atoms | | AltConf |
|---|---|---|---|---|---|
| 78 | D6 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | D7 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | D9 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | E1 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | O7 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | P0 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | P2 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |
| 78 | P3 | 1 | Total | Zn | 0 |
| | | | 1 | 1 | |

- Molecule 79 is ADENOSINE MONOPHOSPHATE (three-letter code: AMP) (formula: $C_{10}H_{14}N_5O_7P$) (labeled as "Ligand of Interest" by depositor).




| Mol | Chain | Residues | Atoms | | | | | | AltConf |
|---|---|---|---|---|---|---|---|---|---|
| 79 | L9 | 1 | Total | C | H | N | O | P | 0 |
| | | | 35 | 10 | 12 | 5 | 7 | 1 | |

- Molecule 80 is SPERMIDINE (three-letter code: SPD) (formula: $C_7H_{19}N_3$).



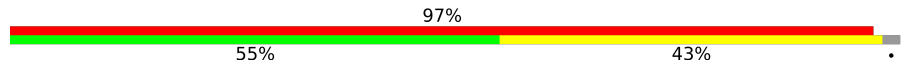

| Mol | Chain | Residues | Atoms | | | | AltConf |
|---|---|---|---|---|---|---|---|
| 80 | N8 | 1 | Total | C | H | N | 0 |
| | | | 29 | 7 | 19 | 3 | |

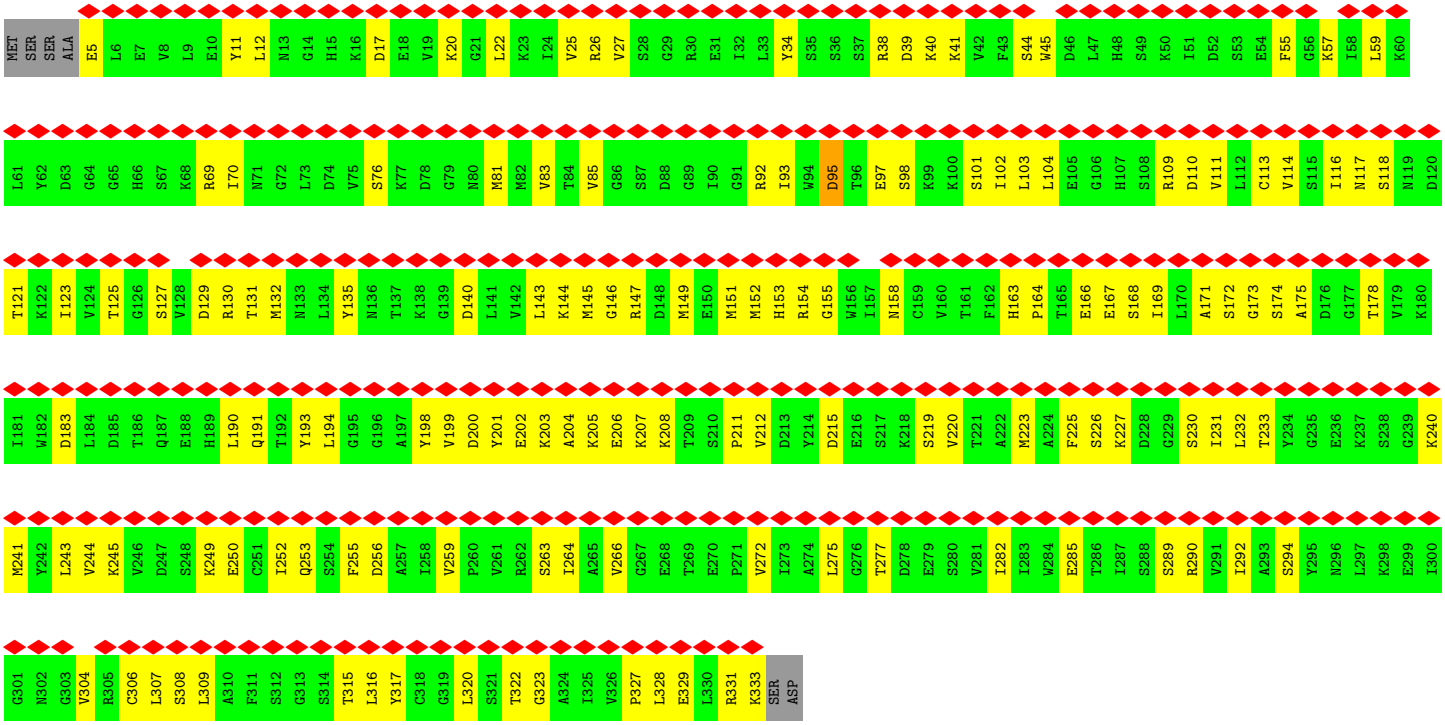
# 3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: Guanine nucleotide binding protein beta subunit

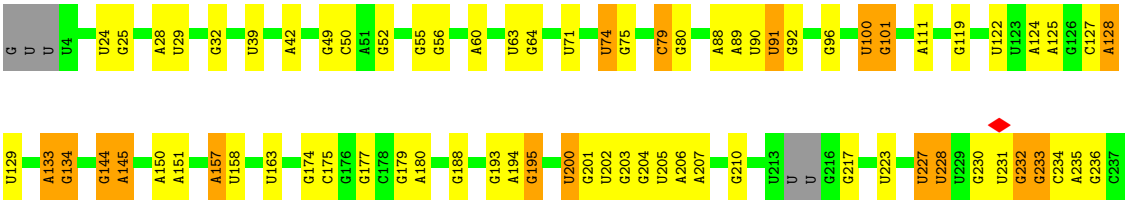
Chain RA:

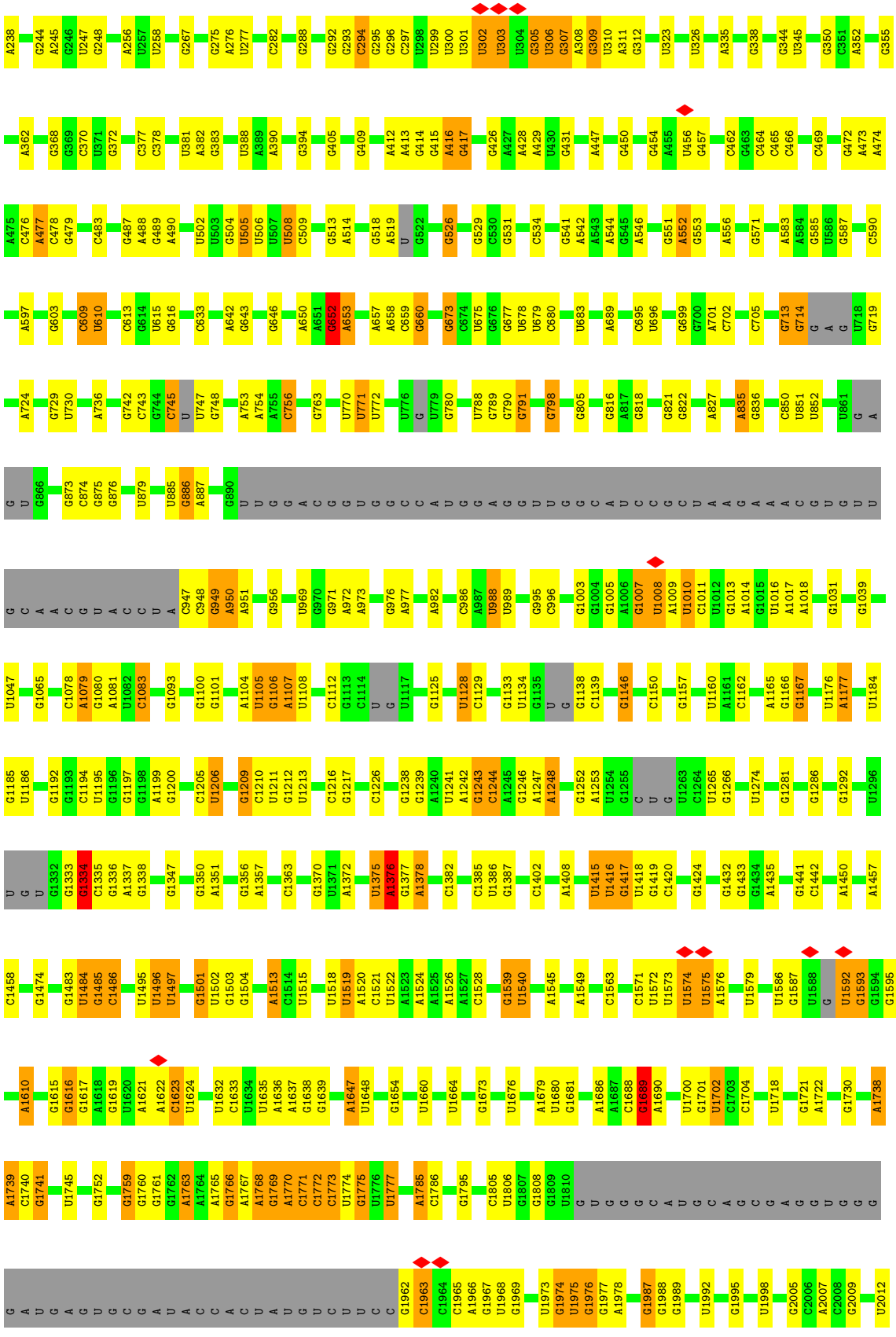


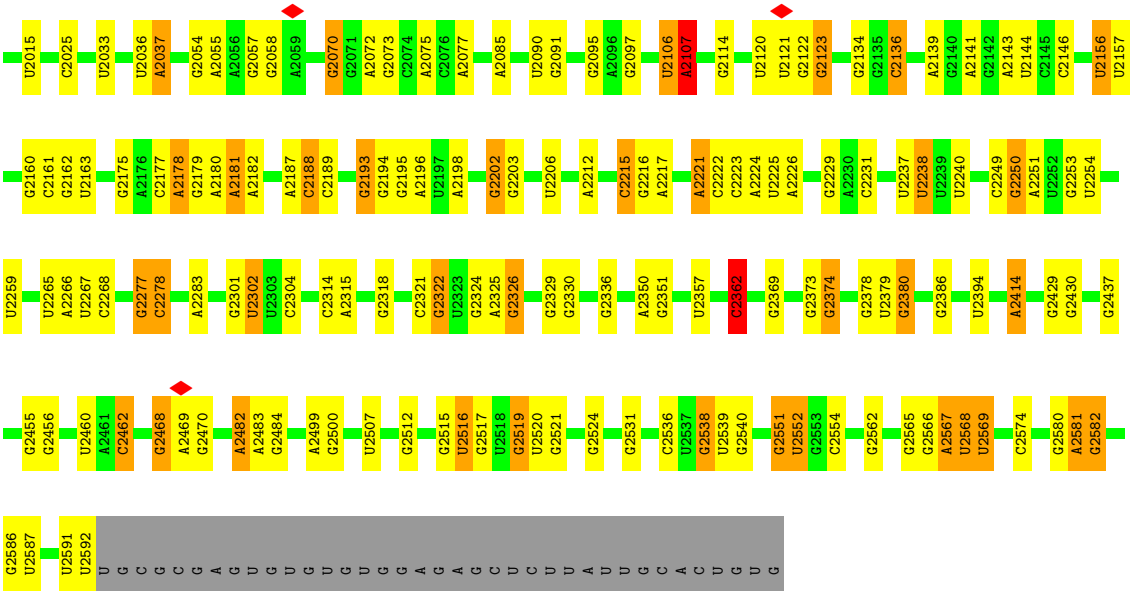




• Molecule 2: 5.8S-23S ribosomal RNA

Chain 1:

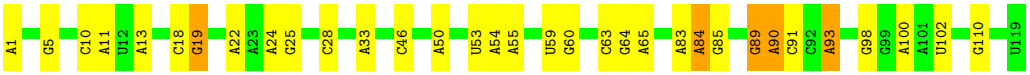







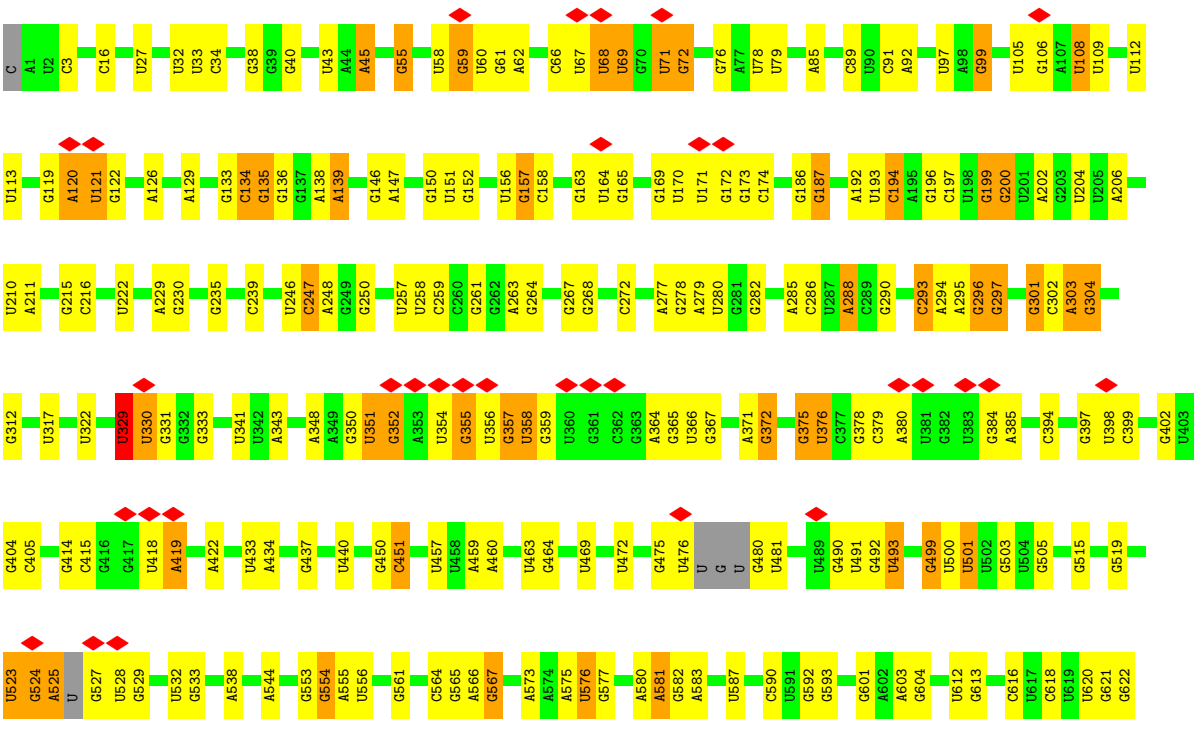
• Molecule 3: 5S ribosomal RNA

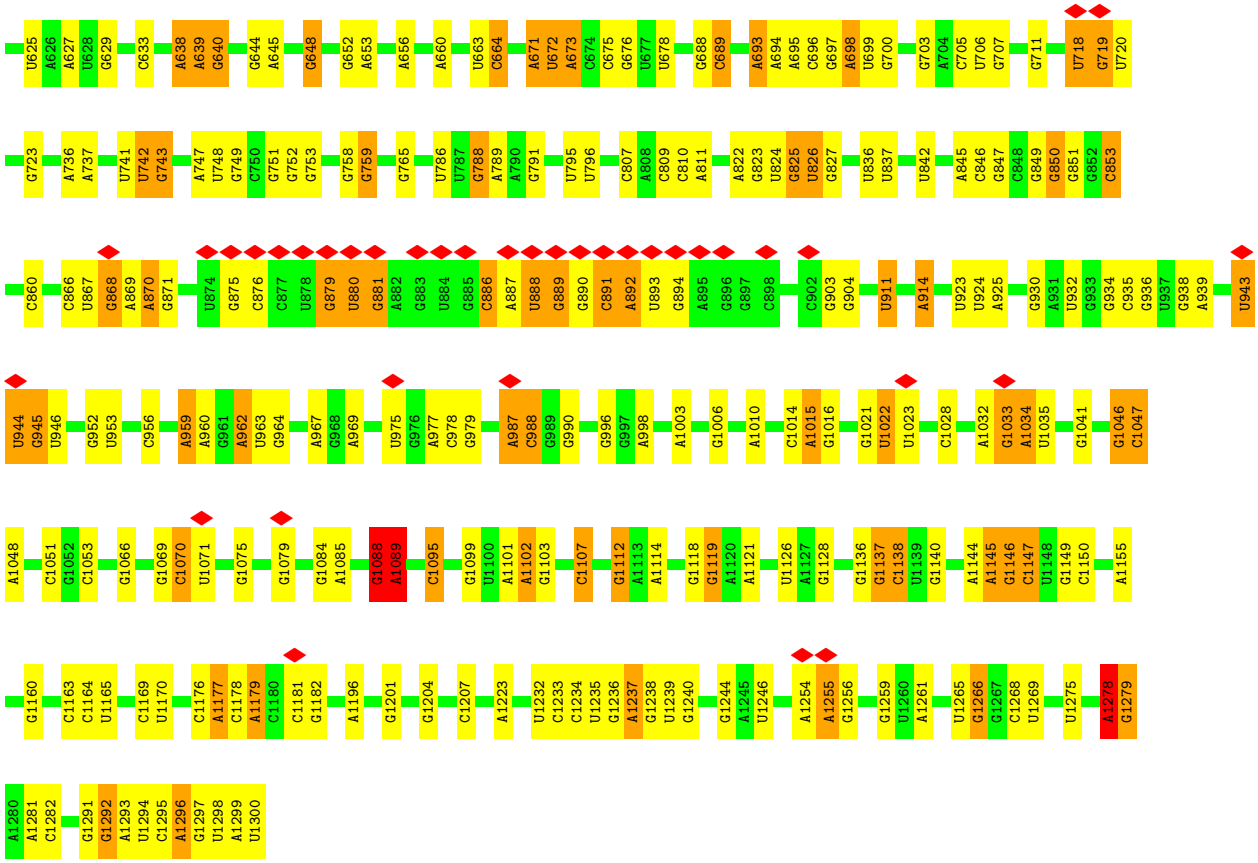
Chain 2:

• Molecule 4: 18S ribosomal RNA

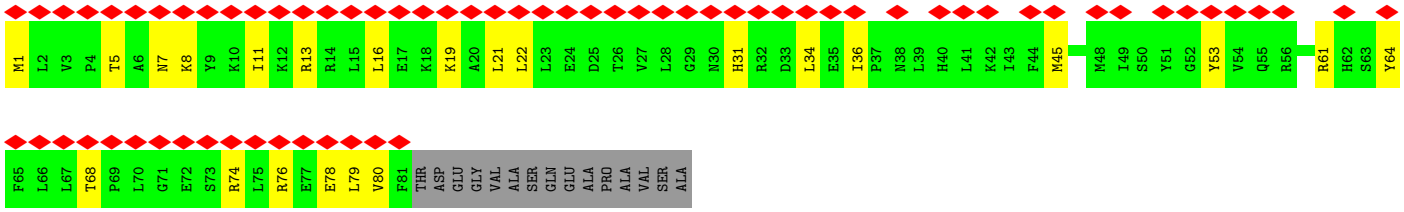
Chain 3:



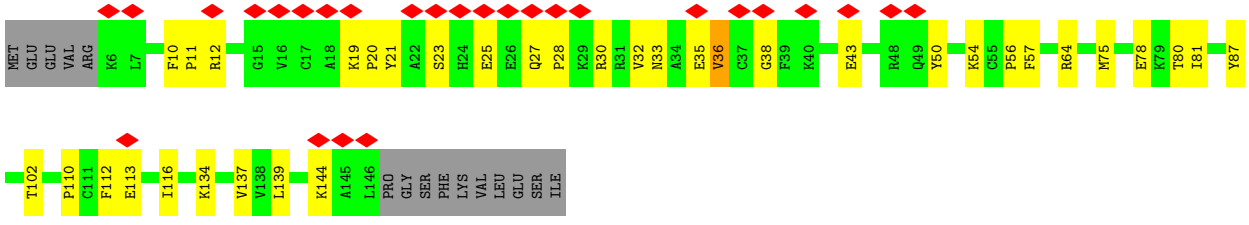
• Molecule 5: 40S RIBOSOMAL PROTEIN S10

Chain C0:

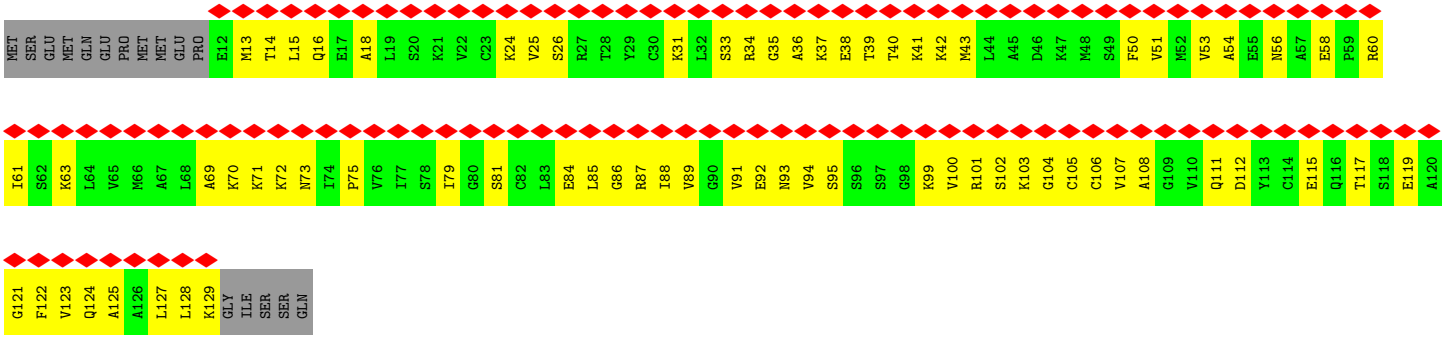
• Molecule 6: 40S RIBOSOMAL PROTEIN S11

Chain C1:

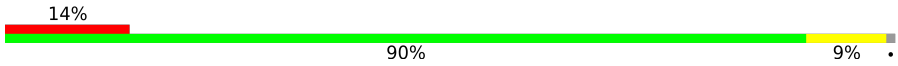
• Molecule 7: 40S RIBOSOMAL PROTEIN S12

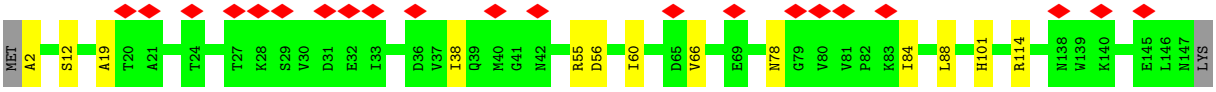
Chain C2:




• Molecule 8: 40S ribosomal protein S13

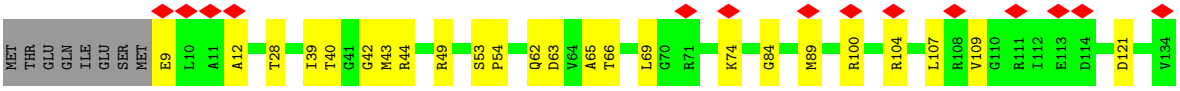
Chain C3:



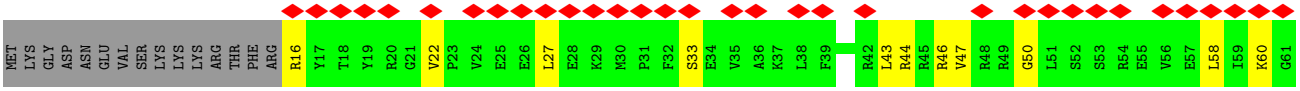

• Molecule 9: 40S ribosomal protein S14

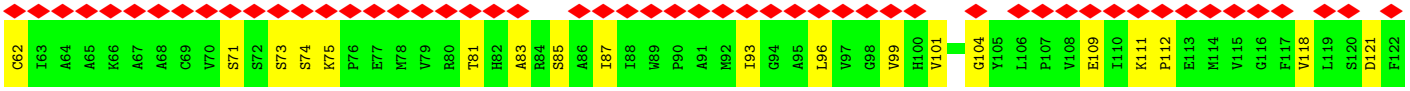
Chain C4:

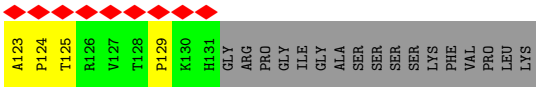




• Molecule 10: RIBOSOMAL PROTEIN S15

Chain C5:

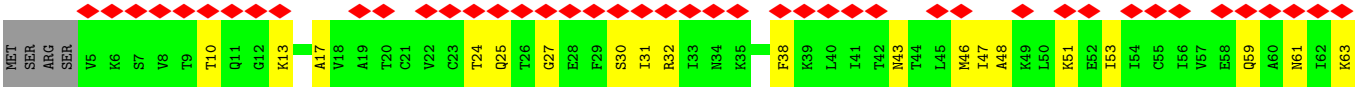



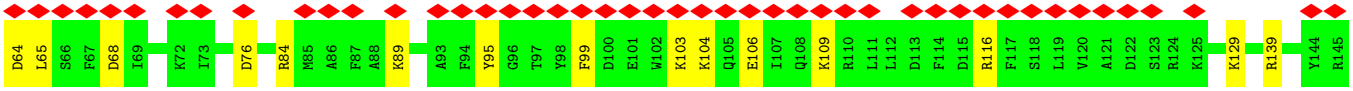




• Molecule 11: 40S RIBOSOMAL PROTEIN S16

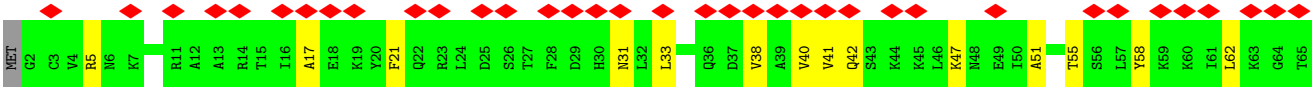
Chain C6:

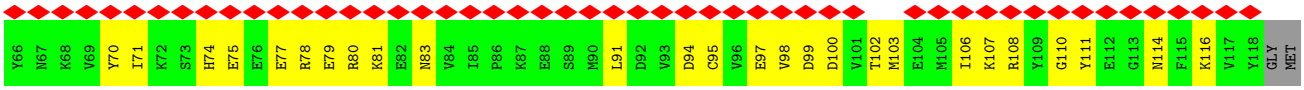






• Molecule 12: 40S ribosomal protein S17

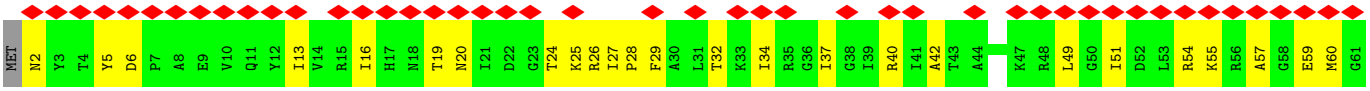
Chain C7:

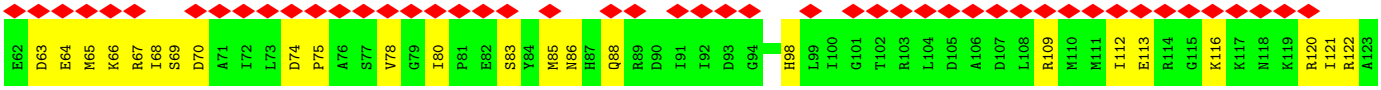



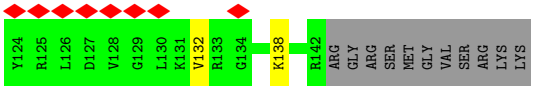




• Molecule 13: 40S ribosomal protein S18

Chain C8:

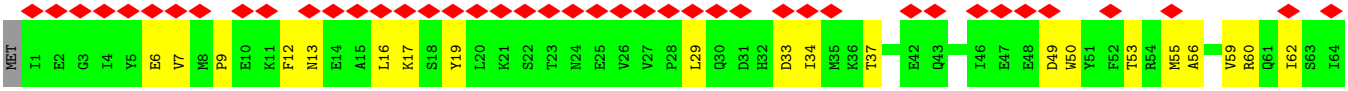



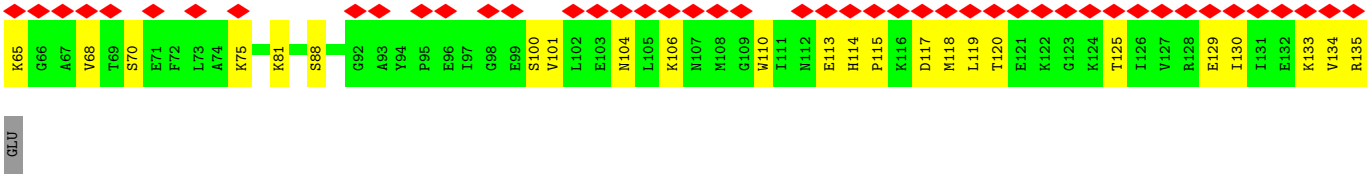




• Molecule 14: 40S ribosomal protein S19

Chain C9:

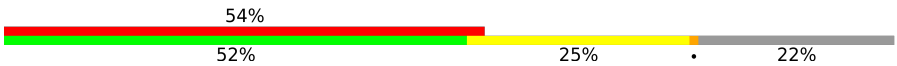



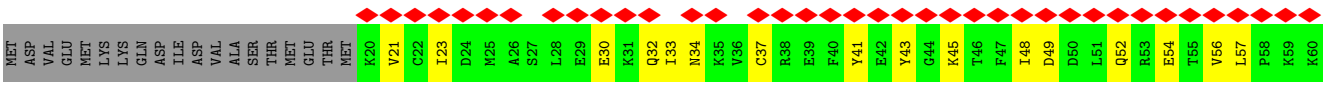


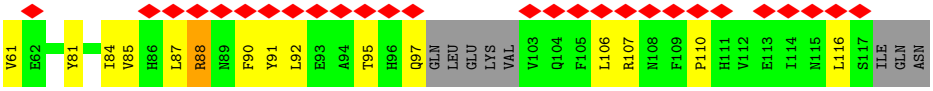


• Molecule 15: 40S RIBOSOMAL PROTEIN S20

Chain D0:

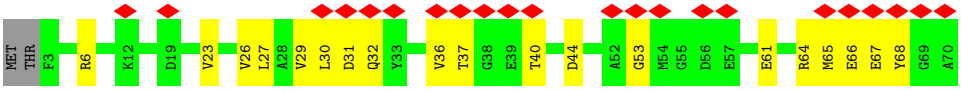




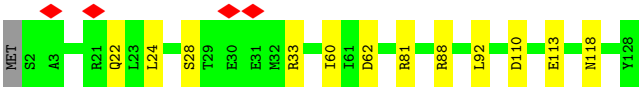

• Molecule 16: ECU11_0225 protein

Chain D1:

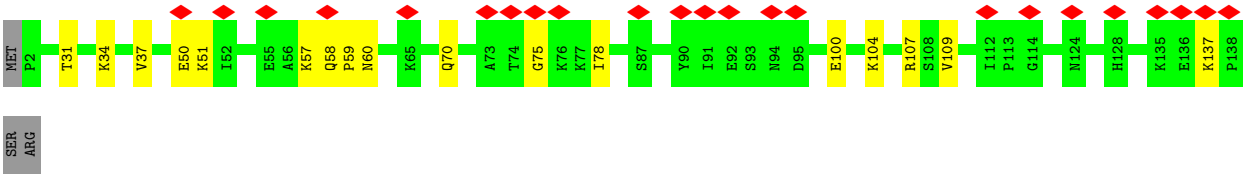

• Molecule 17: 40S RIBOSOMAL PROTEIN S15A (S22 in yeast)

Chain D2:

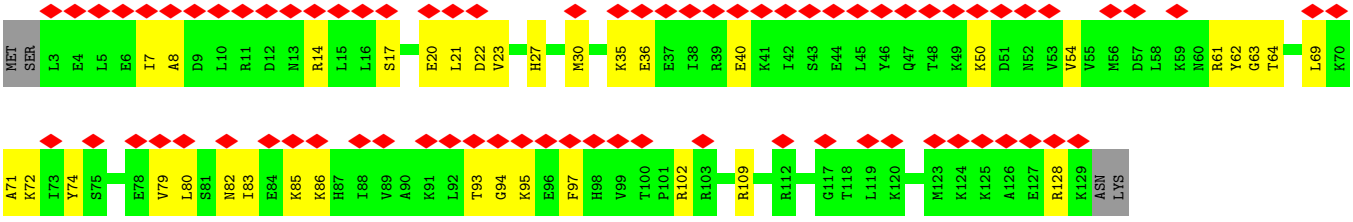

• Molecule 18: 40S ribosomal protein S23

Chain D3:

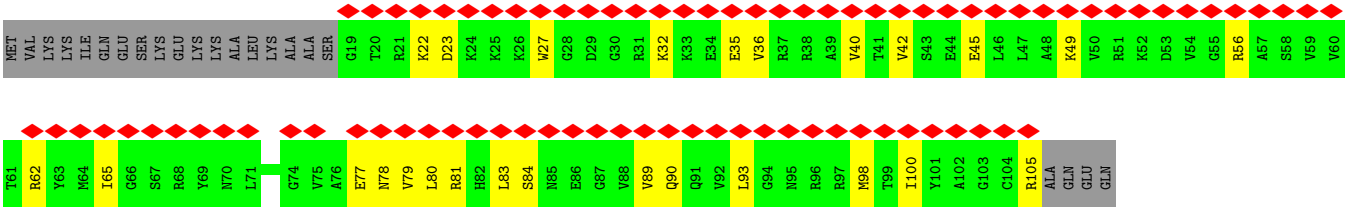

• Molecule 19: 40S RIBOSOMAL PROTEIN S24

Chain D4:

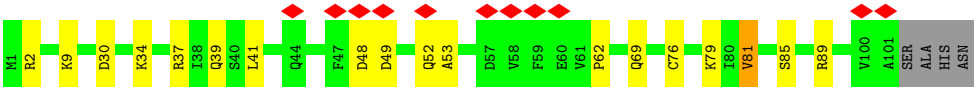

• Molecule 20: 40S ribosomal protein S25

Chain D5:

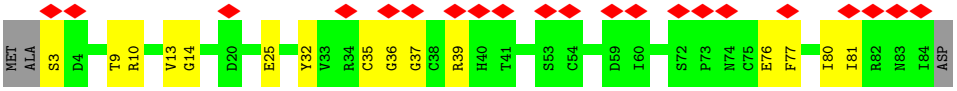
• Molecule 21: 40S ribosomal protein S26

Chain D6:

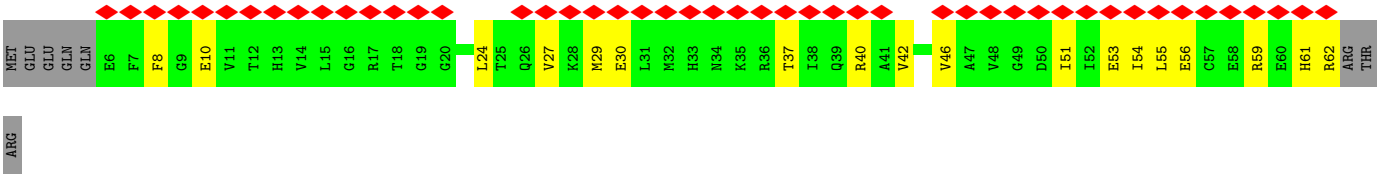

• Molecule 22: 40S RIBOSOMAL PROTEIN S27

Chain D7:

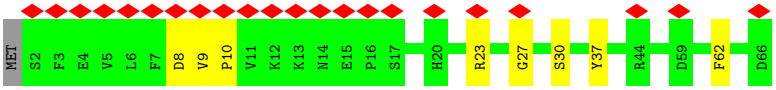

• Molecule 23: 40S RIBOSOMAL PROTEIN S28

Chain D8:

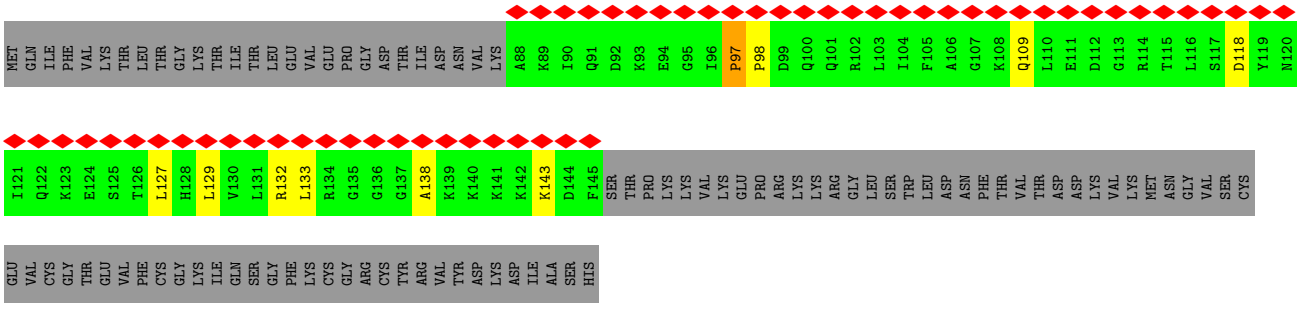

• Molecule 24: 40S ribosomal protein S29

Chain D9:

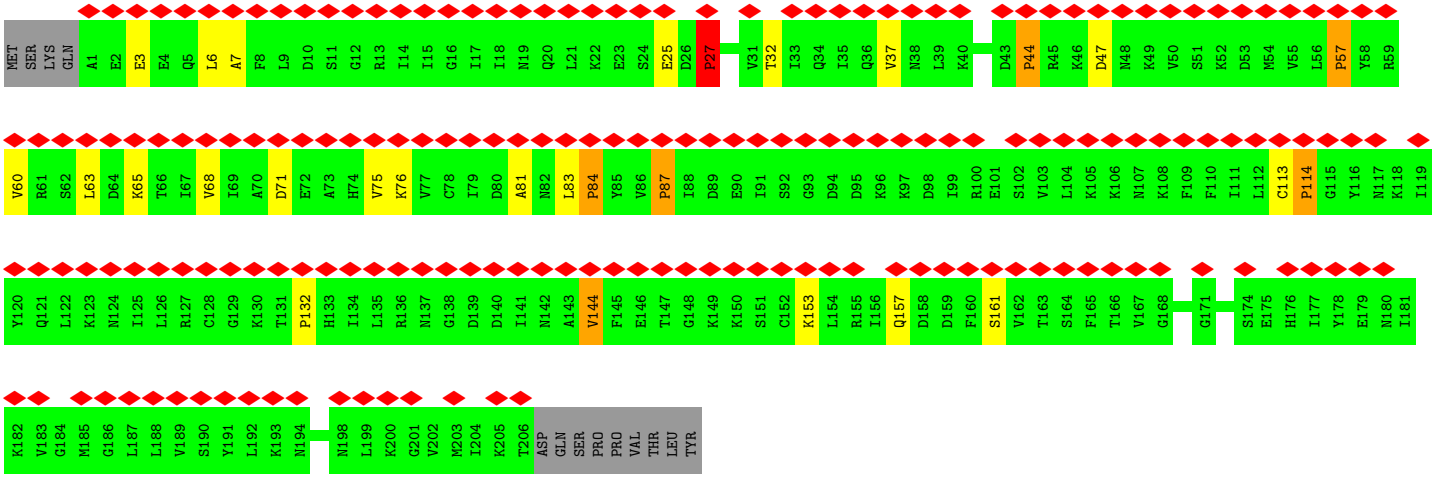

• Molecule 25: Similarity to monoubiquitin/carboxy-extension protein fusion

Chain E1:

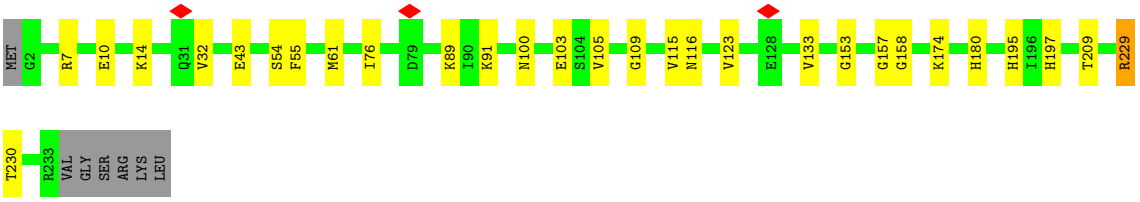

• Molecule 26: 60S ribosomal protein L1

Chain L1:



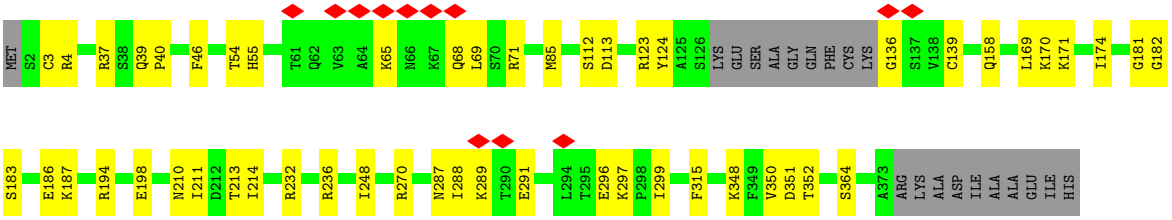

• Molecule 27: 60S ribosomal protein L8

Chain L2:

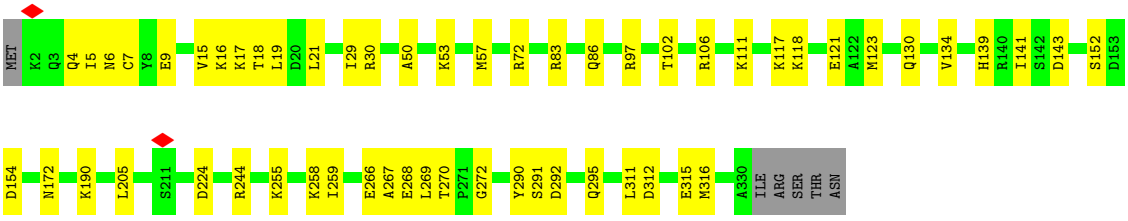

• Molecule 28: 60S ribosomal protein L3

Chain L3:

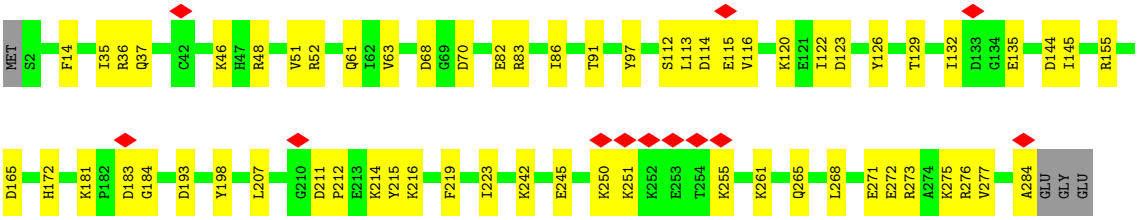

• Molecule 29: 60S RIBOSOMAL PROTEIN L4

Chain L4:

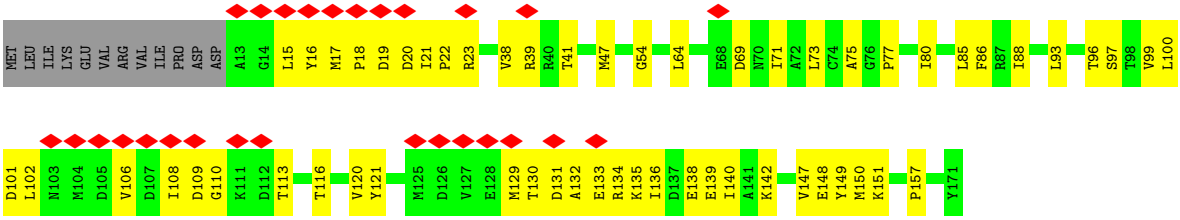

• Molecule 30: 60S RIBOSOMAL PROTEIN L5

Chain L5:



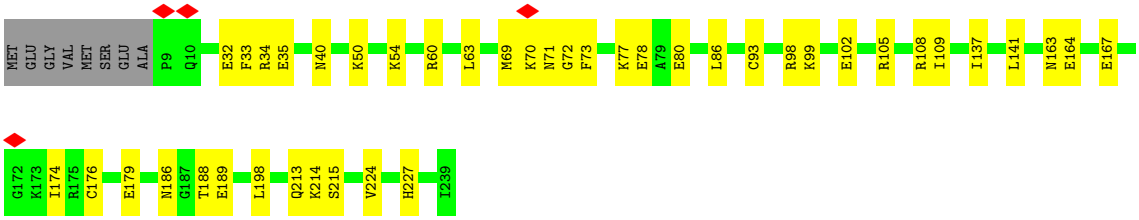

• Molecule 31: 60S RIBOSOMAL PROTEIN L6

Chain L6:

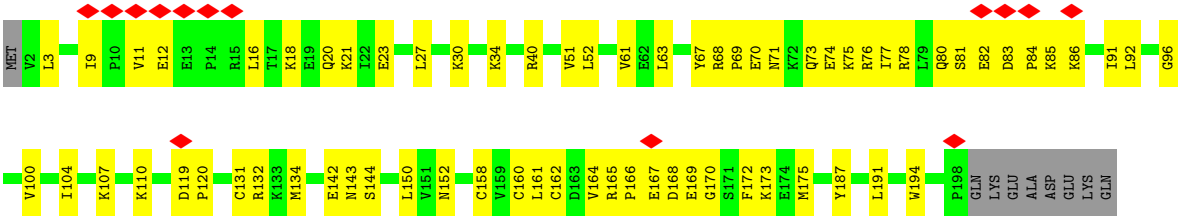

• Molecule 32: 60S ribosomal protein L7

Chain L7:

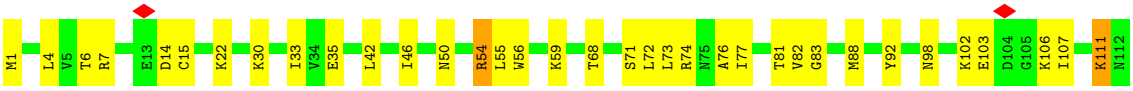

• Molecule 33: 60S ribosomal protein L7a

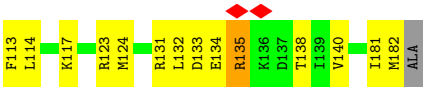
Chain L8:


• Molecule 34: 60S RIBOSOMAL PROTEIN L9

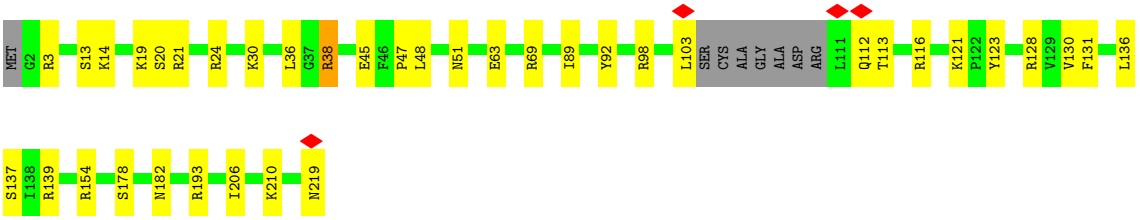
Chain L9:



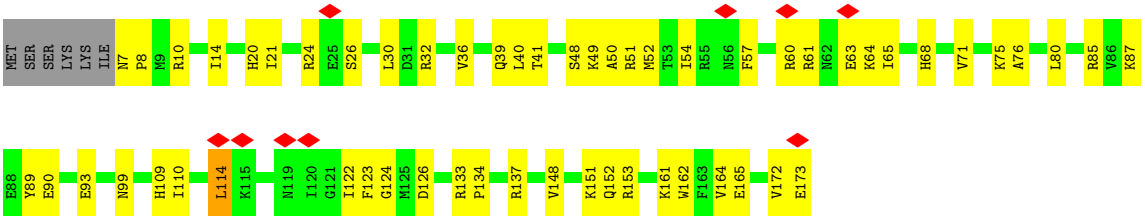

• Molecule 35: 60S ribosomal protein L10

Chain M0:


• Molecule 36: 60S ribosomal protein L11

Chain M1:

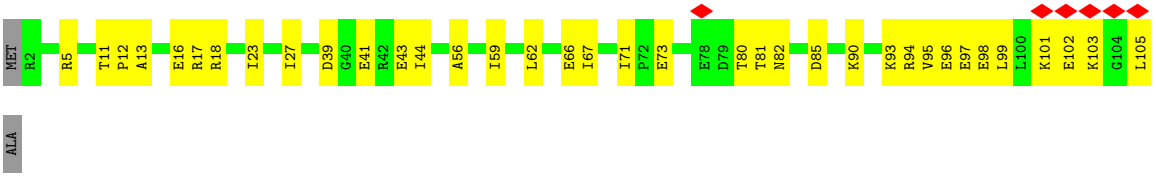

• Molecule 37: 60S RIBOSOMAL PROTEIN L13

Chain M3:



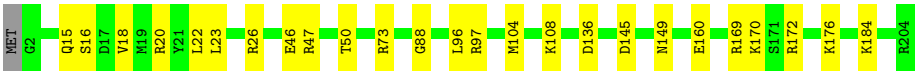
• Molecule 38: ECU06_1215 protein

Chain M4:

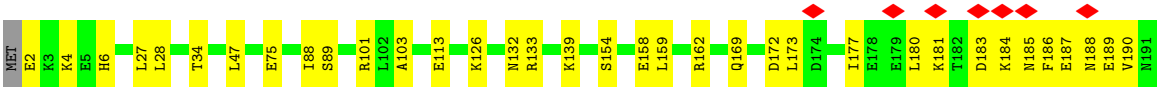

• Molecule 39: Ribosomal protein L15

Chain M5:




• Molecule 40: 60S RIBOSOMAL PROTEIN L13A (L16)

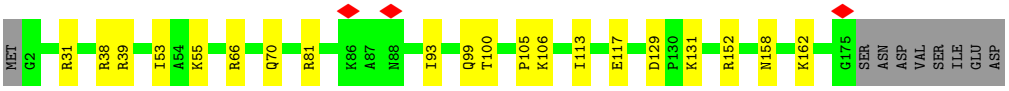
Chain M6:



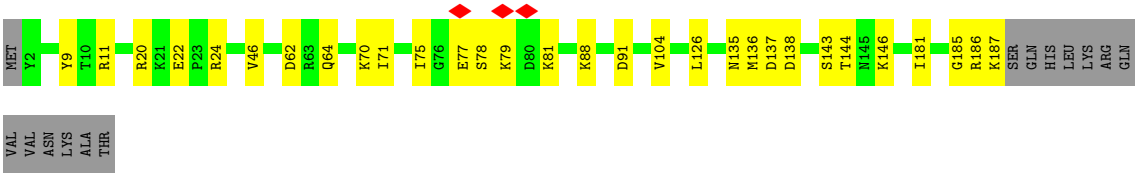
• Molecule 41: 60S RIBOSOMAL PROTEIN L17

Chain M7:


• Molecule 42: 60S RIBOSOMAL PROTEIN L18

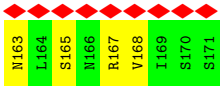
Chain M8:


• Molecule 43: 60S RIBOSOMAL PROTEIN L19

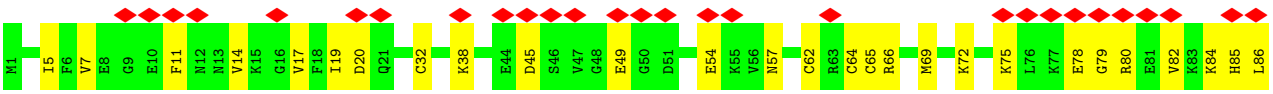
Chain M9:

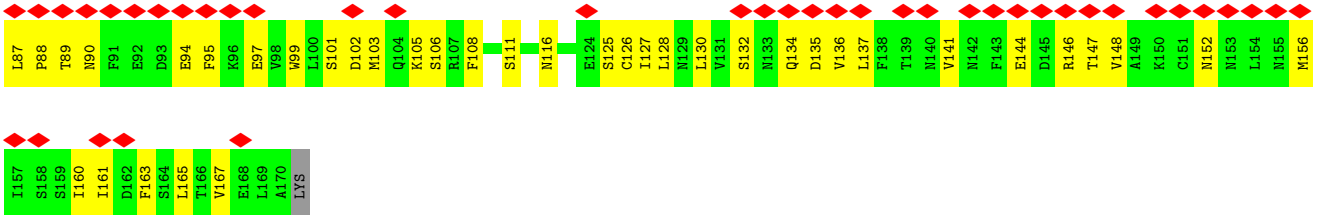




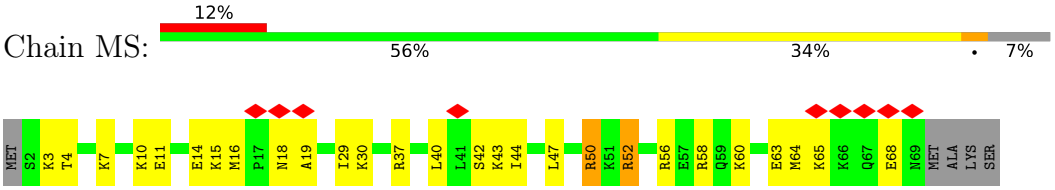

• Molecule 44: Uncharacterized protein ECU01_0250

Chain MD:

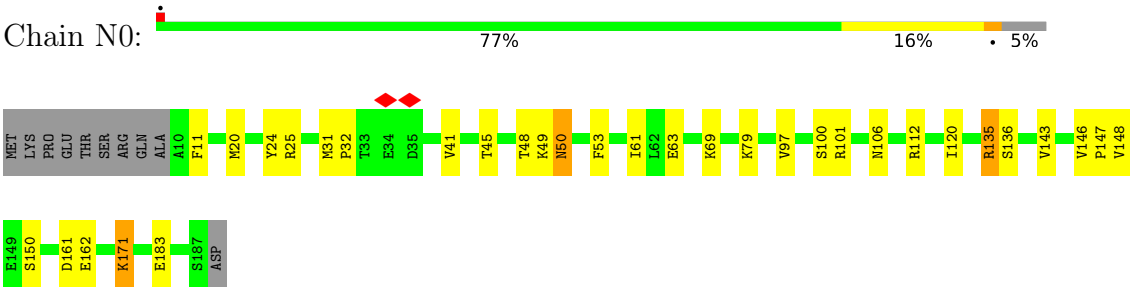





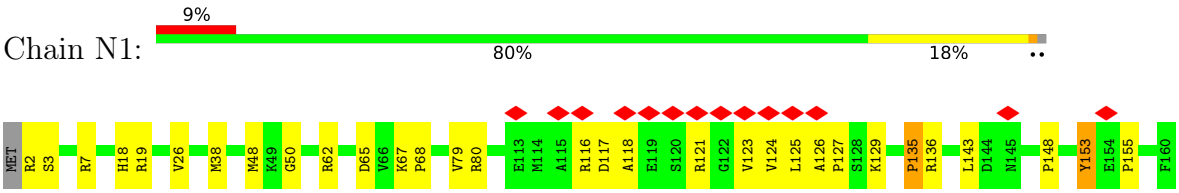

• Molecule 45: ECU06_1135 protein



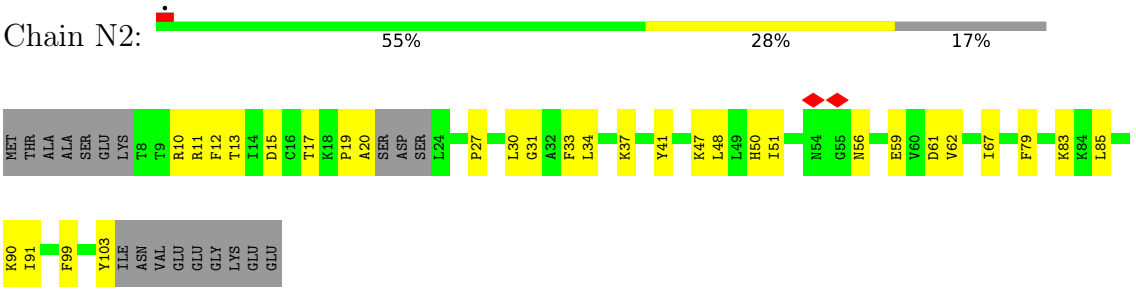

• Molecule 46: 60S ribosomal protein L20



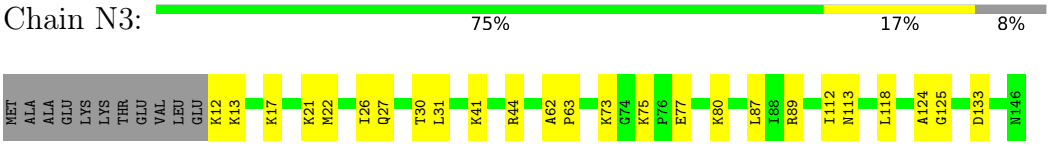

• Molecule 47: 60S ribosomal protein L21




• Molecule 48: 60S ribosomal protein L22

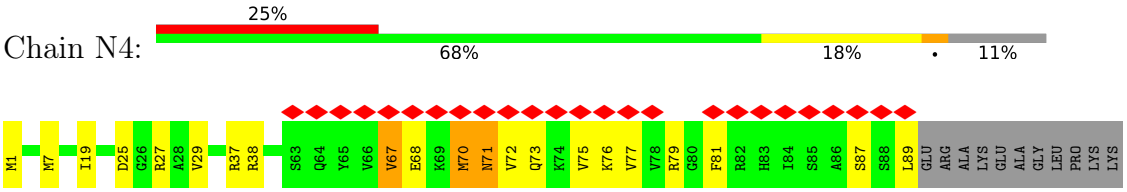



• Molecule 49: 60S ribosomal protein L23



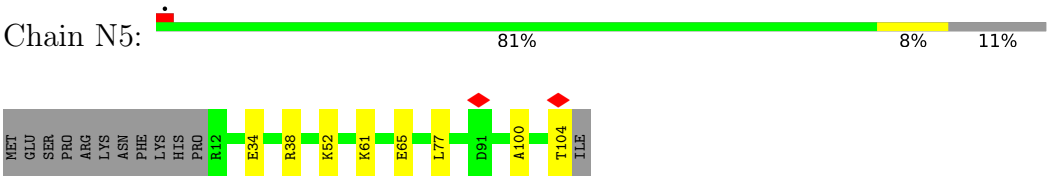
• Molecule 50: Similarity to 60S RIBOSOMAL PROTEIN L24

Chain N4:



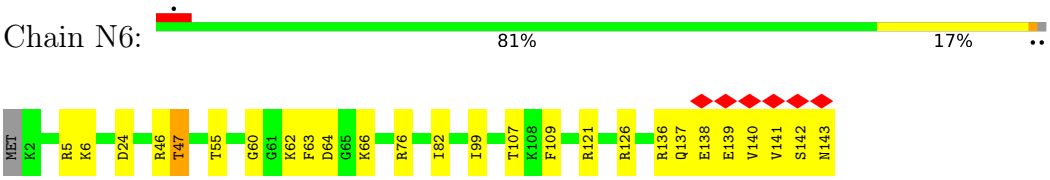

• Molecule 51: 60S RIBOSOMAL PROTEIN L23A

Chain N5:



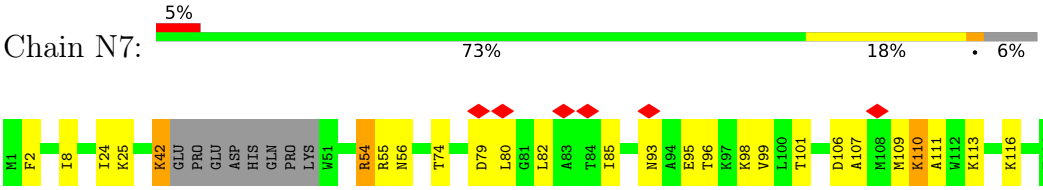

• Molecule 52: 60S RIBOSOMAL PROTEIN L26

Chain N6:



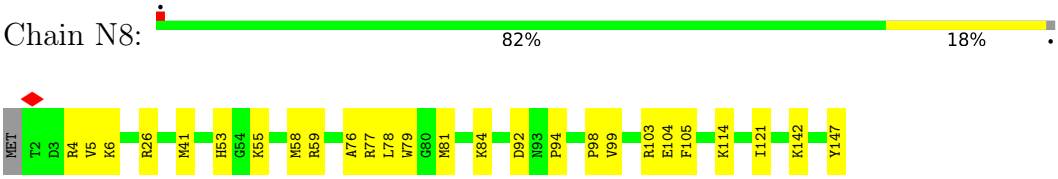

• Molecule 53: 60S RIBOSOMAL PROTEIN L27

Chain N7:



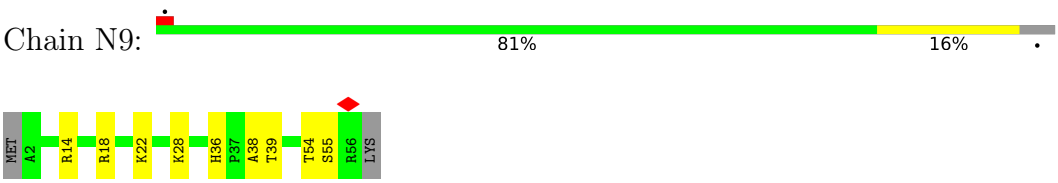

• Molecule 54: 60S ribosomal protein L27a

Chain N8:



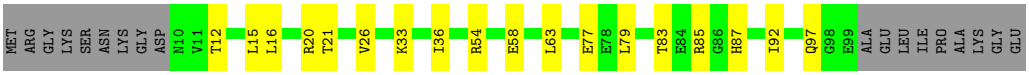

• Molecule 55: 60S ribosomal protein L29

Chain N9:



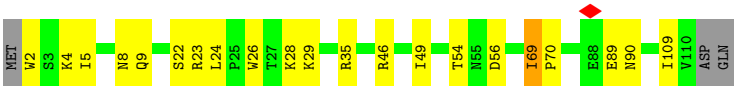

• Molecule 56: 60S RIBOSOMAL PROTEIN L30

Chain O0:



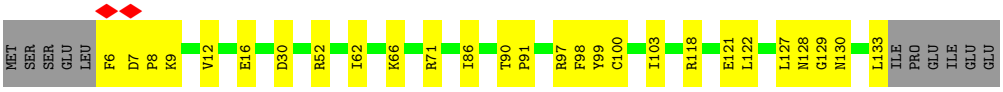

• Molecule 57: 60S ribosomal protein L31

Chain O1:

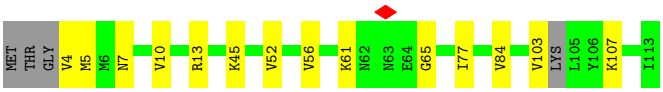

• Molecule 58: 60S ribosomal protein L32

Chain O2:

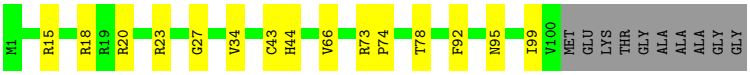

• Molecule 59: 60S RIBOSOMAL PROTEIN L35A (L33)

Chain O3:

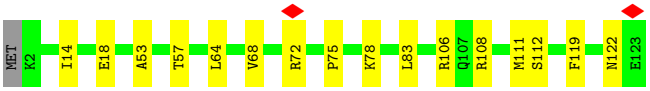

• Molecule 60: 60S ribosomal protein L34

Chain O4:

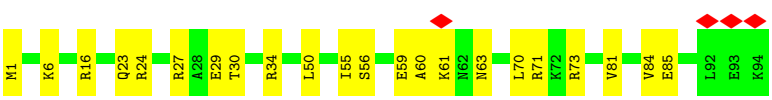

• Molecule 61: 60S ribosomal protein L35-1

Chain O5:


• Molecule 62: 60S ribosomal protein L36

Chain O6:

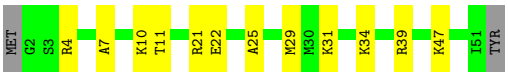

• Molecule 63: 60S ribosomal protein L37

Chain O7:



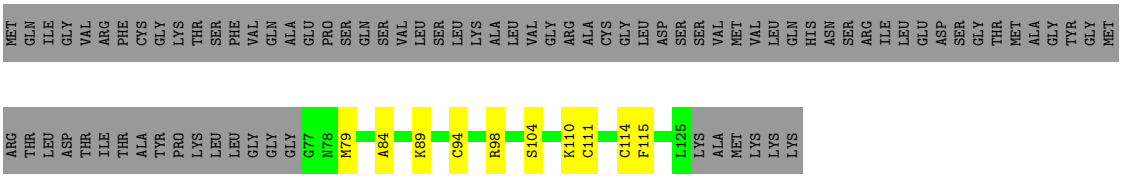
• Molecule 64: 60S ribosomal protein L39

Chain O9:

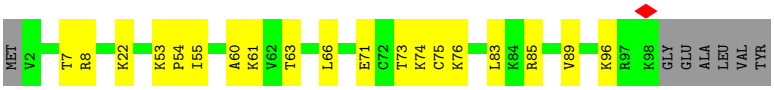

• Molecule 65: UBIQUITIN/ L40 RIBOSOMAL PROTEIN FUSION

Chain P0:

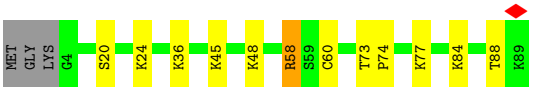

• Molecule 66: 60S ribosomal protein L44

Chain P2:

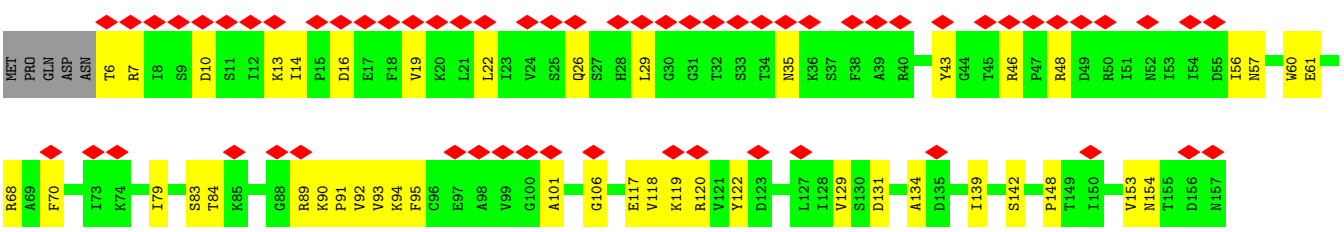

• Molecule 67: 60S RIBOSOMAL PROTEIN L37A (L43)

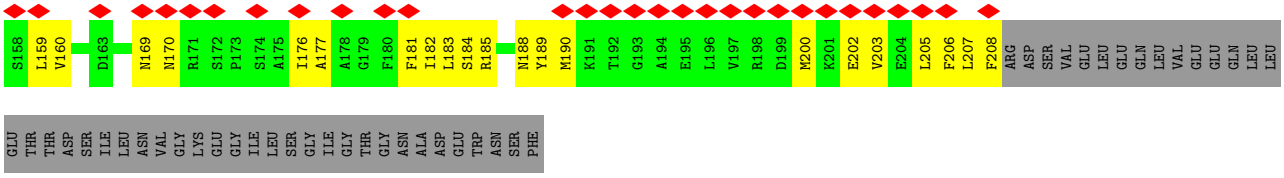
Chain P3:


• Molecule 68: 40S ribosomal protein S0

Chain S0:

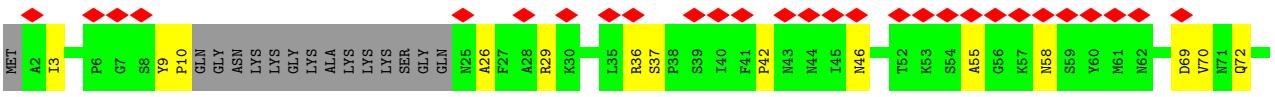



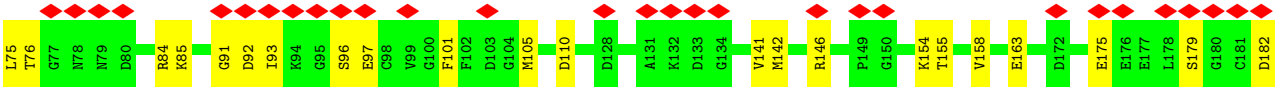




• Molecule 69: 40S ribosomal protein S1

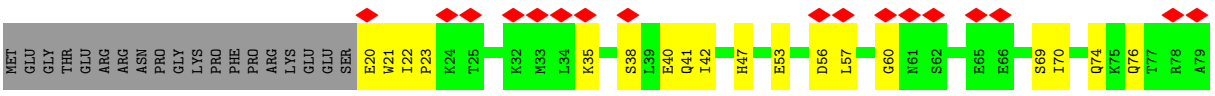
Chain S1:

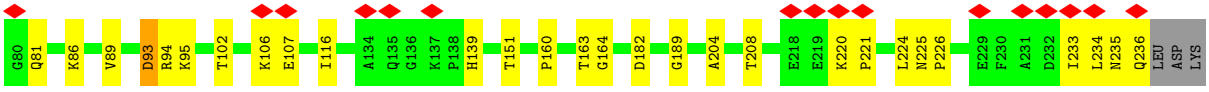





• Molecule 70: 40S RIBOSOMAL PROTEIN S2

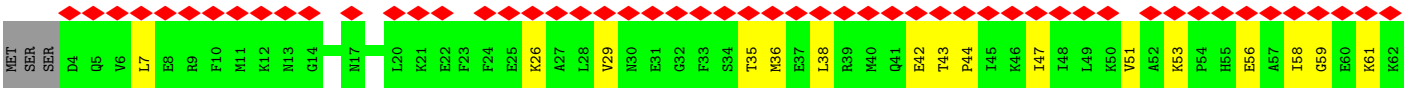
Chain S2:

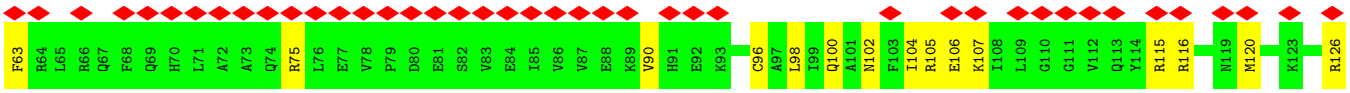



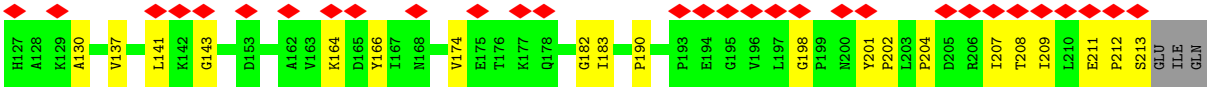


• Molecule 71: 40S ribosomal protein S3

Chain S3:

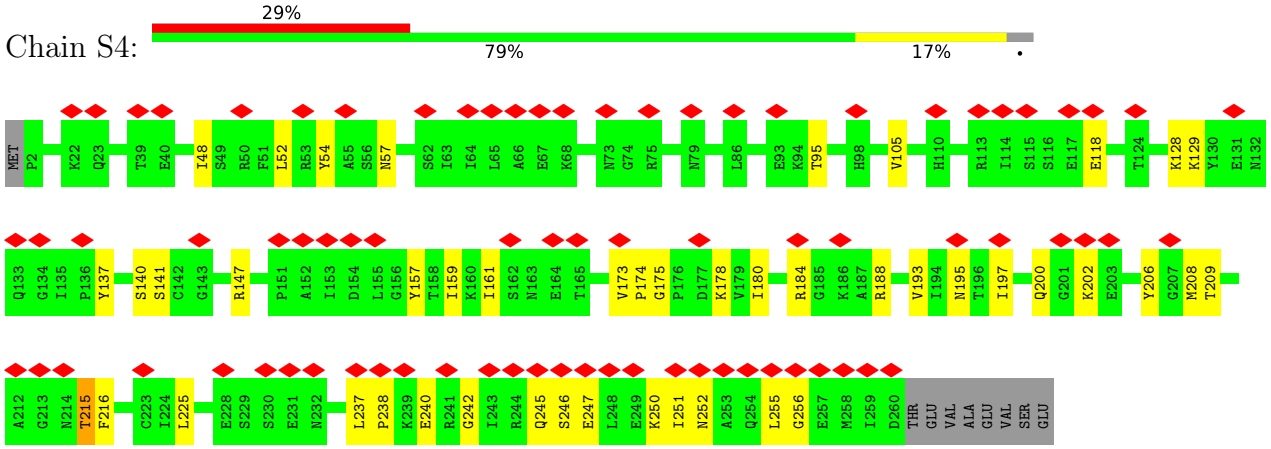







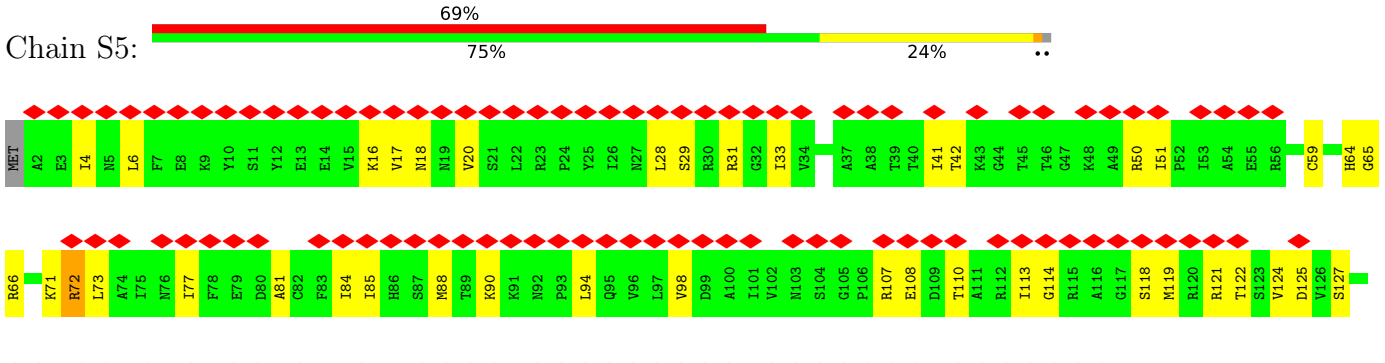
• Molecule 72: 40S ribosomal protein S4

Chain S4:



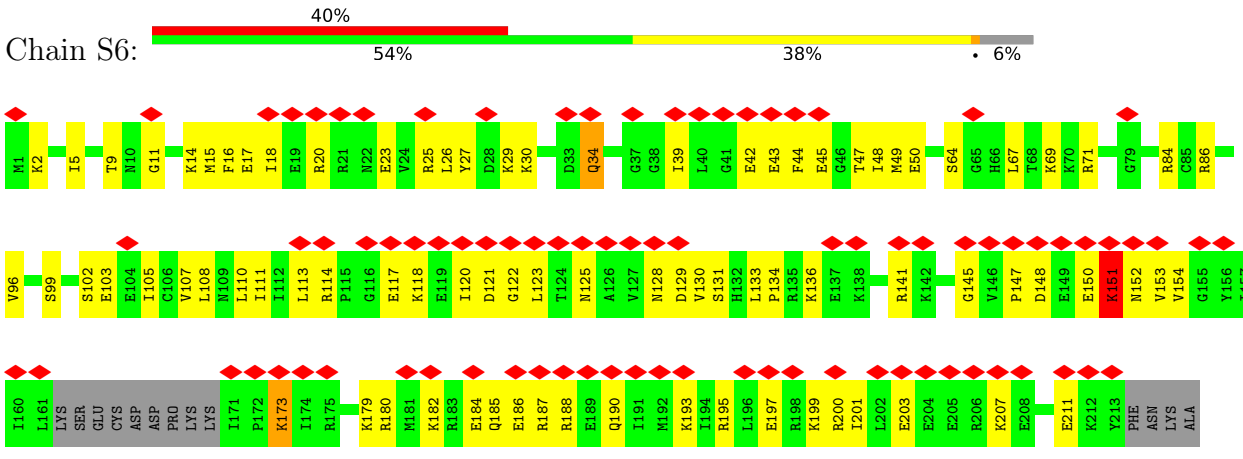

• Molecule 73: 40S ribosomal protein S5

Chain S5:



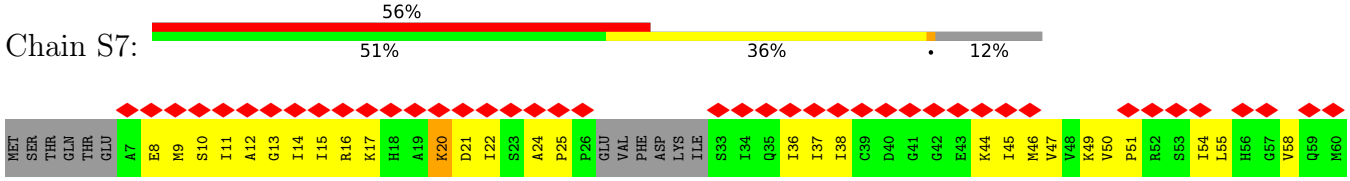

• Molecule 74: 40S ribosomal protein S6

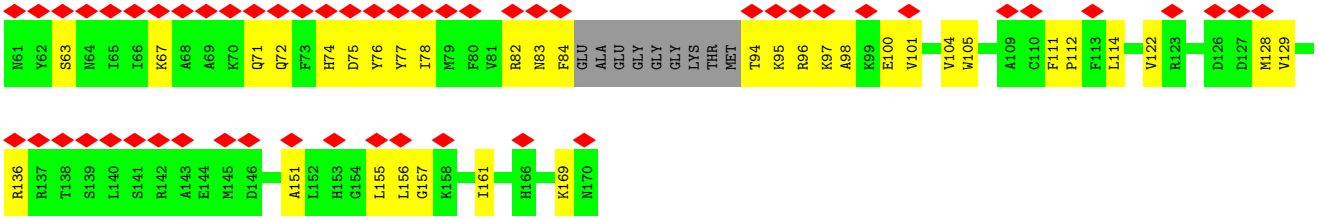
Chain S6:



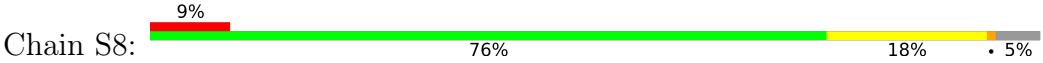

• Molecule 75: 40S ribosomal protein S7

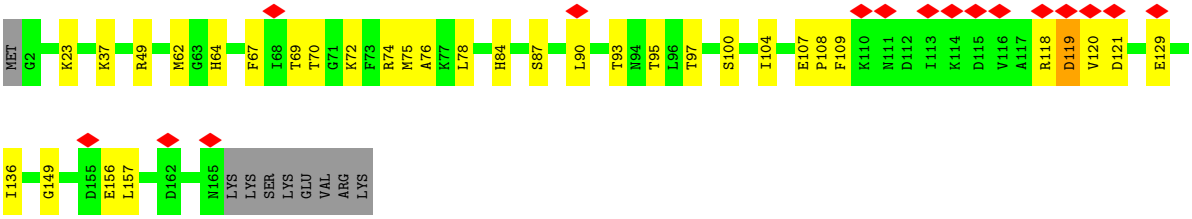
Chain S7:



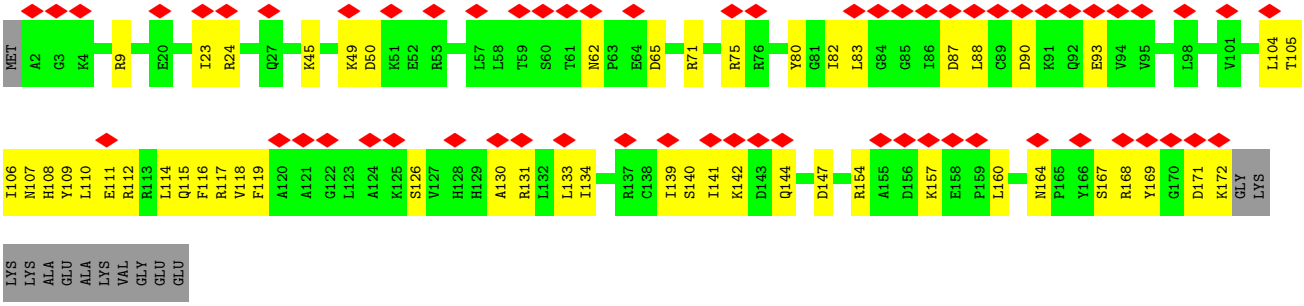



• Molecule 76: 40S ribosomal protein S8




• Molecule 77: 40S ribosomal protein S9

# 4 Experimental information (i)

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, C1 | Depositor |
| Number of particles used | 108005 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | PHASE FLIPPING AND AMPLITUDE CORRECTION | Depositor |
| Microscope | FEI TITAN KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose ($e^-/Å^2$) | 60 | Depositor |
| Minimum defocus (nm) | 800 | Depositor |
| Maximum defocus (nm) | 2600 | Depositor |
| Magnification | 96000 | Depositor |
| Image detector | FEI FALCON III (4k x 4k) | Depositor |
| Maximum map value | 0.928 | Depositor |
| Minimum map value | -0.411 | Depositor |
| Average map value | 0.000 | Depositor |
| Map value standard deviation | 0.017 | Depositor |
| Recommended contour level | 0.05 | Depositor |
| Map size (Å) | 440.832, 440.832, 440.832 | wwPDB |
| Map dimensions | 512, 512, 512 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 0.861, 0.861, 0.861 | Depositor |

# 5 Model quality (i)

## 5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: SPD, AMP, ZN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Chain | Bond lengths | | Bond angles | |
|---|---|---|---|---|---|
| | | RMSZ | #$\|Z\|$ >5 | RMSZ | #$\|Z\|$ >5 |
| 1 | RA | 0.39 | 0/2576 | 0.58 | 0/3470 |
| 2 | 1 | 1.09 | 25/55780 (0.0%) | 1.14 | 190/87016 (0.2%) |
| 3 | 2 | 0.91 | 0/2854 | 0.86 | 3/4449 (0.1%) |
| 4 | 3 | 1.14 | 6/31169 (0.0%) | 1.03 | 51/48638 (0.1%) |
| 5 | C0 | 0.40 | 0/701 | 0.55 | 0/943 |
| 6 | C1 | 0.50 | 0/1150 | 0.57 | 0/1543 |
| 7 | C2 | 0.30 | 0/884 | 0.50 | 0/1180 |
| 8 | C3 | 0.49 | 0/1190 | 0.56 | 0/1601 |
| 9 | C4 | 0.44 | 0/952 | 0.60 | 0/1276 |
| 10 | C5 | 0.41 | 0/923 | 0.53 | 0/1246 |
| 11 | C6 | 0.48 | 0/1150 | 0.55 | 0/1538 |
| 12 | C7 | 0.42 | 0/975 | 0.52 | 0/1306 |
| 13 | C8 | 0.42 | 0/1133 | 0.62 | 0/1516 |
| 14 | C9 | 0.44 | 0/1109 | 0.55 | 0/1490 |
| 15 | D0 | 0.41 | 0/794 | 0.65 | 2/1066 (0.2%) |
| 16 | D1 | 0.40 | 0/522 | 0.49 | 0/701 |
| 17 | D2 | 0.49 | 0/1029 | 0.60 | 0/1375 |
| 18 | D3 | 0.47 | 0/1068 | 0.60 | 0/1430 |
| 19 | D4 | 0.37 | 0/1070 | 0.51 | 0/1426 |
| 20 | D5 | 0.37 | 0/696 | 0.57 | 0/928 |
| 21 | D6 | 0.47 | 0/813 | 0.57 | 0/1082 |
| 22 | D7 | 0.48 | 0/645 | 0.53 | 0/865 |
| 23 | D8 | 0.39 | 0/451 | 0.63 | 0/603 |
| 24 | D9 | 0.55 | 0/538 | 0.66 | 1/718 (0.1%) |
| 25 | E1 | 0.26 | 0/275 | 0.65 | 2/375 (0.5%) |
| 26 | L1 | 0.27 | 0/1015 | 0.64 | 7/1411 (0.5%) |
| 27 | L2 | 0.42 | 0/1788 | 0.58 | 0/2408 |
| 28 | L3 | 0.42 | 0/2876 | 0.59 | 0/3854 |
| 29 | L4 | 0.40 | 0/2634 | 0.58 | 1/3533 (0.0%) |
| 30 | L5 | 0.36 | 0/2315 | 0.47 | 0/3097 |
| 31 | L6 | 0.33 | 0/1299 | 0.48 | 0/1753 |
| 32 | L7 | 0.39 | 0/1936 | 0.51 | 0/2580 |

| Mol | Chain | Bond lengths | | Bond angles | |
|---|---|---|---|---|---|
| | | RMSZ | #\|Z\| >5 | RMSZ | #\|Z\| >5 |
| 33 | L8 | 0.33 | 0/1600 | 0.49 | 1/2156 (0.0%) |
| 34 | L9 | 0.36 | 0/1462 | 0.53 | 0/1961 |
| 35 | M0 | 0.40 | 0/1738 | 0.55 | 0/2319 |
| 36 | M1 | 0.32 | 0/1357 | 0.50 | 0/1813 |
| 37 | M3 | 0.41 | 0/1333 | 0.54 | 0/1785 |
| 38 | M4 | 0.33 | 0/857 | 0.48 | 0/1150 |
| 39 | M5 | 0.49 | 0/1684 | 0.58 | 0/2244 |
| 40 | M6 | 0.40 | 0/1602 | 0.50 | 0/2142 |
| 41 | M7 | 0.42 | 0/1389 | 0.56 | 0/1865 |
| 42 | M8 | 0.38 | 0/1494 | 0.51 | 0/2003 |
| 43 | M9 | 0.36 | 0/1413 | 0.48 | 0/1866 |
| 44 | MD | 0.28 | 0/1368 | 0.51 | 0/1842 |
| 45 | MS | 0.38 | 0/597 | 0.51 | 0/782 |
| 46 | N0 | 0.41 | 0/1470 | 0.52 | 0/1980 |
| 47 | N1 | 0.45 | 0/1313 | 0.62 | 1/1759 (0.1%) |
| 48 | N2 | 0.29 | 0/748 | 0.49 | 0/1001 |
| 49 | N3 | 0.38 | 0/1074 | 0.60 | 0/1438 |
| 50 | N4 | 0.36 | 0/719 | 0.52 | 0/959 |
| 51 | N5 | 0.40 | 0/730 | 0.56 | 0/983 |
| 52 | N6 | 0.38 | 0/1187 | 0.52 | 0/1576 |
| 53 | N7 | 0.33 | 0/954 | 0.46 | 0/1279 |
| 54 | N8 | 0.48 | 0/1230 | 0.69 | 0/1648 |
| 55 | N9 | 0.39 | 0/447 | 0.58 | 0/597 |
| 56 | O0 | 0.34 | 0/701 | 0.49 | 0/939 |
| 57 | O1 | 0.37 | 0/889 | 0.51 | 0/1194 |
| 58 | O2 | 0.43 | 0/1084 | 0.60 | 0/1448 |
| 59 | O3 | 0.40 | 0/876 | 0.58 | 0/1180 |
| 60 | O4 | 0.42 | 0/817 | 0.53 | 0/1085 |
| 61 | O5 | 0.36 | 0/988 | 0.47 | 0/1314 |
| 62 | O6 | 0.33 | 0/742 | 0.46 | 0/988 |
| 63 | O7 | 0.45 | 0/702 | 0.65 | 0/927 |
| 64 | O9 | 0.38 | 0/441 | 0.56 | 0/580 |
| 65 | P0 | 0.37 | 0/383 | 0.51 | 0/503 |
| 66 | P2 | 0.39 | 0/800 | 0.58 | 0/1056 |
| 67 | P3 | 0.40 | 0/673 | 0.52 | 0/893 |
| 68 | S0 | 0.36 | 0/1615 | 0.49 | 0/2189 |
| 69 | S1 | 0.44 | 0/1701 | 0.55 | 0/2275 |
| 70 | S2 | 0.43 | 0/1660 | 0.55 | 0/2238 |
| 71 | S3 | 0.41 | 0/1684 | 0.54 | 0/2263 |
| 72 | S4 | 0.43 | 0/2087 | 0.55 | 0/2810 |
| 73 | S5 | 0.39 | 0/1478 | 0.57 | 0/1989 |
| 74 | S6 | 0.40 | 0/1700 | 0.56 | 0/2259 |
| 75 | S7 | 0.36 | 0/1191 | 0.49 | 0/1602 |

| Mol | Chain | Bond lengths | | Bond angles | |
|---|---|---|---|---|---|
| | | RMSZ | #\|Z\| >5 | RMSZ | #\|Z\| >5 |
| 76 | S8 | 0.47 | 0/1323 | 0.59 | 1/1769 (0.1%) |
| 77 | S9 | 0.38 | 0/1397 | 0.52 | 0/1874 |
| All | All | 0.84 | 31/177008 (0.0%) | 0.89 | 260/256940 (0.1%) |

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

| Mol | Chain | #Chirality outliers | #Planarity outliers |
|---|---|---|---|
| 1 | RA | 0 | 1 |
| 6 | C1 | 0 | 1 |
| 7 | C2 | 0 | 1 |
| 14 | C9 | 0 | 1 |
| 32 | L7 | 0 | 1 |
| 34 | L9 | 0 | 2 |
| 37 | M3 | 0 | 1 |
| 43 | M9 | 0 | 1 |
| 50 | N4 | 0 | 2 |
| 62 | O6 | 0 | 1 |
| 70 | S2 | 0 | 1 |
| 72 | S4 | 0 | 1 |
| 74 | S6 | 0 | 1 |
| All | All | 0 | 15 |

The worst 5 of 31 bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 2 | 1 | 2193 | G | C8-N7 | -6.47 | 1.27 | 1.30 |
| 2 | 1 | 816 | G | C8-N7 | -6.07 | 1.27 | 1.30 |
| 2 | 1 | 472 | G | C8-N7 | -5.88 | 1.27 | 1.30 |
| 2 | 1 | 2322 | G | C8-N7 | -5.55 | 1.27 | 1.30 |
| 2 | 1 | 1017 | A | C8-N7 | -5.54 | 1.27 | 1.31 |

The worst 5 of 260 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 4 | 3 | 451 | C | N3-C2-O2 | -11.03 | 114.18 | 121.90 |
| 2 | 1 | 2249 | C | C6-N1-C2 | -10.79 | 115.99 | 120.30 |
| 2 | 1 | 431 | G | O4'-C1'-N9 | 9.04 | 115.43 | 108.20 |
| 4 | 3 | 451 | C | N1-C2-O2 | 8.44 | 123.96 | 118.90 |
| 2 | 1 | 129 | U | N3-C2-O2 | -8.09 | 116.54 | 122.20 |

There are no chirality outliers.

5 of 15 planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|---|---|---|---|---|
| 6 | C1 | 36 | VAL | Peptide |
| 7 | C2 | 104 | GLY | Peptide |
| 14 | C9 | 113 | GLU | Peptide |
| 32 | L7 | 227 | HIS | Peptide |
| 1 | RA | 95 | ASP | Peptide |

## 5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 1 | RA | 2537 | 0 | 2550 | 139 | 0 |
| 2 | 1 | 49833 | 0 | 24957 | 253 | 0 |
| 3 | 2 | 2550 | 0 | 1288 | 11 | 0 |
| 4 | 3 | 27838 | 0 | 13926 | 194 | 0 |
| 5 | C0 | 686 | 0 | 730 | 21 | 0 |
| 6 | C1 | 1126 | 0 | 1172 | 33 | 0 |
| 7 | C2 | 879 | 0 | 937 | 76 | 0 |
| 8 | C3 | 1166 | 0 | 1210 | 11 | 0 |
| 9 | C4 | 942 | 0 | 1005 | 18 | 0 |
| 10 | C5 | 903 | 0 | 945 | 31 | 0 |
| 11 | C6 | 1132 | 0 | 1193 | 26 | 0 |
| 12 | C7 | 962 | 0 | 987 | 39 | 0 |
| 13 | C8 | 1121 | 0 | 1170 | 42 | 0 |
| 14 | C9 | 1089 | 0 | 1103 | 38 | 0 |
| 15 | D0 | 779 | 0 | 787 | 32 | 0 |
| 16 | D1 | 518 | 0 | 526 | 17 | 0 |
| 17 | D2 | 1012 | 0 | 1033 | 9 | 0 |
| 18 | D3 | 1052 | 0 | 1126 | 12 | 0 |
| 19 | D4 | 1056 | 0 | 1135 | 31 | 0 |
| 20 | D5 | 691 | 0 | 727 | 22 | 0 |
| 21 | D6 | 801 | 0 | 820 | 13 | 0 |
| 22 | D7 | 633 | 0 | 621 | 15 | 0 |
| 23 | D8 | 446 | 0 | 457 | 23 | 0 |
| 24 | D9 | 524 | 0 | 517 | 7 | 0 |
| 25 | E1 | 276 | 0 | 128 | 6 | 0 |
| 26 | L1 | 1016 | 0 | 439 | 10 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 27 | L2 | 1759 | 0 | 1817 | 21 | 0 |
| 28 | L3 | 2827 | 0 | 2945 | 49 | 0 |
| 29 | L4 | 2596 | 0 | 2669 | 42 | 0 |
| 30 | L5 | 2273 | 0 | 2281 | 42 | 0 |
| 31 | L6 | 1279 | 0 | 1302 | 63 | 0 |
| 32 | L7 | 1903 | 0 | 1962 | 32 | 0 |
| 33 | L8 | 1573 | 0 | 1682 | 57 | 0 |
| 34 | L9 | 1443 | 0 | 1504 | 37 | 0 |
| 35 | M0 | 1706 | 0 | 1750 | 29 | 0 |
| 36 | M1 | 1336 | 0 | 1378 | 47 | 0 |
| 37 | M3 | 1308 | 0 | 1374 | 34 | 0 |
| 38 | M4 | 848 | 0 | 881 | 35 | 0 |
| 39 | M5 | 1657 | 0 | 1719 | 19 | 0 |
| 40 | M6 | 1577 | 0 | 1659 | 45 | 0 |
| 41 | M7 | 1363 | 0 | 1399 | 14 | 0 |
| 42 | M8 | 1470 | 0 | 1551 | 26 | 0 |
| 43 | M9 | 1398 | 0 | 1483 | 27 | 0 |
| 44 | MD | 1349 | 0 | 1346 | 64 | 0 |
| 45 | MS | 592 | 0 | 661 | 23 | 0 |
| 46 | N0 | 1438 | 0 | 1490 | 26 | 0 |
| 47 | N1 | 1288 | 0 | 1331 | 32 | 0 |
| 48 | N2 | 735 | 0 | 757 | 21 | 0 |
| 49 | N3 | 1058 | 0 | 1138 | 22 | 0 |
| 50 | N4 | 709 | 0 | 738 | 31 | 0 |
| 51 | N5 | 720 | 0 | 757 | 6 | 0 |
| 52 | N6 | 1171 | 0 | 1219 | 20 | 0 |
| 53 | N7 | 938 | 0 | 1008 | 28 | 0 |
| 54 | N8 | 1196 | 0 | 1207 | 26 | 0 |
| 55 | N9 | 437 | 0 | 442 | 9 | 0 |
| 56 | O0 | 692 | 0 | 736 | 12 | 0 |
| 57 | O1 | 879 | 0 | 946 | 19 | 0 |
| 58 | O2 | 1062 | 0 | 1135 | 19 | 0 |
| 59 | O3 | 861 | 0 | 879 | 12 | 0 |
| 60 | O4 | 807 | 0 | 868 | 12 | 0 |
| 61 | O5 | 981 | 0 | 1075 | 14 | 0 |
| 62 | O6 | 735 | 0 | 796 | 14 | 0 |
| 63 | O7 | 691 | 0 | 715 | 9 | 0 |
| 64 | O9 | 434 | 0 | 478 | 8 | 0 |
| 65 | P0 | 381 | 0 | 394 | 10 | 0 |
| 66 | P2 | 788 | 0 | 860 | 12 | 0 |
| 67 | P3 | 664 | 0 | 708 | 10 | 0 |
| 68 | S0 | 1584 | 0 | 1630 | 57 | 0 |

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| Mol | Chain | Non-H | H(model) | H(added) | Clashes | Symm-Clashes |
|---|---|---|---|---|---|---|
| 69 | S1 | 1670 | 0 | 1705 | 32 | 0 |
| 70 | S2 | 1636 | 0 | 1731 | 31 | 0 |
| 71 | S3 | 1658 | 0 | 1728 | 37 | 0 |
| 72 | S4 | 2045 | 0 | 2092 | 37 | 0 |
| 73 | S5 | 1461 | 0 | 1523 | 40 | 0 |
| 74 | S6 | 1680 | 0 | 1756 | 87 | 0 |
| 75 | S7 | 1173 | 0 | 1206 | 66 | 0 |
| 76 | S8 | 1300 | 0 | 1344 | 25 | 0 |
| 77 | S9 | 1374 | 0 | 1435 | 46 | 0 |
| 78 | D6 | 1 | 0 | 0 | 0 | 0 |
| 78 | D7 | 1 | 0 | 0 | 0 | 0 |
| 78 | D9 | 1 | 0 | 0 | 0 | 0 |
| 78 | E1 | 1 | 0 | 0 | 0 | 0 |
| 78 | O7 | 1 | 0 | 0 | 0 | 0 |
| 78 | P0 | 1 | 0 | 0 | 0 | 0 |
| 78 | P2 | 1 | 0 | 0 | 0 | 0 |
| 78 | P3 | 1 | 0 | 0 | 0 | 0 |
| 79 | L9 | 23 | 12 | 12 | 0 | 0 |
| 80 | N8 | 10 | 19 | 19 | 0 | 0 |
| All | All | 166112 | 31 | 128710 | 2343 | 0 |

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

The worst 5 of 2343 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

| Atom-1 | Atom-2 | Interatomic distance (Å) | Clash overlap (Å) |
|---|---|---|---|
| 4:3:573:A:H5” | 9:C4:49:ARG:HD3 | 1.39 | 1.03 |
| 75:S7:49:LYS:HB3 | 75:S7:83:ASN:HB3 | 1.44 | 0.99 |
| 50:N4:73:GLN:HE22 | 74:S6:114:ARG:HB2 | 1.31 | 0.95 |
| 2:1:2538:G:H2’ | 2:1:2539:U:H5” | 1.48 | 0.95 |
| 73:S5:6:LEU:HD23 | 73:S5:94:LEU:HD22 | 1.49 | 0.95 |

There are no symmetry-related clashes.

## 5.3 Torsion angles (i)

### 5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles |
|---|---|---|---|---|---|---|
| 1 | RA | 326/334 (98%) | 264 (81%) | 62 (19%) | 0 | 100 100 |
| 5 | C0 | 79/96 (82%) | 72 (91%) | 7 (9%) | 0 | 100 100 |
| 6 | C1 | 139/156 (89%) | 123 (88%) | 16 (12%) | 0 | 100 100 |
| 7 | C2 | 116/134 (87%) | 102 (88%) | 14 (12%) | 0 | 100 100 |
| 8 | C3 | 144/148 (97%) | 136 (94%) | 8 (6%) | 0 | 100 100 |
| 9 | C4 | 124/134 (92%) | 113 (91%) | 11 (9%) | 0 | 100 100 |
| 10 | C5 | 114/148 (77%) | 107 (94%) | 7 (6%) | 0 | 100 100 |
| 11 | C6 | 139/145 (96%) | 124 (89%) | 15 (11%) | 0 | 100 100 |
| 12 | C7 | 115/120 (96%) | 104 (90%) | 11 (10%) | 0 | 100 100 |
| 13 | C8 | 139/153 (91%) | 126 (91%) | 13 (9%) | 0 | 100 100 |
| 14 | C9 | 133/137 (97%) | 123 (92%) | 10 (8%) | 0 | 100 100 |
| 15 | D0 | 89/120 (74%) | 81 (91%) | 8 (9%) | 0 | 100 100 |
| 16 | D1 | 66/70 (94%) | 65 (98%) | 1 (2%) | 0 | 100 100 |
| 17 | D2 | 125/128 (98%) | 122 (98%) | 3 (2%) | 0 | 100 100 |
| 18 | D3 | 135/140 (96%) | 129 (96%) | 6 (4%) | 0 | 100 100 |
| 19 | D4 | 125/131 (95%) | 113 (90%) | 12 (10%) | 0 | 100 100 |
| 20 | D5 | 85/109 (78%) | 72 (85%) | 13 (15%) | 0 | 100 100 |
| 21 | D6 | 99/105 (94%) | 94 (95%) | 5 (5%) | 0 | 100 100 |
| 22 | D7 | 80/85 (94%) | 68 (85%) | 12 (15%) | 0 | 100 100 |
| 23 | D8 | 55/65 (85%) | 47 (86%) | 8 (14%) | 0 | 100 100 |
| 24 | D9 | 63/66 (96%) | 57 (90%) | 6 (10%) | 0 | 100 100 |
| 25 | E1 | 56/152 (37%) | 47 (84%) | 8 (14%) | 1 (2%) | 8 21 |
| 26 | L1 | 204/219 (93%) | 151 (74%) | 41 (20%) | 12 (6%) | 1 2 |
| 27 | L2 | 230/239 (96%) | 204 (89%) | 26 (11%) | 0 | 100 100 |
| 28 | L3 | 359/383 (94%) | 315 (88%) | 43 (12%) | 1 (0%) | 41 66 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles |
|---|---|---|---|---|---|---|
| 29 | L4 | 327/335 (98%) | 293 (90%) | 33 (10%) | 1 (0%) | 41 66 |
| 30 | L5 | 281/287 (98%) | 262 (93%) | 19 (7%) | 0 | 100 100 |
| 31 | L6 | 157/171 (92%) | 128 (82%) | 28 (18%) | 1 (1%) | 25 50 |
| 32 | L7 | 229/239 (96%) | 213 (93%) | 16 (7%) | 0 | 100 100 |
| 33 | L8 | 195/206 (95%) | 163 (84%) | 32 (16%) | 0 | 100 100 |
| 34 | L9 | 181/183 (99%) | 154 (85%) | 27 (15%) | 0 | 100 100 |
| 35 | M0 | 207/219 (94%) | 190 (92%) | 16 (8%) | 1 (0%) | 29 54 |
| 36 | M1 | 165/173 (95%) | 143 (87%) | 21 (13%) | 1 (1%) | 25 50 |
| 37 | M3 | 159/163 (98%) | 144 (91%) | 14 (9%) | 1 (1%) | 25 50 |
| 38 | M4 | 102/106 (96%) | 93 (91%) | 9 (9%) | 0 | 100 100 |
| 39 | M5 | 201/204 (98%) | 190 (94%) | 11 (6%) | 0 | 100 100 |
| 40 | M6 | 194/198 (98%) | 187 (96%) | 7 (4%) | 0 | 100 100 |
| 41 | M7 | 172/183 (94%) | 157 (91%) | 15 (9%) | 0 | 100 100 |
| 42 | M8 | 184/200 (92%) | 172 (94%) | 12 (6%) | 0 | 100 100 |
| 43 | M9 | 168/171 (98%) | 157 (94%) | 11 (6%) | 0 | 100 100 |
| 44 | MD | 168/171 (98%) | 138 (82%) | 30 (18%) | 0 | 100 100 |
| 45 | MS | 66/73 (90%) | 63 (96%) | 3 (4%) | 0 | 100 100 |
| 46 | N0 | 176/188 (94%) | 157 (89%) | 16 (9%) | 3 (2%) | 9 23 |
| 47 | N1 | 157/160 (98%) | 136 (87%) | 19 (12%) | 2 (1%) | 12 30 |
| 48 | N2 | 89/112 (80%) | 76 (85%) | 13 (15%) | 0 | 100 100 |
| 49 | N3 | 133/146 (91%) | 127 (96%) | 6 (4%) | 0 | 100 100 |
| 50 | N4 | 87/100 (87%) | 74 (85%) | 12 (14%) | 1 (1%) | 14 34 |
| 51 | N5 | 91/105 (87%) | 83 (91%) | 8 (9%) | 0 | 100 100 |
| 52 | N6 | 140/143 (98%) | 131 (94%) | 7 (5%) | 2 (1%) | 11 28 |
| 53 | N7 | 114/126 (90%) | 100 (88%) | 14 (12%) | 0 | 100 100 |
| 54 | N8 | 144/147 (98%) | 123 (85%) | 20 (14%) | 1 (1%) | 22 46 |
| 55 | N9 | 53/57 (93%) | 47 (89%) | 6 (11%) | 0 | 100 100 |
| 56 | O0 | 88/108 (82%) | 83 (94%) | 5 (6%) | 0 | 100 100 |
| 57 | O1 | 106/111 (96%) | 94 (89%) | 10 (9%) | 2 (2%) | 8 20 |
| 58 | O2 | 126/139 (91%) | 123 (98%) | 3 (2%) | 0 | 100 100 |
| 59 | O3 | 105/113 (93%) | 97 (92%) | 8 (8%) | 0 | 100 100 |

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| Mol | Chain | Analysed | Favoured | Allowed | Outliers | Percentiles | |
|---|---|---|---|---|---|---|---|
| 60 | O4 | 98/110 (89%) | 94 (96%) | 4 (4%) | 0 | 100 | 100 |
| 61 | O5 | 119/122 (98%) | 118 (99%) | 1 (1%) | 0 | 100 | 100 |
| 62 | O6 | 92/94 (98%) | 85 (92%) | 7 (8%) | 0 | 100 | 100 |
| 63 | O7 | 84/90 (93%) | 81 (96%) | 3 (4%) | 0 | 100 | 100 |
| 64 | O9 | 48/52 (92%) | 43 (90%) | 5 (10%) | 0 | 100 | 100 |
| 65 | P0 | 47/131 (36%) | 42 (89%) | 5 (11%) | 0 | 100 | 100 |
| 66 | P2 | 95/104 (91%) | 81 (85%) | 13 (14%) | 1 (1%) | 14 | 34 |
| 67 | P3 | 84/89 (94%) | 80 (95%) | 4 (5%) | 0 | 100 | 100 |
| 68 | S0 | 201/252 (80%) | 178 (89%) | 23 (11%) | 0 | 100 | 100 |
| 69 | S1 | 205/239 (86%) | 184 (90%) | 21 (10%) | 0 | 100 | 100 |
| 70 | S2 | 215/242 (89%) | 199 (93%) | 16 (7%) | 0 | 100 | 100 |
| 71 | S3 | 208/216 (96%) | 190 (91%) | 18 (9%) | 0 | 100 | 100 |
| 72 | S4 | 257/268 (96%) | 228 (89%) | 29 (11%) | 0 | 100 | 100 |
| 73 | S5 | 186/189 (98%) | 171 (92%) | 14 (8%) | 1 (0%) | 29 | 54 |
| 74 | S6 | 200/217 (92%) | 182 (91%) | 17 (8%) | 1 (0%) | 29 | 54 |
| 75 | S7 | 143/170 (84%) | 132 (92%) | 10 (7%) | 1 (1%) | 22 | 46 |
| 76 | S8 | 162/173 (94%) | 148 (91%) | 13 (8%) | 1 (1%) | 25 | 50 |
| 77 | S9 | 169/184 (92%) | 147 (87%) | 22 (13%) | 0 | 100 | 100 |
| All | All | 10717/11696 (92%) | 9640 (90%) | 1042 (10%) | 35 (0%) | 44 | 66 |

5 of 35 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 26 | L1 | 27 | PRO |
| 26 | L1 | 37 | VAL |
| 26 | L1 | 44 | PRO |
| 26 | L1 | 57 | PRO |
| 26 | L1 | 83 | LEU |

### 5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was

analysed, and the total number of residues.

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles |
|---|---|---|---|---|---|
| 1 | RA | 286/291 (98%) | 285 (100%) | 1 (0%) | 92 98 |
| 5 | C0 | 76/86 (88%) | 76 (100%) | 0 | 100 100 |
| 6 | C1 | 124/138 (90%) | 124 (100%) | 0 | 100 100 |
| 7 | C2 | 99/114 (87%) | 99 (100%) | 0 | 100 100 |
| 8 | C3 | 127/129 (98%) | 127 (100%) | 0 | 100 100 |
| 9 | C4 | 93/101 (92%) | 93 (100%) | 0 | 100 100 |
| 10 | C5 | 98/125 (78%) | 98 (100%) | 0 | 100 100 |
| 11 | C6 | 121/125 (97%) | 118 (98%) | 3 (2%) | 47 76 |
| 12 | C7 | 107/109 (98%) | 106 (99%) | 1 (1%) | 78 92 |
| 13 | C8 | 119/129 (92%) | 119 (100%) | 0 | 100 100 |
| 14 | C9 | 119/121 (98%) | 118 (99%) | 1 (1%) | 81 93 |
| 15 | D0 | 88/114 (77%) | 87 (99%) | 1 (1%) | 73 90 |
| 16 | D1 | 55/57 (96%) | 55 (100%) | 0 | 100 100 |
| 17 | D2 | 107/108 (99%) | 107 (100%) | 0 | 100 100 |
| 18 | D3 | 111/114 (97%) | 111 (100%) | 0 | 100 100 |
| 19 | D4 | 117/121 (97%) | 117 (100%) | 0 | 100 100 |
| 20 | D5 | 73/91 (80%) | 73 (100%) | 0 | 100 100 |
| 21 | D6 | 86/89 (97%) | 85 (99%) | 1 (1%) | 71 88 |
| 22 | D7 | 71/73 (97%) | 71 (100%) | 0 | 100 100 |
| 23 | D8 | 48/56 (86%) | 48 (100%) | 0 | 100 100 |
| 24 | D9 | 57/58 (98%) | 57 (100%) | 0 | 100 100 |
| 27 | L2 | 192/198 (97%) | 191 (100%) | 1 (0%) | 88 96 |
| 28 | L3 | 298/313 (95%) | 298 (100%) | 0 | 100 100 |
| 29 | L4 | 274/280 (98%) | 271 (99%) | 3 (1%) | 73 90 |
| 30 | L5 | 235/238 (99%) | 234 (100%) | 1 (0%) | 91 97 |
| 31 | L6 | 139/151 (92%) | 139 (100%) | 0 | 100 100 |
| 32 | L7 | 210/216 (97%) | 208 (99%) | 2 (1%) | 76 91 |
| 33 | L8 | 181/190 (95%) | 180 (99%) | 1 (1%) | 86 95 |
| 34 | L9 | 157/157 (100%) | 155 (99%) | 2 (1%) | 69 87 |
| 35 | M0 | 179/184 (97%) | 178 (99%) | 1 (1%) | 86 95 |
| 36 | M1 | 143/149 (96%) | 142 (99%) | 1 (1%) | 84 94 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles |
|---|---|---|---|---|---|
| 37 | M3 | 139/141 (99%) | 137 (99%) | 2 (1%) | 67 86 |
| 38 | M4 | 93/94 (99%) | 93 (100%) | 0 | 100 100 |
| 39 | M5 | 173/174 (99%) | 173 (100%) | 0 | 100 100 |
| 40 | M6 | 167/168 (99%) | 167 (100%) | 0 | 100 100 |
| 41 | M7 | 142/160 (89%) | 141 (99%) | 1 (1%) | 84 94 |
| 42 | M8 | 165/178 (93%) | 165 (100%) | 0 | 100 100 |
| 43 | M9 | 147/148 (99%) | 146 (99%) | 1 (1%) | 84 94 |
| 44 | MD | 158/159 (99%) | 158 (100%) | 0 | 100 100 |
| 45 | MS | 65/69 (94%) | 63 (97%) | 2 (3%) | 40 69 |
| 46 | N0 | 160/169 (95%) | 158 (99%) | 2 (1%) | 69 87 |
| 47 | N1 | 137/140 (98%) | 136 (99%) | 1 (1%) | 84 94 |
| 48 | N2 | 76/94 (81%) | 76 (100%) | 0 | 100 100 |
| 49 | N3 | 113/122 (93%) | 113 (100%) | 0 | 100 100 |
| 50 | N4 | 78/86 (91%) | 78 (100%) | 0 | 100 100 |
| 51 | N5 | 78/91 (86%) | 78 (100%) | 0 | 100 100 |
| 52 | N6 | 126/127 (99%) | 125 (99%) | 1 (1%) | 81 93 |
| 53 | N7 | 98/110 (89%) | 95 (97%) | 3 (3%) | 40 69 |
| 54 | N8 | 124/125 (99%) | 124 (100%) | 0 | 100 100 |
| 55 | N9 | 44/47 (94%) | 44 (100%) | 0 | 100 100 |
| 56 | O0 | 77/90 (86%) | 77 (100%) | 0 | 100 100 |
| 57 | O1 | 101/106 (95%) | 101 (100%) | 0 | 100 100 |
| 58 | O2 | 114/125 (91%) | 114 (100%) | 0 | 100 100 |
| 59 | O3 | 93/99 (94%) | 92 (99%) | 1 (1%) | 73 90 |
| 60 | O4 | 87/91 (96%) | 87 (100%) | 0 | 100 100 |
| 61 | O5 | 102/103 (99%) | 102 (100%) | 0 | 100 100 |
| 62 | O6 | 74/79 (94%) | 73 (99%) | 1 (1%) | 67 86 |
| 63 | O7 | 73/76 (96%) | 73 (100%) | 0 | 100 100 |
| 64 | O9 | 44/46 (96%) | 43 (98%) | 1 (2%) | 50 78 |
| 65 | P0 | 41/107 (38%) | 41 (100%) | 0 | 100 100 |
| 66 | P2 | 84/89 (94%) | 84 (100%) | 0 | 100 100 |
| 67 | P3 | 67/69 (97%) | 65 (97%) | 2 (3%) | 41 70 |

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| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles |
|---|---|---|---|---|---|
| 68 | S0 | 176/219 (80%) | 175 (99%) | 1 (1%) | 86 95 |
| 69 | S1 | 184/206 (89%) | 184 (100%) | 0 | 100 100 |
| 70 | S2 | 177/200 (88%) | 177 (100%) | 0 | 100 100 |
| 71 | S3 | 178/184 (97%) | 177 (99%) | 1 (1%) | 86 95 |
| 72 | S4 | 228/236 (97%) | 228 (100%) | 0 | 100 100 |
| 73 | S5 | 159/160 (99%) | 158 (99%) | 1 (1%) | 86 95 |
| 74 | S6 | 182/194 (94%) | 180 (99%) | 2 (1%) | 73 90 |
| 75 | S7 | 127/144 (88%) | 126 (99%) | 1 (1%) | 81 93 |
| 76 | S8 | 140/149 (94%) | 140 (100%) | 0 | 100 100 |
| 77 | S9 | 147/156 (94%) | 147 (100%) | 0 | 100 100 |
| All | All | 9128/9755 (94%) | 9084 (100%) | 44 (0%) | 89 96 |

5 of 44 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 47 | N1 | 153 | TYR |
| 64 | O9 | 4 | ARG |
| 52 | N6 | 109 | PHE |
| 53 | N7 | 110 | LYS |
| 67 | P3 | 60 | CYS |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 109 such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 43 | M9 | 134 | HIS |
| 55 | N9 | 36 | HIS |
| 72 | S4 | 245 | GLN |
| 44 | MD | 116 | ASN |
| 51 | N5 | 44 | ASN |

### 5.3.3 RNA (i)

| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|---|---|---|---|---|
| 2 | 1 | 2305/2486 (92%) | 405 (17%) | 25 (1%) |
| 3 | 2 | 118/119 (99%) | 20 (16%) | 0 |
| 4 | 3 | 1292/1300 (99%) | 335 (25%) | 13 (1%) |

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| Mol | Chain | Analysed | Backbone Outliers | Pucker Outliers |
|---|---|---|---|---|
| All | All | 3715/3905 (95%) | 760 (20%) | 38 (1%) |

5 of 760 RNA backbone outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 2 | 1 | 24 | U |
| 2 | 1 | 25 | G |
| 2 | 1 | 32 | G |
| 2 | 1 | 39 | U |
| 2 | 1 | 49 | G |

5 of 38 RNA pucker outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 4 | 3 | 133 | G |
| 4 | 3 | 891 | C |
| 4 | 3 | 199 | G |
| 4 | 3 | 523 | U |
| 4 | 3 | 1137 | G |

## 5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates

There are no monosaccharides in this entry.

## 5.6 Ligand geometry

Of 10 ligands modelled in this entry, 8 are monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

| Mol | Type | Chain | Res | Link | Bond lengths | | | Bond angles | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Counts | RMSZ | $\#\|Z\|>2$ | Counts | RMSZ | $\#\|Z\|>2$ |
| 79 | AMP | L9 | 201 | - | 22,25,25 | 0.62 | 0 | 25,38,38 | 0.72 | 1 (4%) |
| 80 | SPD | N8 | 201 | - | 9,9,9 | 0.41 | 0 | 8,8,8 | 1.18 | 1 (12%) |

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

| Mol | Type | Chain | Res | Link | Chirals | Torsions | Rings |
|---|---|---|---|---|---|---|---|
| 79 | AMP | L9 | 201 | - | - | 3/6/26/26 | 0/3/3/3 |
| 80 | SPD | N8 | 201 | - | - | 3/7/7/7 | - |

There are no bond length outliers.

All (2) bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 80 | N8 | 201 | SPD | C4-C5-N6 | -2.63 | 105.03 | 112.14 |
| 79 | L9 | 201 | AMP | C5-C6-N6 | 2.13 | 123.59 | 120.35 |

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

| Mol | Chain | Res | Type | Atoms |
|---|---|---|---|---|
| 79 | L9 | 201 | AMP | O4'-C4'-C5'-O5' |
| 79 | L9 | 201 | AMP | C3'-C4'-C5'-O5' |
| 80 | N8 | 201 | SPD | N6-C7-C8-C9 |
| 80 | N8 | 201 | SPD | C4-C5-N6-C7 |
| 80 | N8 | 201 | SPD | C2-C3-C4-C5 |

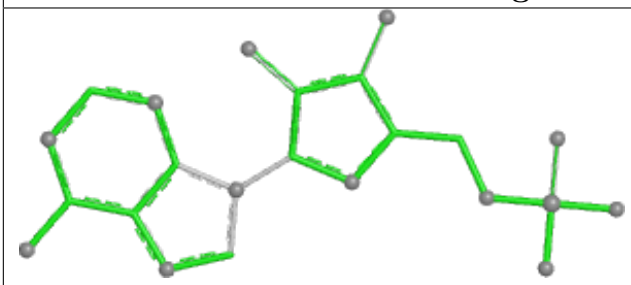
There are no ring outliers.

No monomer is involved in short contacts.

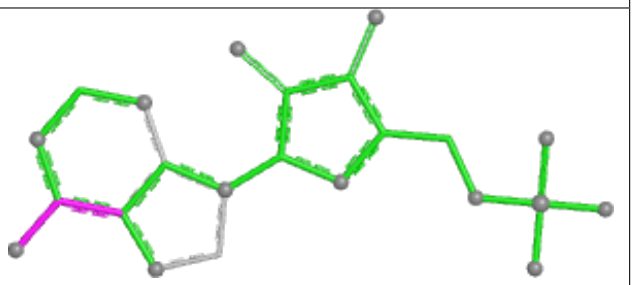
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

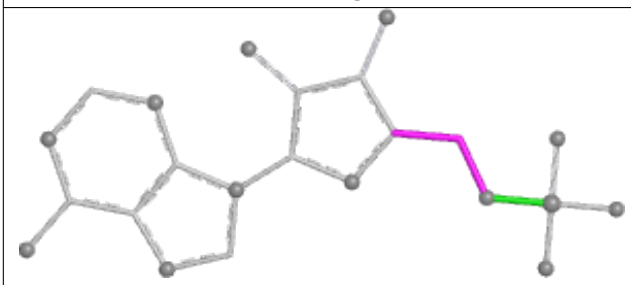
**Ligand AMP L9 201**



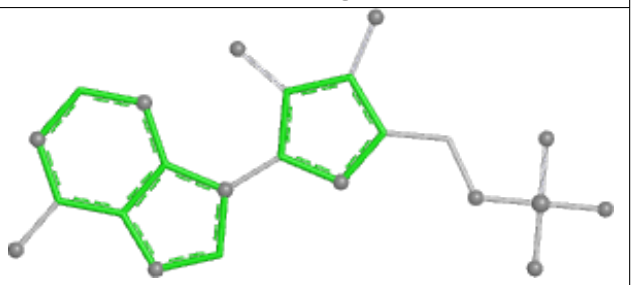
**Bond lengths**



**Bond angles**



**Torsions**



**Rings**

## 5.7 Other polymers (i)

There are no such residues in this entry.

## 5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

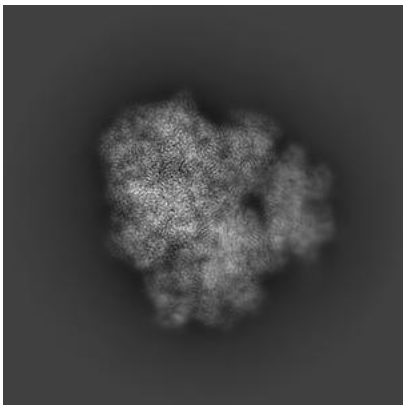
# 6 Map visualisation

This section contains visualisations of the EMDB entry EMD-13936. These allow visual inspection of the internal detail of the map and identification of artifacts.

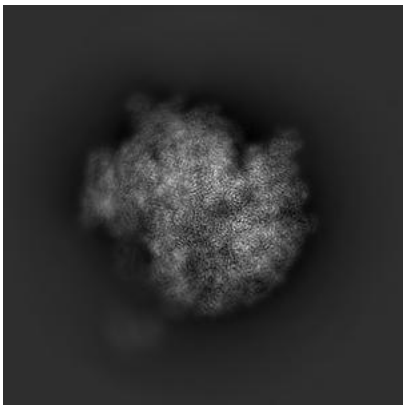
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

## 6.1 Orthogonal projections

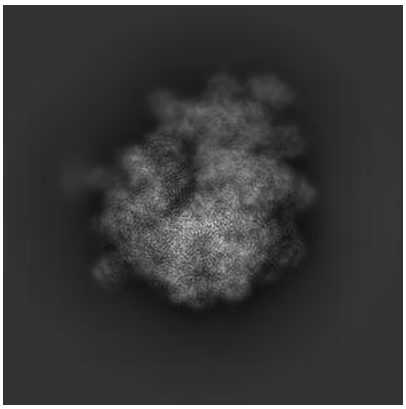
### 6.1.1 Primary map



X

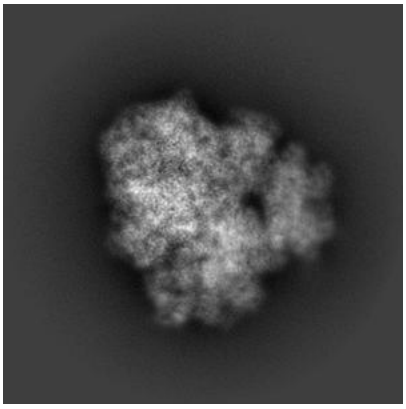


Y

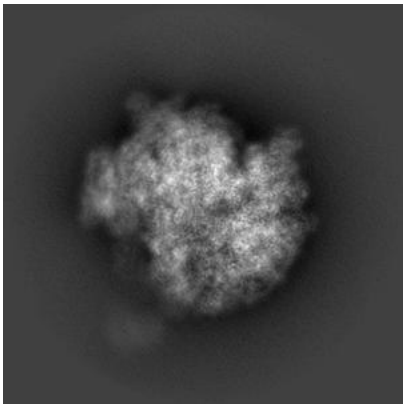


Z

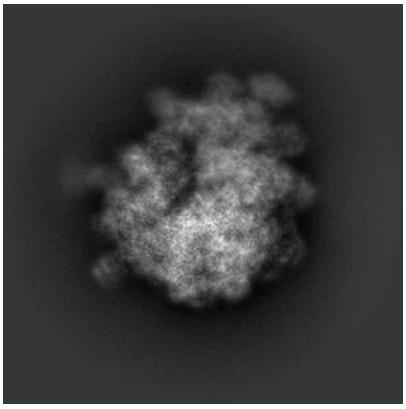
### 6.1.2 Raw map



X



Y

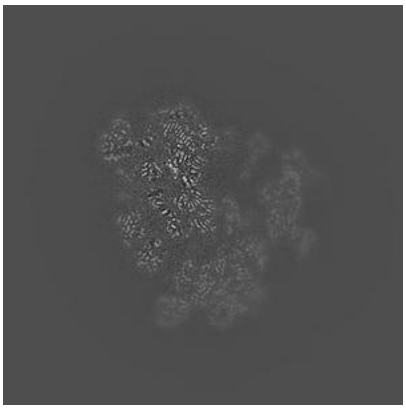


Z

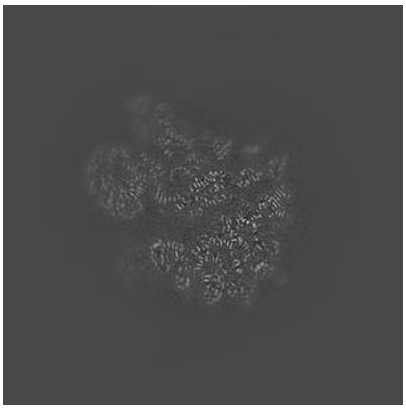
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices (i)

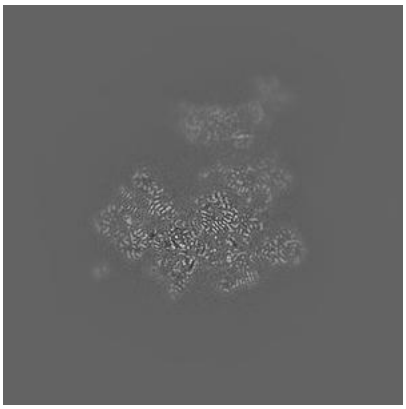
### 6.2.1 Primary map



X Index: 256

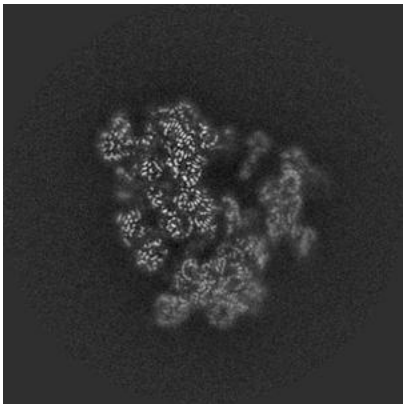


Y Index: 256

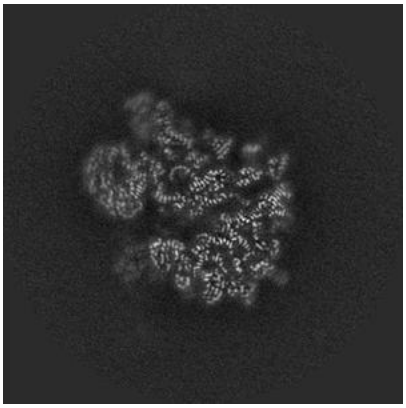


Z Index: 256

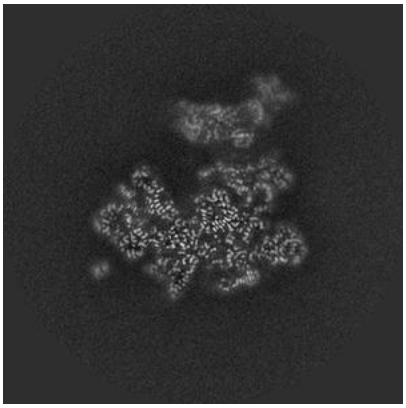
### 6.2.2 Raw map



X Index: 256



Y Index: 256

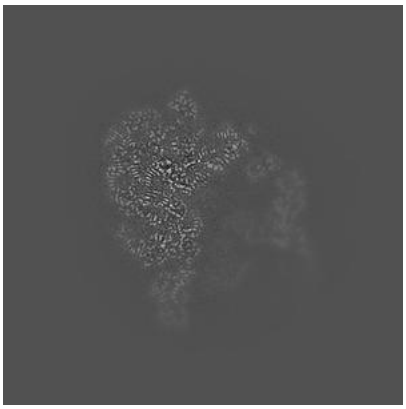


Z Index: 256

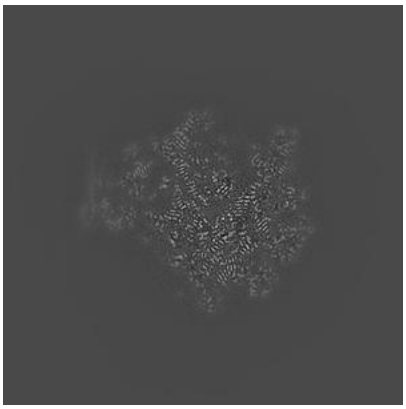
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices (i)

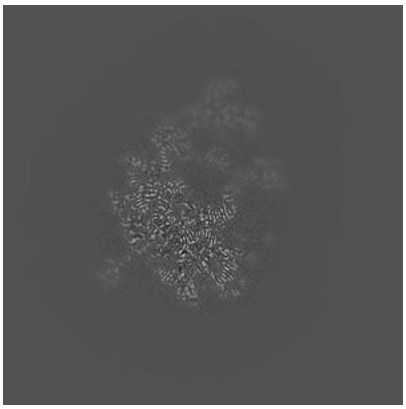
### 6.3.1 Primary map



X Index: 231

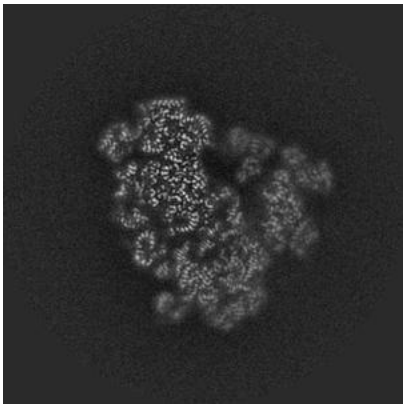


Y Index: 219

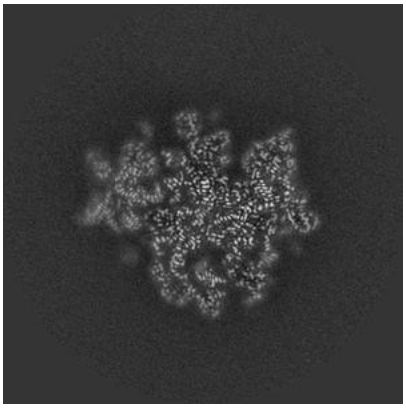


Z Index: 301

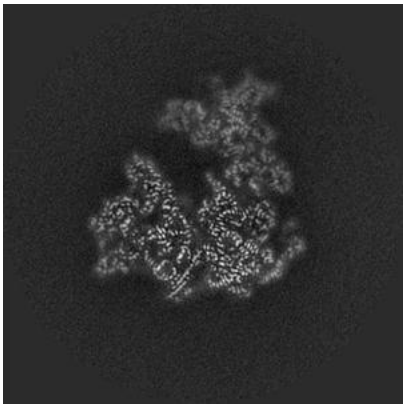
### 6.3.2 Raw map



X Index: 267



Y Index: 233

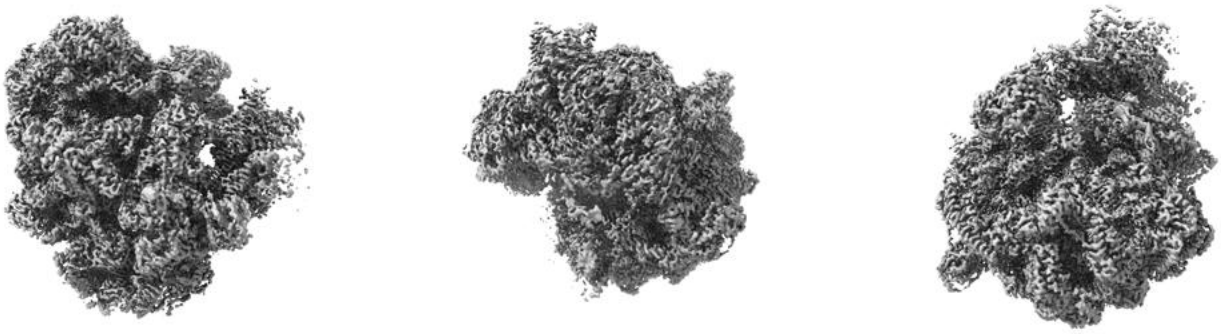


Z Index: 272

The images above show the largest variance slices of the map in three orthogonal directions.

## 6.4 Orthogonal surface views (i)

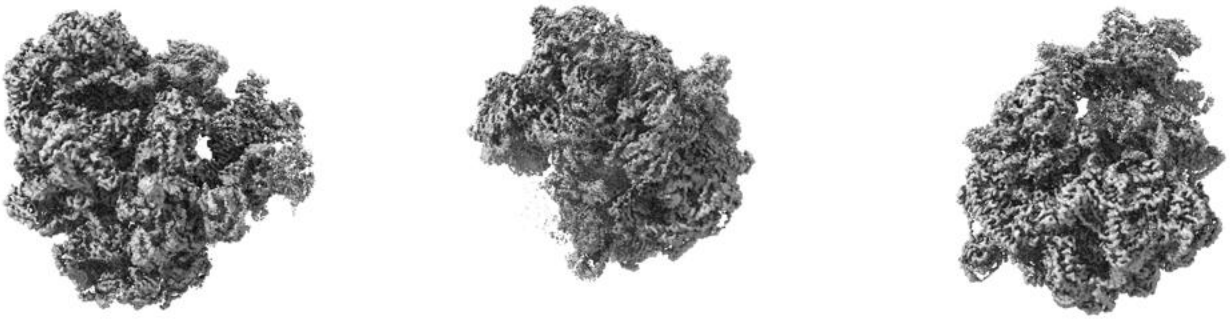
### 6.4.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.05. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 Raw map



X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

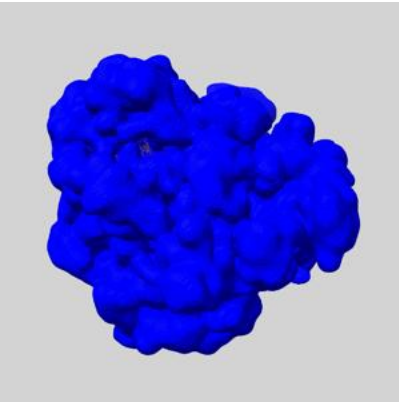
## 6.5 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

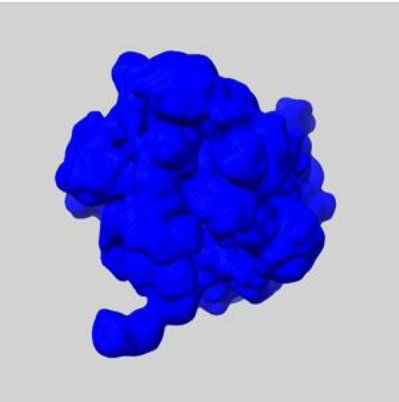
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

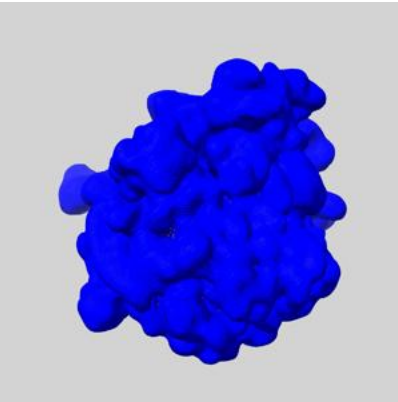
### 6.5.1 emd_13936_msk_1.map (i)



X



Y

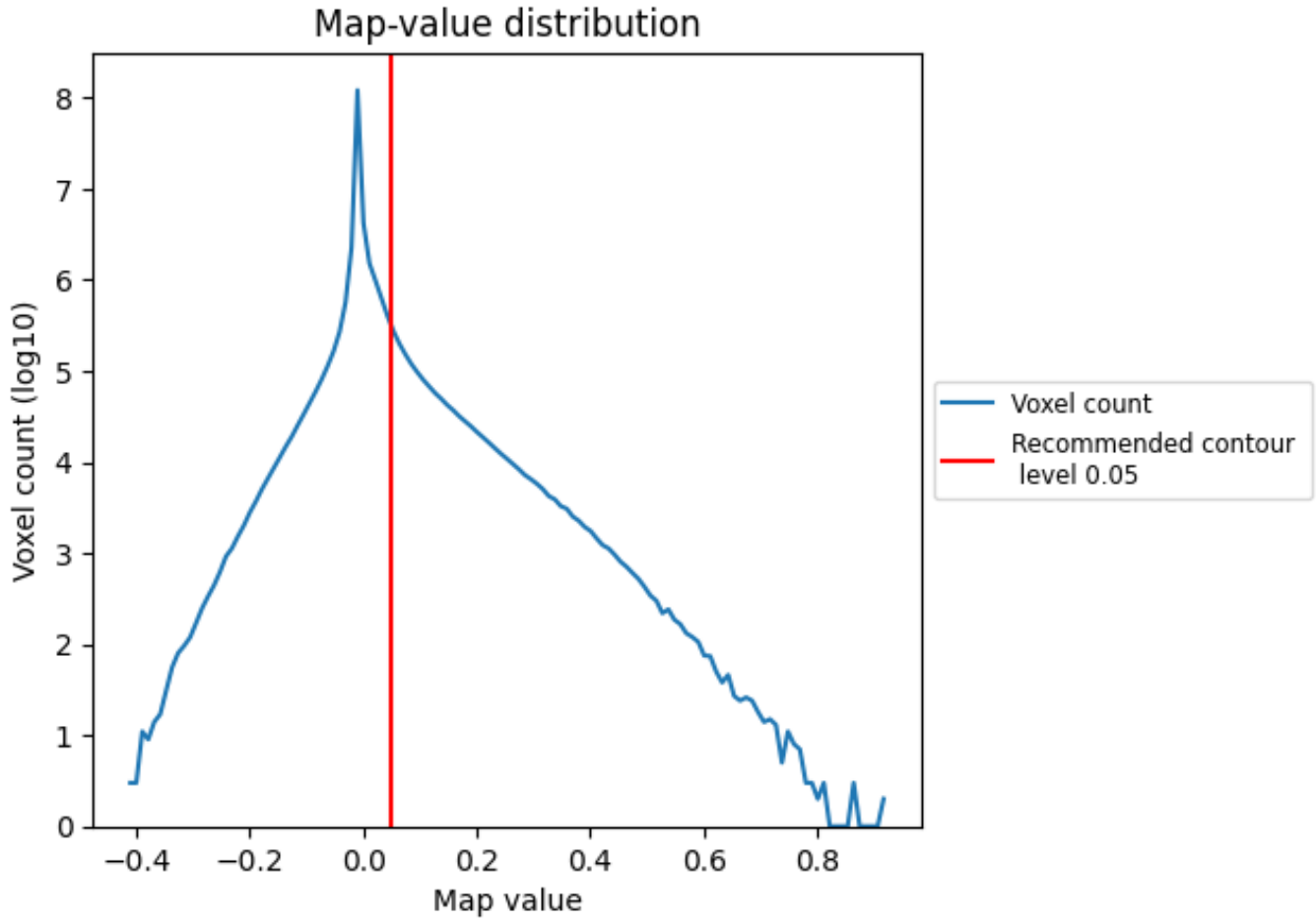


Z

# 7 Map analysis

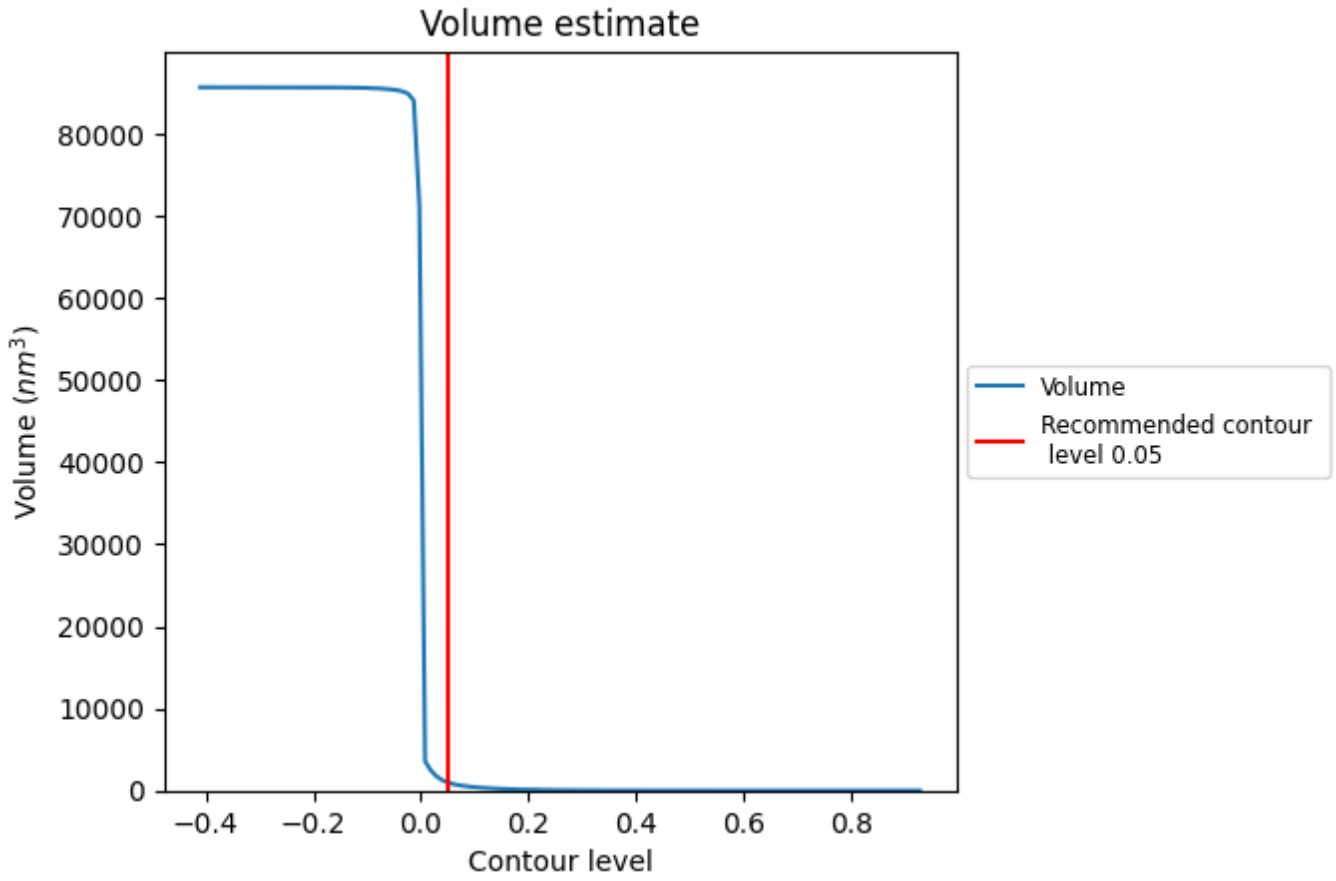
This section contains the results of statistical analysis of the map.

## 7.1 Map-value distribution




The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

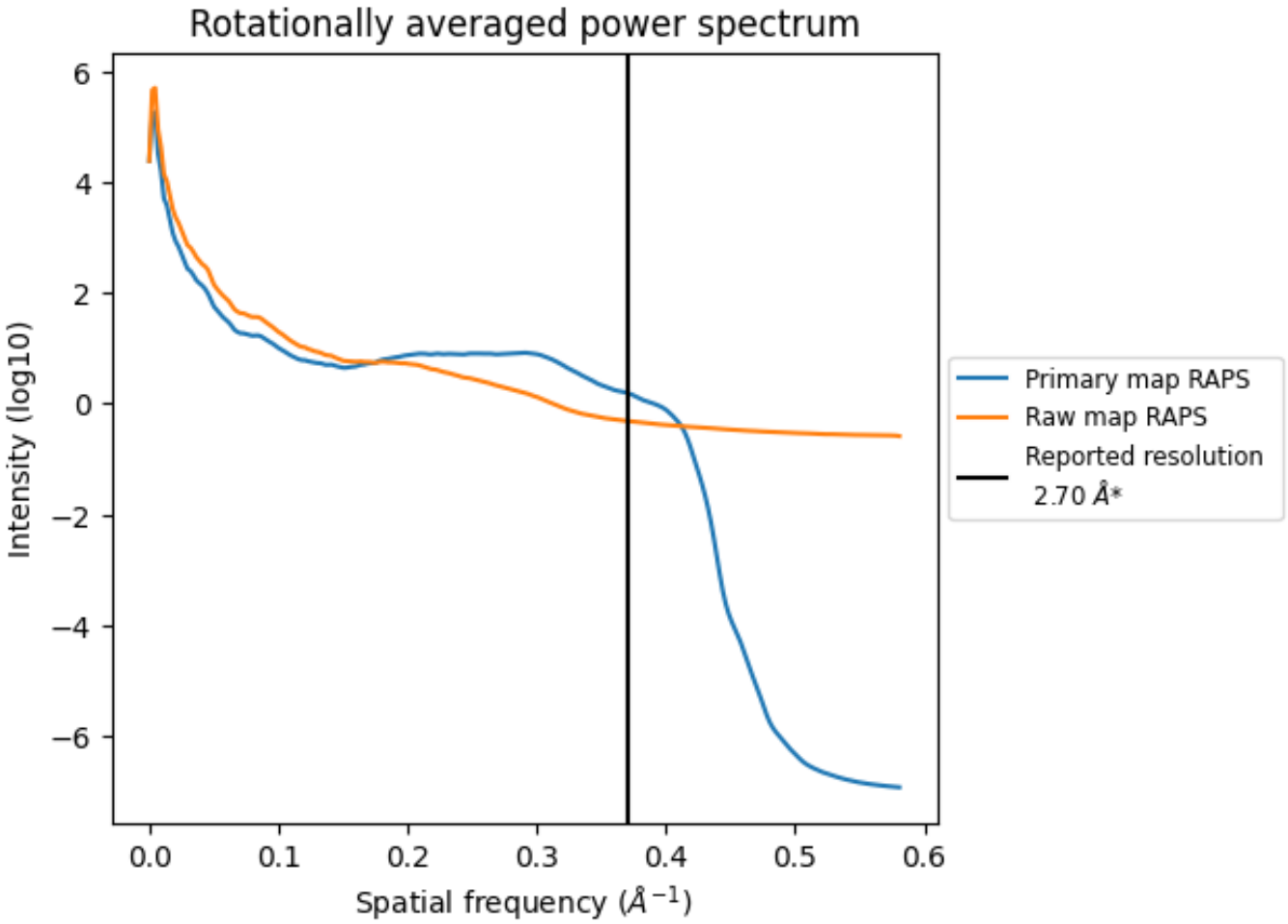
## 7.2 Volume estimate (i)




The volume at the recommended contour level is 982 $nm^3$; this corresponds to an approximate mass of 887 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

## 7.3 Rotationally averaged power spectrum (i)

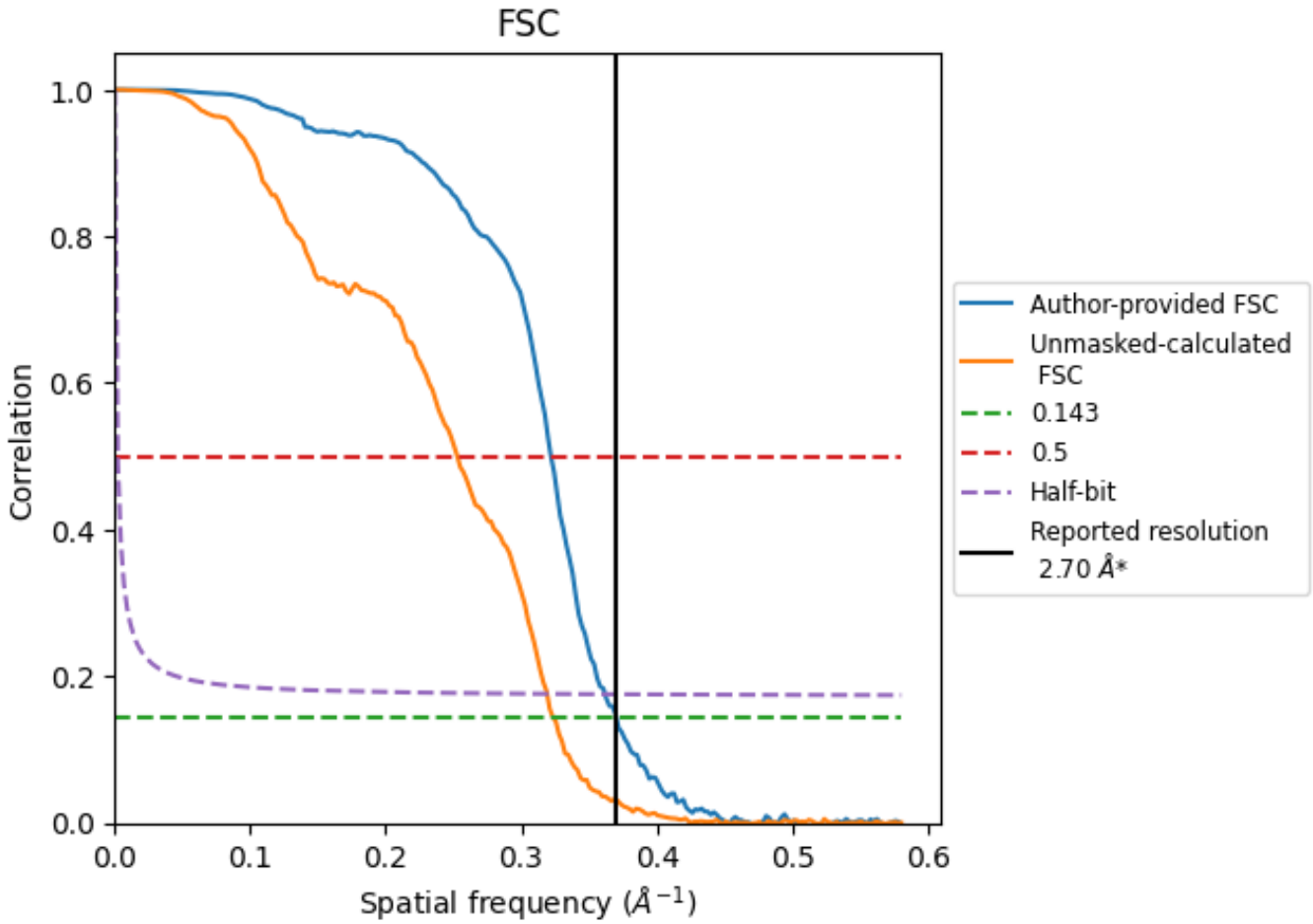



*Reported resolution corresponds to spatial frequency of 0.370 Å$^{-1}$

# 8 Fourier-Shell correlation

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

## 8.1 FSC




*Reported resolution corresponds to spatial frequency of 0.370 Å$^{-1}$

## 8.2 Resolution estimates (i)

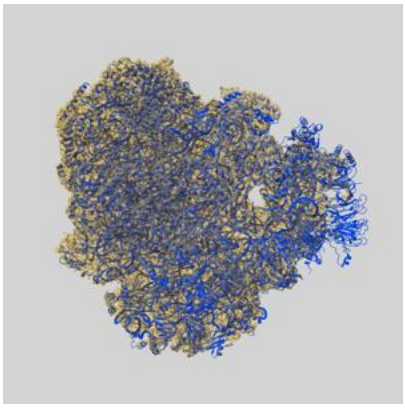
| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 2.70 | - | - |
| Author-provided FSC curve | 2.70 | 3.11 | 2.76 |
| Unmasked-calculated* | 3.09 | 3.95 | 3.13 |

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.09 differs from the reported value 2.7 by more than 10 %

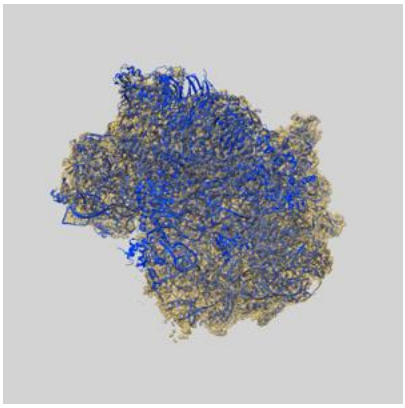
# 9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-13936 and PDB model 7QEP. Per-residue inclusion information can be found in section 3 on page 19.

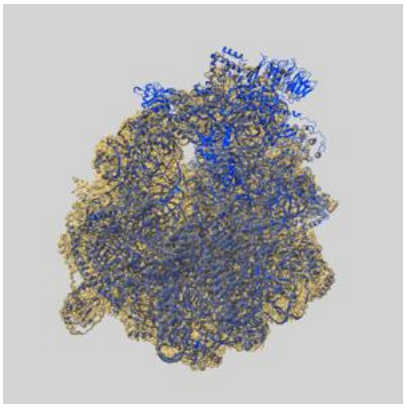
## 9.1 Map-model overlay



X



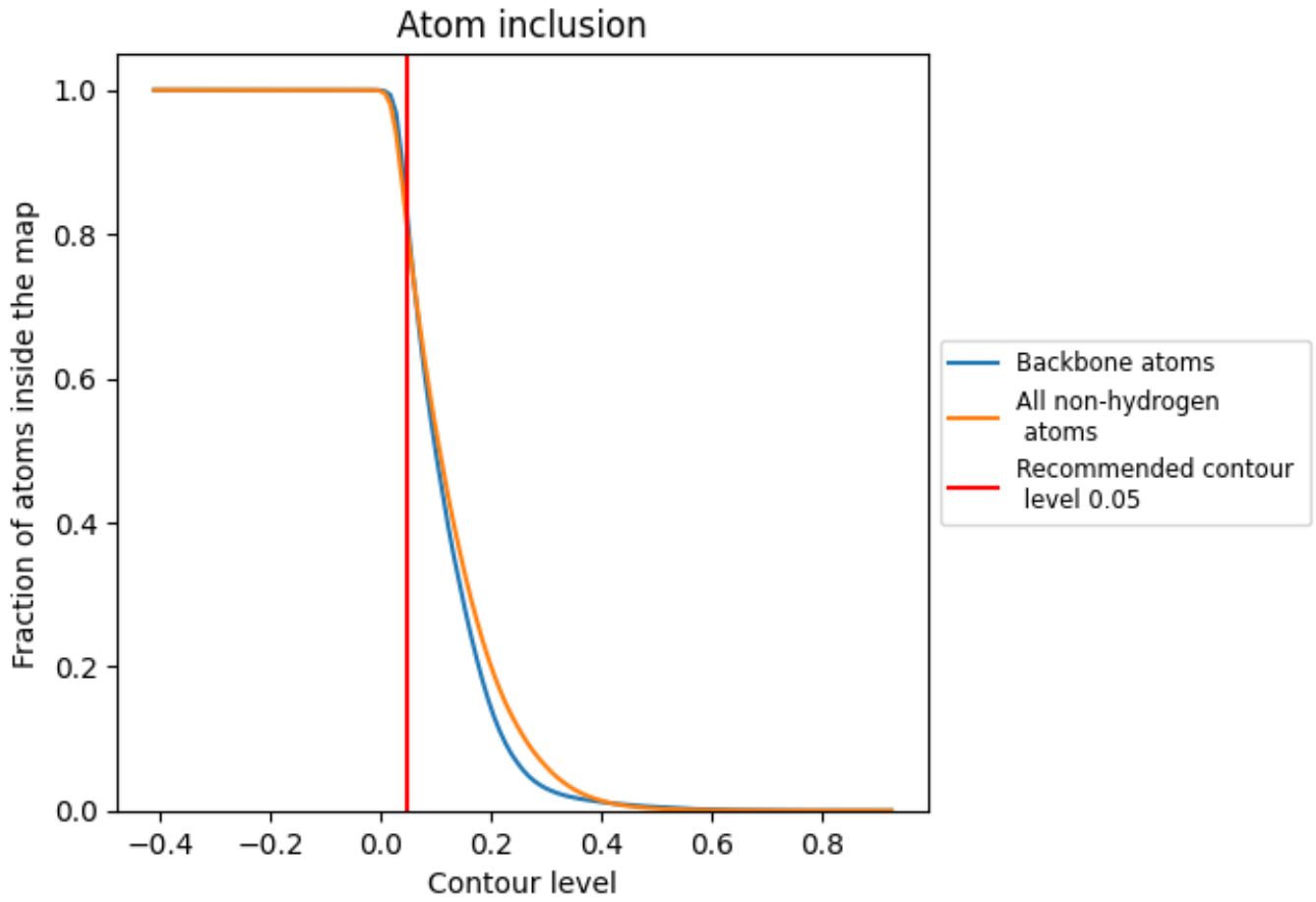
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.05 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Atom inclusion (i)




At the recommended contour level, 81% of all backbone atoms, 80% of all non-hydrogen atoms, are inside the map.