# wwPDB EM Validation Summary Report (i)

Nov 19, 2022 – 05:48 pm GMT

| | | |
|---|---|---|
| PDB ID | : | 5O66 |
| EMDB ID | : | EMD-8640 |
| Title | : | Asymmetric AcrABZ-TolC |
| Authors | : | Du, D.; Luisi, B.F. |
| Deposited on | : | 2017-06-05 |
| Resolution | : | 5.90 Å(reported) |

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 (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

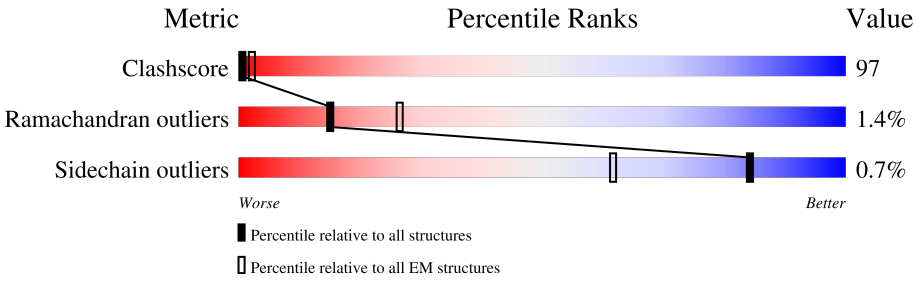
| | | |
|---|---|---|
| EMDB validation analysis | : | 0.0.1.dev43 |
| MolProbity | : | 4.02b-467 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| MapQ | : | 1.9.9 |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.31.2 |

# 1 Overall quality at a glance

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

The reported resolution of this entry is 5.90 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 |

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 | A | 493 | 38% 12% 73% • 13% |
| 1 | B | 493 | 37% 6% 80% • 13% |
| 1 | C | 493 | 36% 7% 79% • 13% |
| 2 | D | 373 | 38% 14% 73% • • 9% |
| 2 | E | 373 | 42% 9% 81% • 9% |
| 2 | F | 373 | 43% 13% 74% • • 9% |
| 2 | G | 373 | 47% 8% 80% • 9% |
| 2 | H | 373 | 43% 14% 75% • • 9% |

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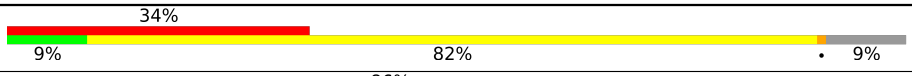
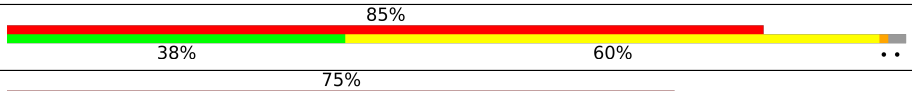
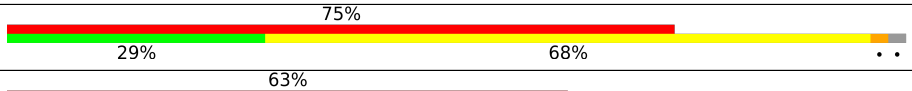
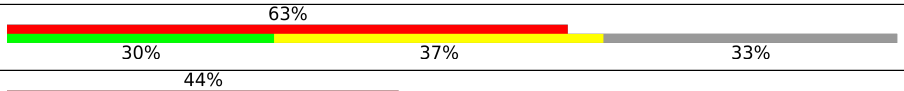
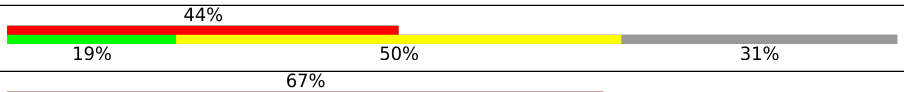
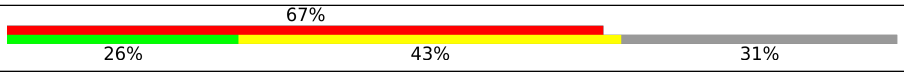
| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 2 | I | 373 |   |
| 3 | J | 1049 |   |
| 3 | K | 1049 |   |
| 3 | L | 1049 |   |
| 4 | M | 54 |   |
| 4 | N | 54 |   |
| 4 | O | 54 |   |

# 2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 49671 atoms, of which 0 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 Outer membrane protein TolC.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 428 | Total | C | N | O | S | 0 | 0 |
| | | | 3304 | 2037 | 586 | 676 | 5 | | |
| 1 | B | 428 | Total | C | N | O | S | 0 | 0 |
| | | | 3304 | 2037 | 586 | 676 | 5 | | |
| 1 | C | 428 | Total | C | N | O | S | 0 | 0 |
| | | | 3304 | 2037 | 586 | 676 | 5 | | |

- Molecule 2 is a protein called Multidrug efflux pump subunit AcrA.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 2 | D | 340 | Total | C | N | O | S | 0 | 0 |
| | | | 2553 | 1591 | 451 | 506 | 5 | | |
| 2 | E | 340 | Total | C | N | O | S | 0 | 0 |
| | | | 2553 | 1591 | 451 | 506 | 5 | | |
| 2 | F | 340 | Total | C | N | O | S | 0 | 0 |
| | | | 2553 | 1591 | 451 | 506 | 5 | | |
| 2 | G | 340 | Total | C | N | O | S | 0 | 0 |
| | | | 2553 | 1591 | 451 | 506 | 5 | | |
| 2 | H | 340 | Total | C | N | O | S | 0 | 0 |
| | | | 2553 | 1591 | 451 | 506 | 5 | | |
| 2 | I | 340 | Total | C | N | O | S | 0 | 0 |
| | | | 2553 | 1591 | 451 | 506 | 5 | | |

There are 24 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| D | 223 | MET | PHE | conflict | UNP P0AE07 |
| D | 224 | MET | LEU | conflict | UNP P0AE07 |
| D | 287 | MET | LEU | conflict | UNP P0AE07 |
| D | 288 | MET | LEU | conflict | UNP P0AE07 |
| E | 223 | MET | PHE | conflict | UNP P0AE07 |
| E | 224 | MET | LEU | conflict | UNP P0AE07 |
| E | 287 | MET | LEU | conflict | UNP P0AE07 |

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| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| E | 288 | MET | LEU | conflict | UNP P0AE07 |
| F | 223 | MET | PHE | conflict | UNP P0AE07 |
| F | 224 | MET | LEU | conflict | UNP P0AE07 |
| F | 287 | MET | LEU | conflict | UNP P0AE07 |
| F | 288 | MET | LEU | conflict | UNP P0AE07 |
| G | 223 | MET | PHE | conflict | UNP P0AE07 |
| G | 224 | MET | LEU | conflict | UNP P0AE07 |
| G | 287 | MET | LEU | conflict | UNP P0AE07 |
| G | 288 | MET | LEU | conflict | UNP P0AE07 |
| H | 223 | MET | PHE | conflict | UNP P0AE07 |
| H | 224 | MET | LEU | conflict | UNP P0AE07 |
| H | 287 | MET | LEU | conflict | UNP P0AE07 |
| H | 288 | MET | LEU | conflict | UNP P0AE07 |
| I | 223 | MET | PHE | conflict | UNP P0AE07 |
| I | 224 | MET | LEU | conflict | UNP P0AE07 |
| I | 287 | MET | LEU | conflict | UNP P0AE07 |
| I | 288 | MET | LEU | conflict | UNP P0AE07 |

- Molecule 3 is a protein called Multidrug efflux pump subunit AcrB.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 3 | J | 1044 | Total | C | N | O | S | 0 | 0 |
| | | | 7908 | 5086 | 1308 | 1470 | 44 | | |
| 3 | K | 1033 | Total | C | N | O | S | 0 | 0 |
| | | | 7845 | 5049 | 1294 | 1458 | 44 | | |
| 3 | L | 1033 | Total | C | N | O | S | 0 | 0 |
| | | | 7845 | 5049 | 1294 | 1458 | 44 | | |

- Molecule 4 is a protein called Multidrug efflux pump accessory protein AcrZ.

| Mol | Chain | Residues | Atoms | | | | | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|
| 4 | M | 36 | Total | C | N | O | S | 0 | 0 |
| | | | 277 | 193 | 38 | 43 | 3 | | |
| 4 | N | 37 | Total | C | N | O | S | 0 | 0 |
| | | | 283 | 196 | 39 | 45 | 3 | | |
| 4 | O | 37 | Total | C | N | O | S | 0 | 0 |
| | | | 283 | 196 | 39 | 45 | 3 | | |

There are 15 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| M | 50 | HIS | - | expression tag | UNP P0AAX1 |

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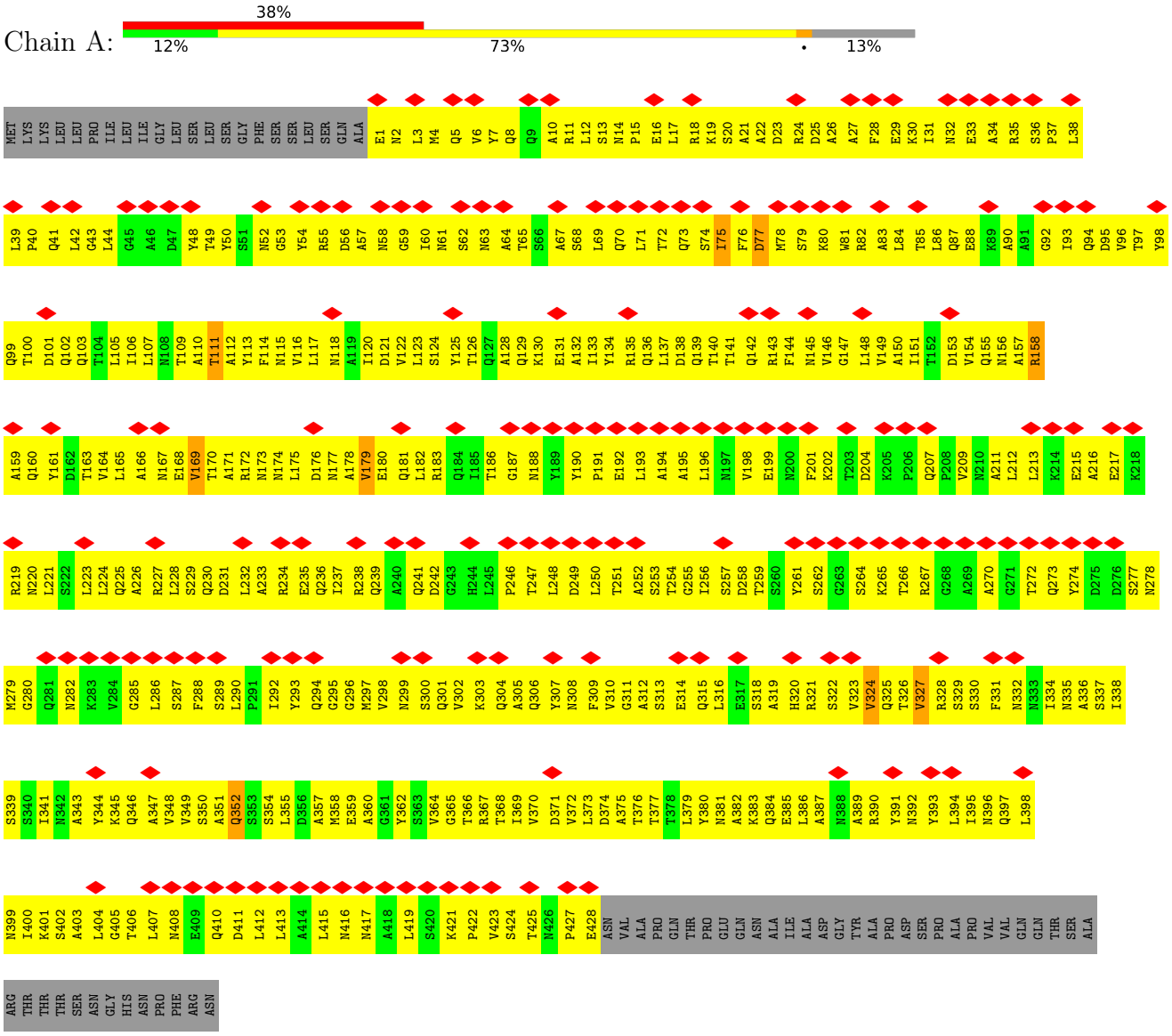
| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| M | 51 | HIS | - | expression tag | UNP P0AAX1 |
| M | 52 | HIS | - | expression tag | UNP P0AAX1 |
| M | 53 | HIS | - | expression tag | UNP P0AAX1 |
| M | 54 | HIS | - | expression tag | UNP P0AAX1 |
| N | 50 | HIS | - | expression tag | UNP P0AAX1 |
| N | 51 | HIS | - | expression tag | UNP P0AAX1 |
| N | 52 | HIS | - | expression tag | UNP P0AAX1 |
| N | 53 | HIS | - | expression tag | UNP P0AAX1 |
| N | 54 | HIS | - | expression tag | UNP P0AAX1 |
| O | 50 | HIS | - | expression tag | UNP P0AAX1 |
| O | 51 | HIS | - | expression tag | UNP P0AAX1 |
| O | 52 | HIS | - | expression tag | UNP P0AAX1 |
| O | 53 | HIS | - | expression tag | UNP P0AAX1 |
| O | 54 | HIS | - | expression tag | UNP P0AAX1 |

# 3 Residue-property plots (i)

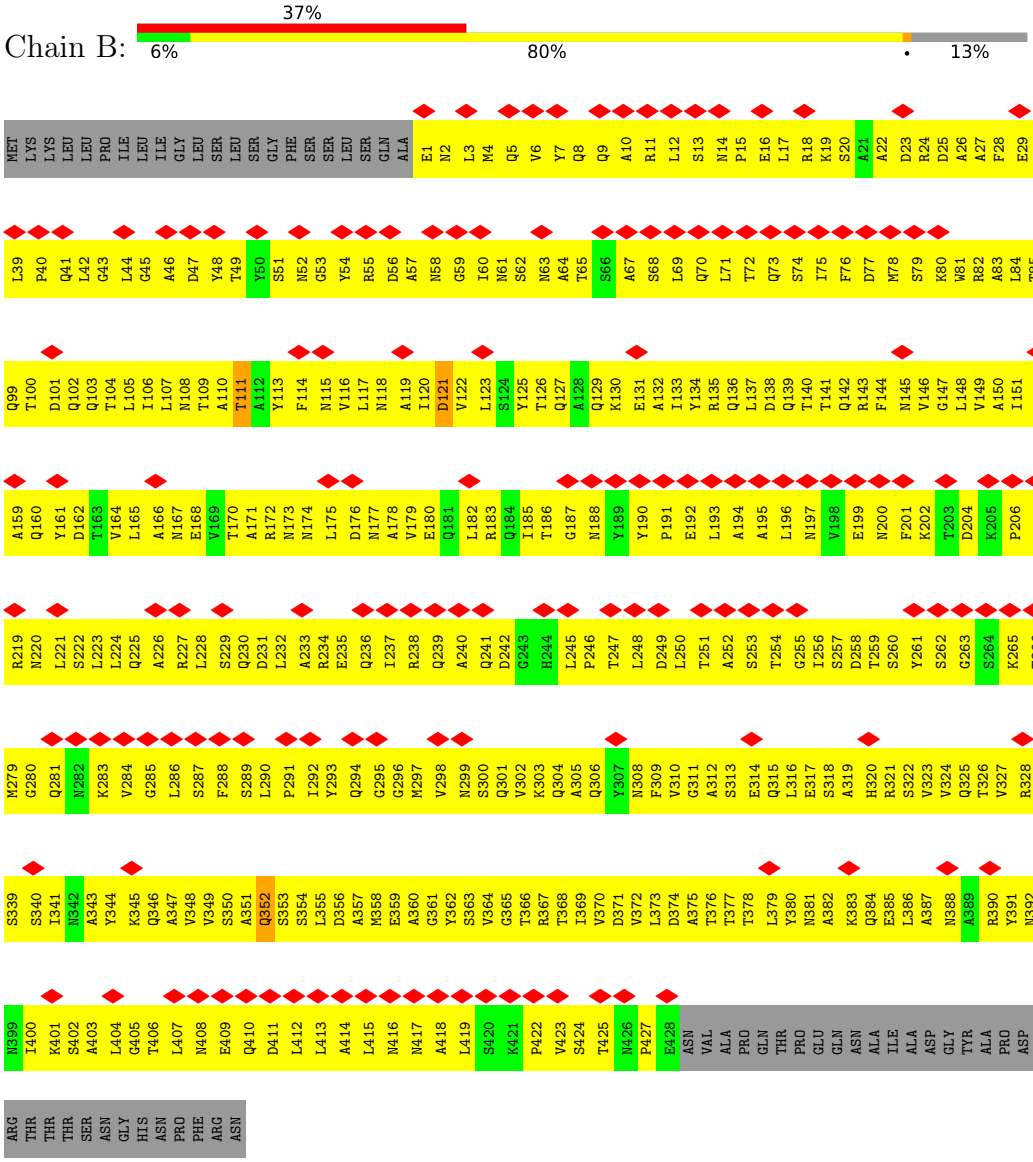
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Outer membrane protein TolC



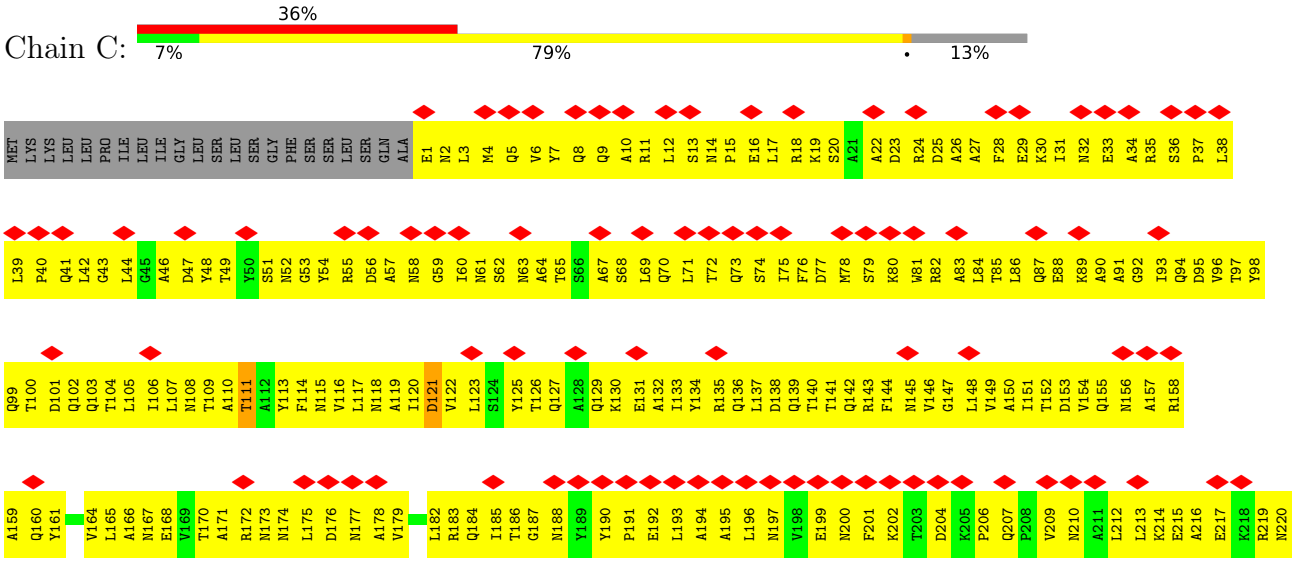

• Molecule 1: Outer membrane protein TolC

Chain B:



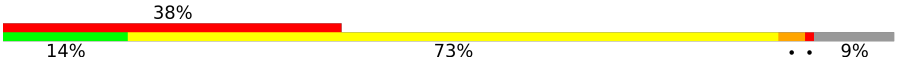

• Molecule 1: Outer membrane protein TolC

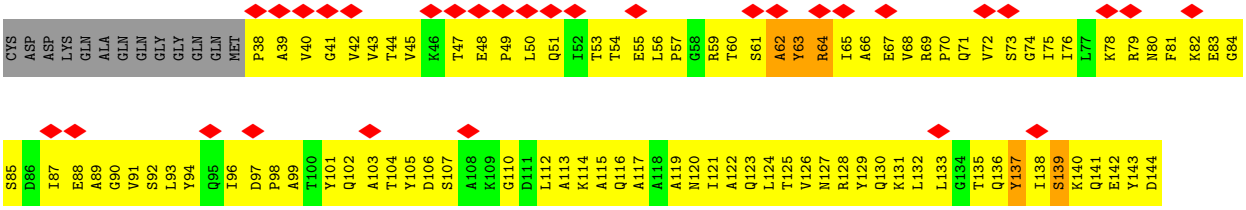
Chain C:




• Molecule 2: Multidrug efflux pump subunit AcrA

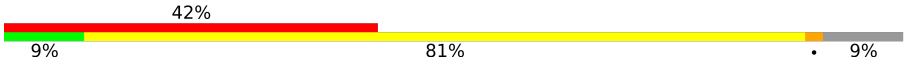
Chain D:

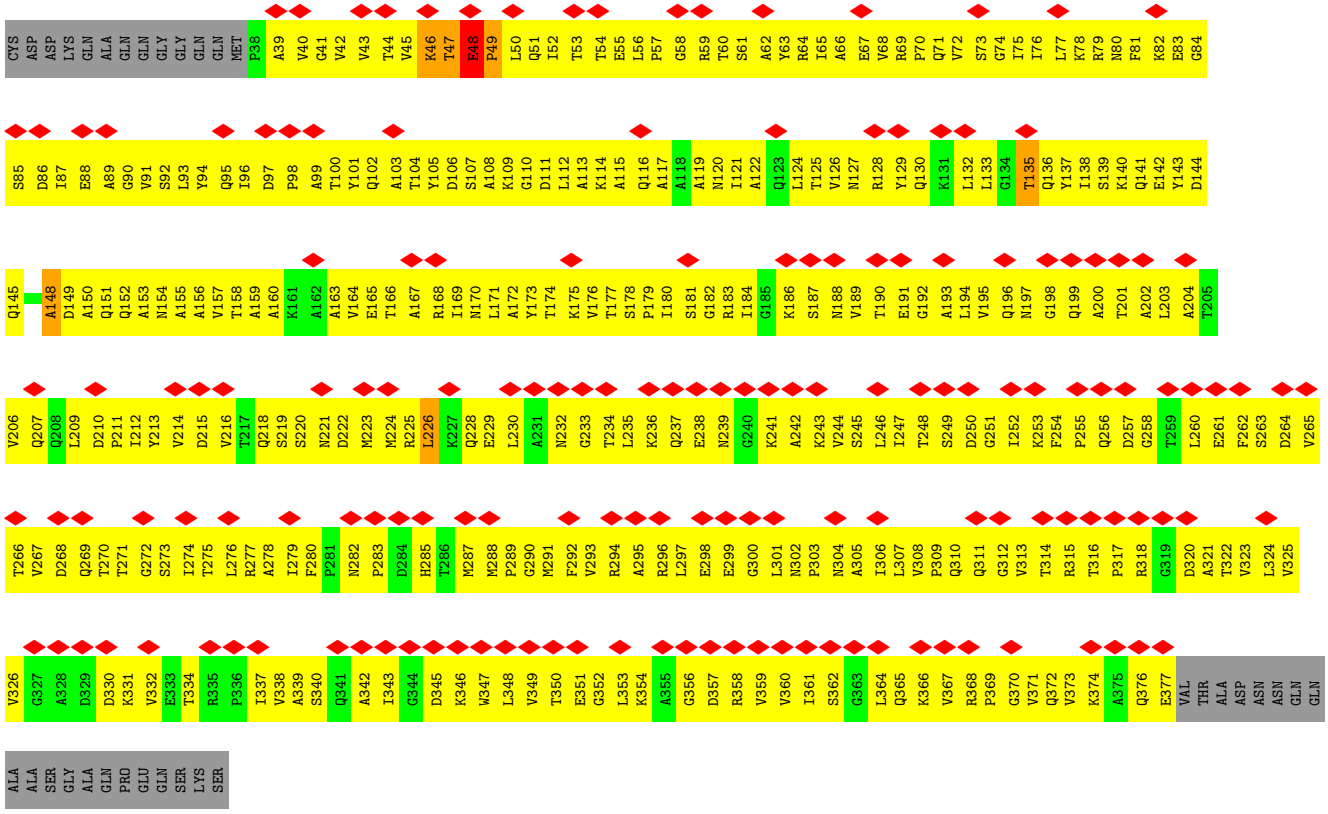



• Molecule 2: Multidrug efflux pump subunit AcrA

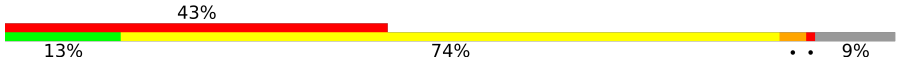
Chain E:

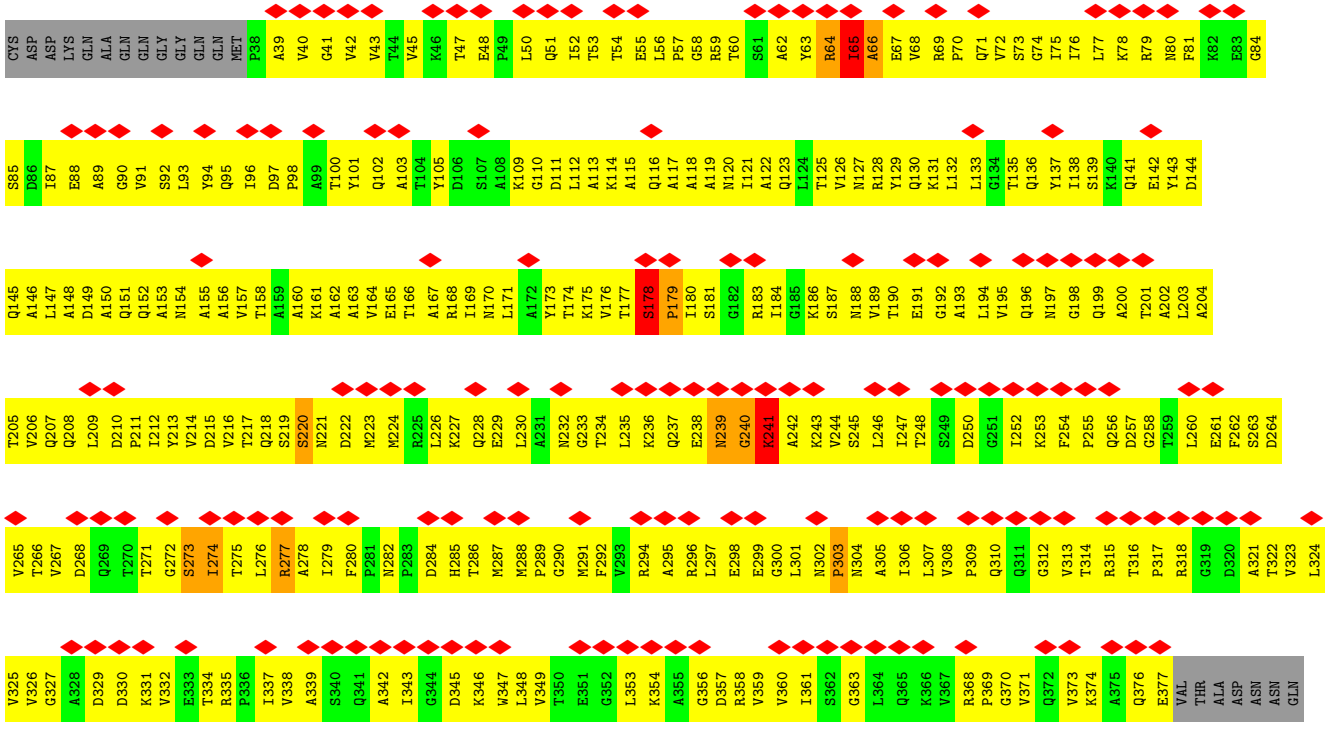




• Molecule 2: Multidrug efflux pump subunit AcrA

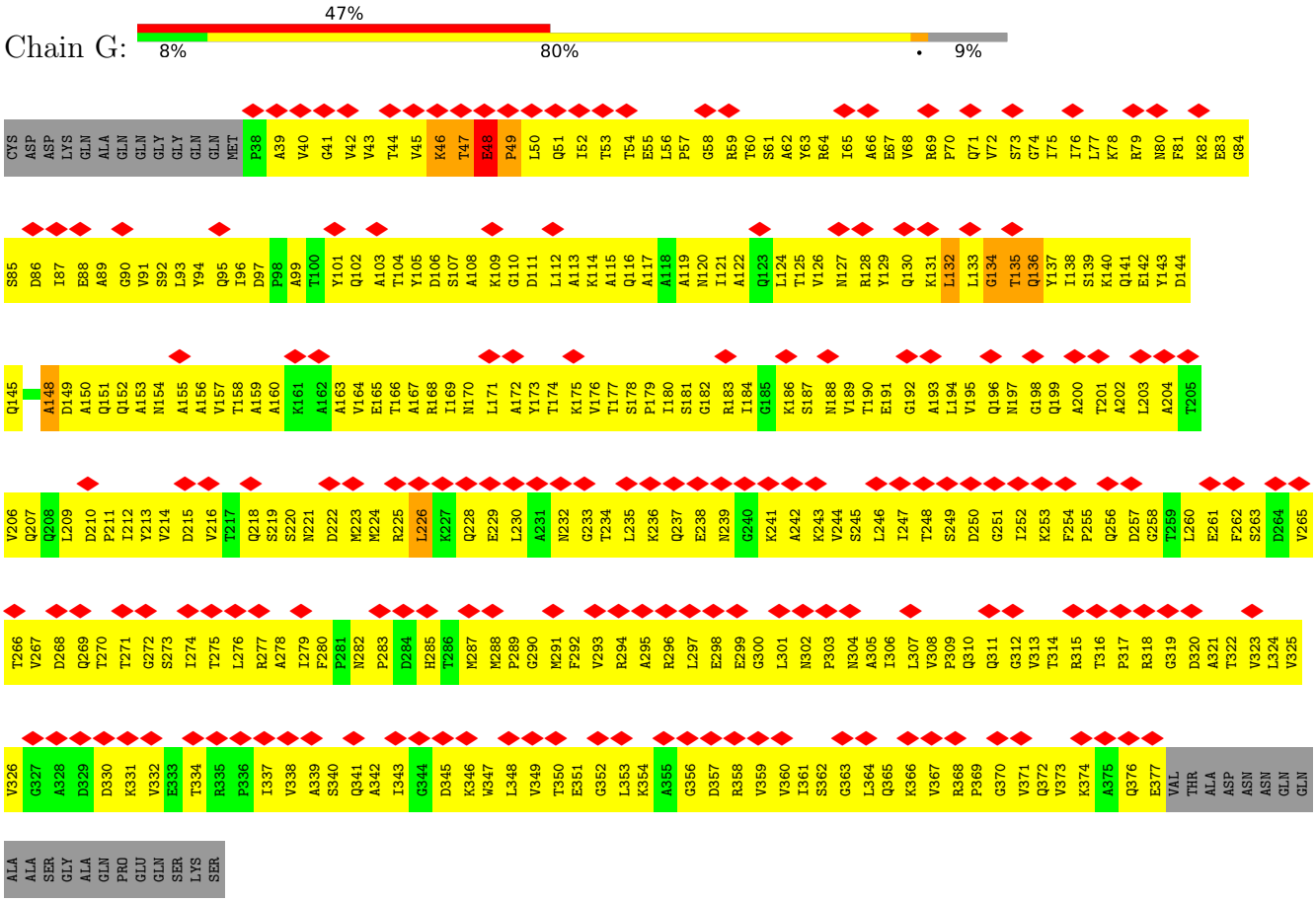
Chain F:



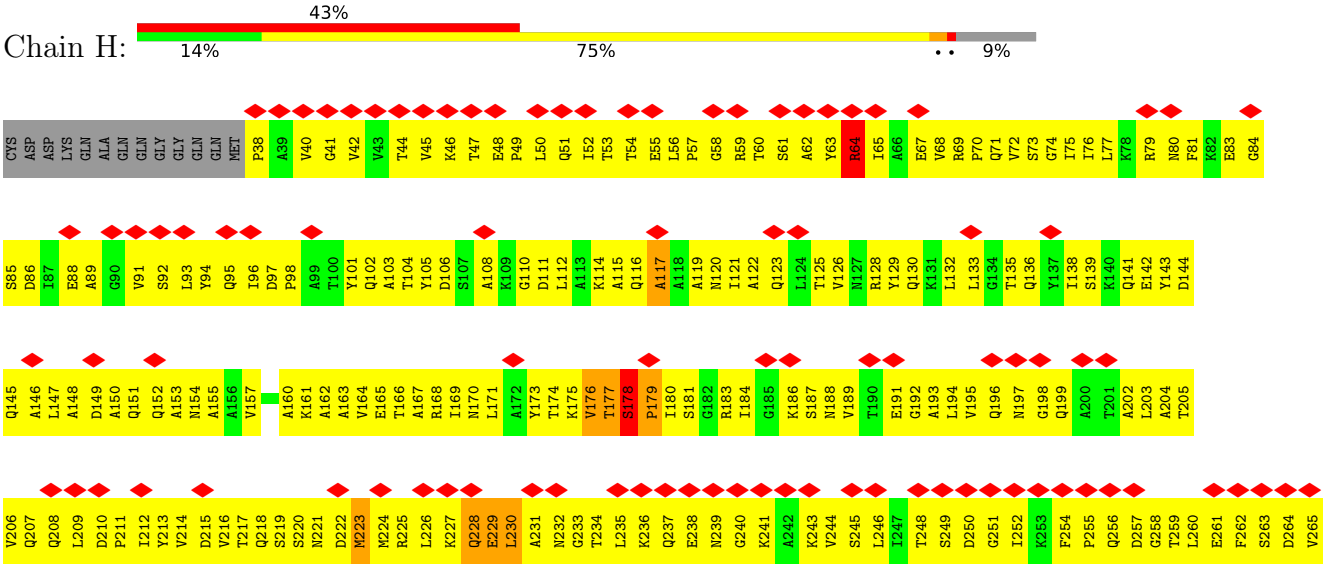

• Molecule 2: Multidrug efflux pump subunit AcrA

Chain G:

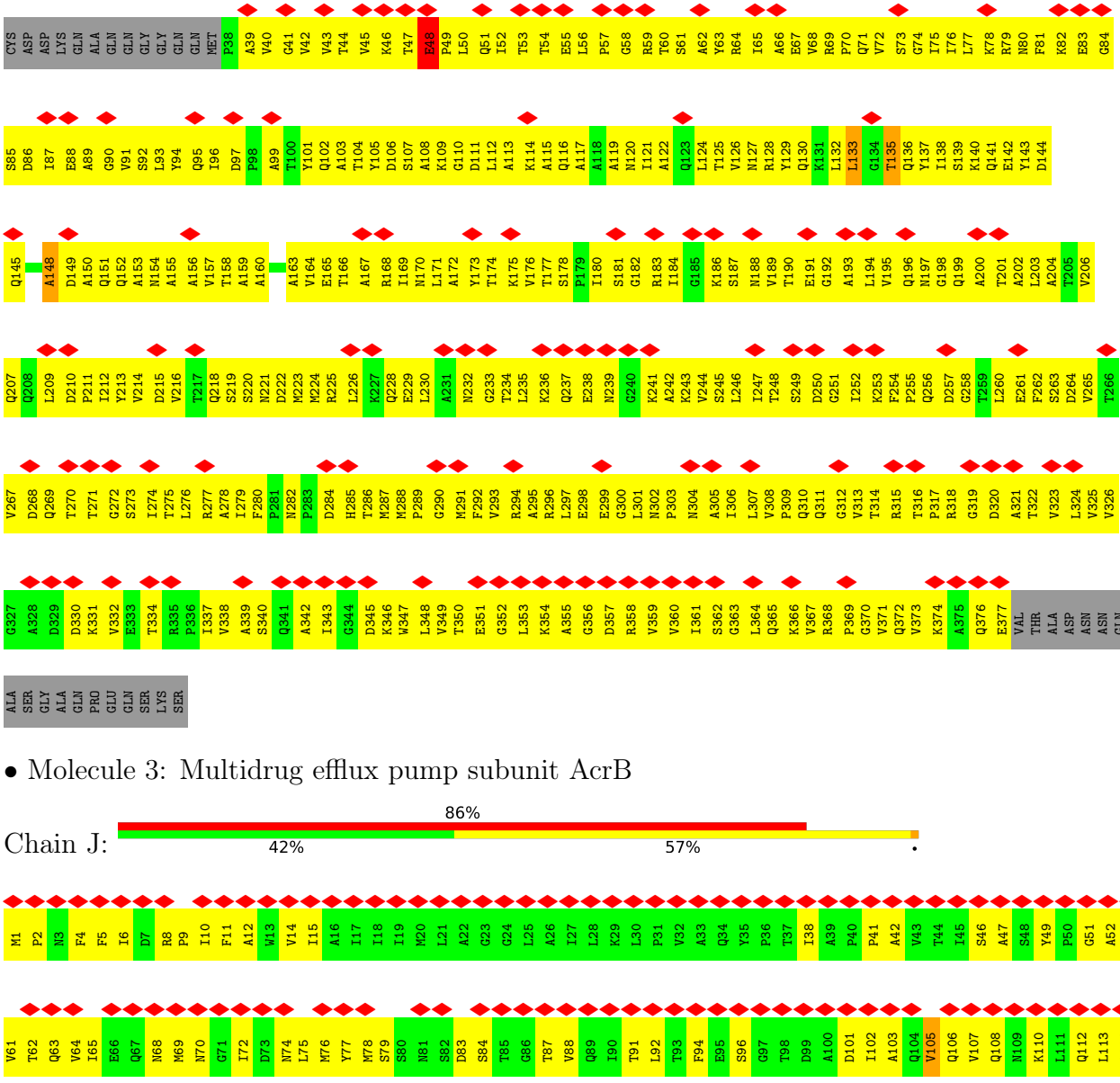



• Molecule 2: Multidrug efflux pump subunit AcrA

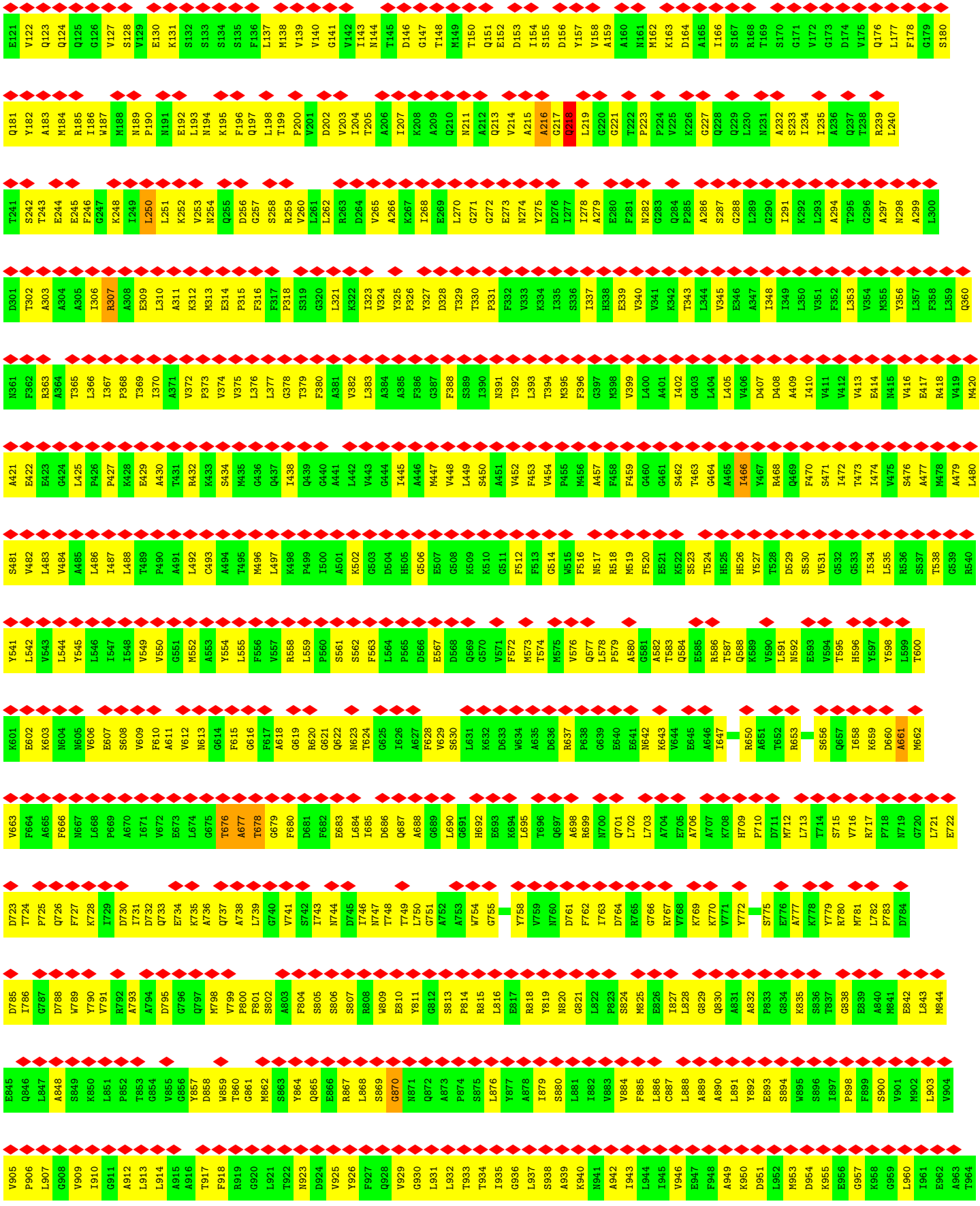
Chain H:

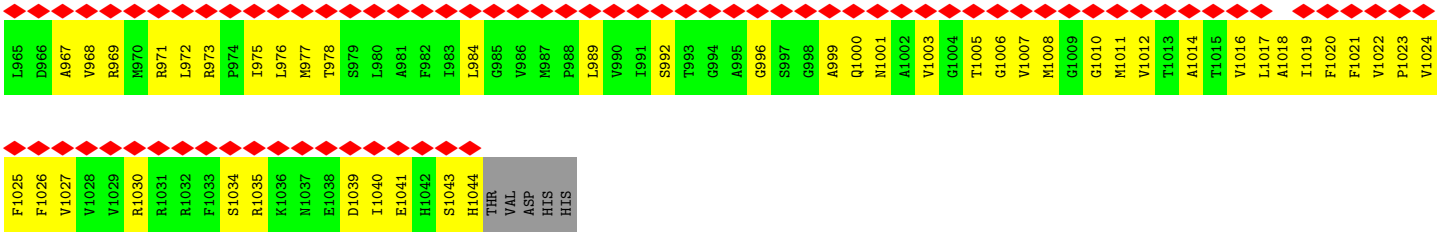



• Molecule 2: Multidrug efflux pump subunit AcrA

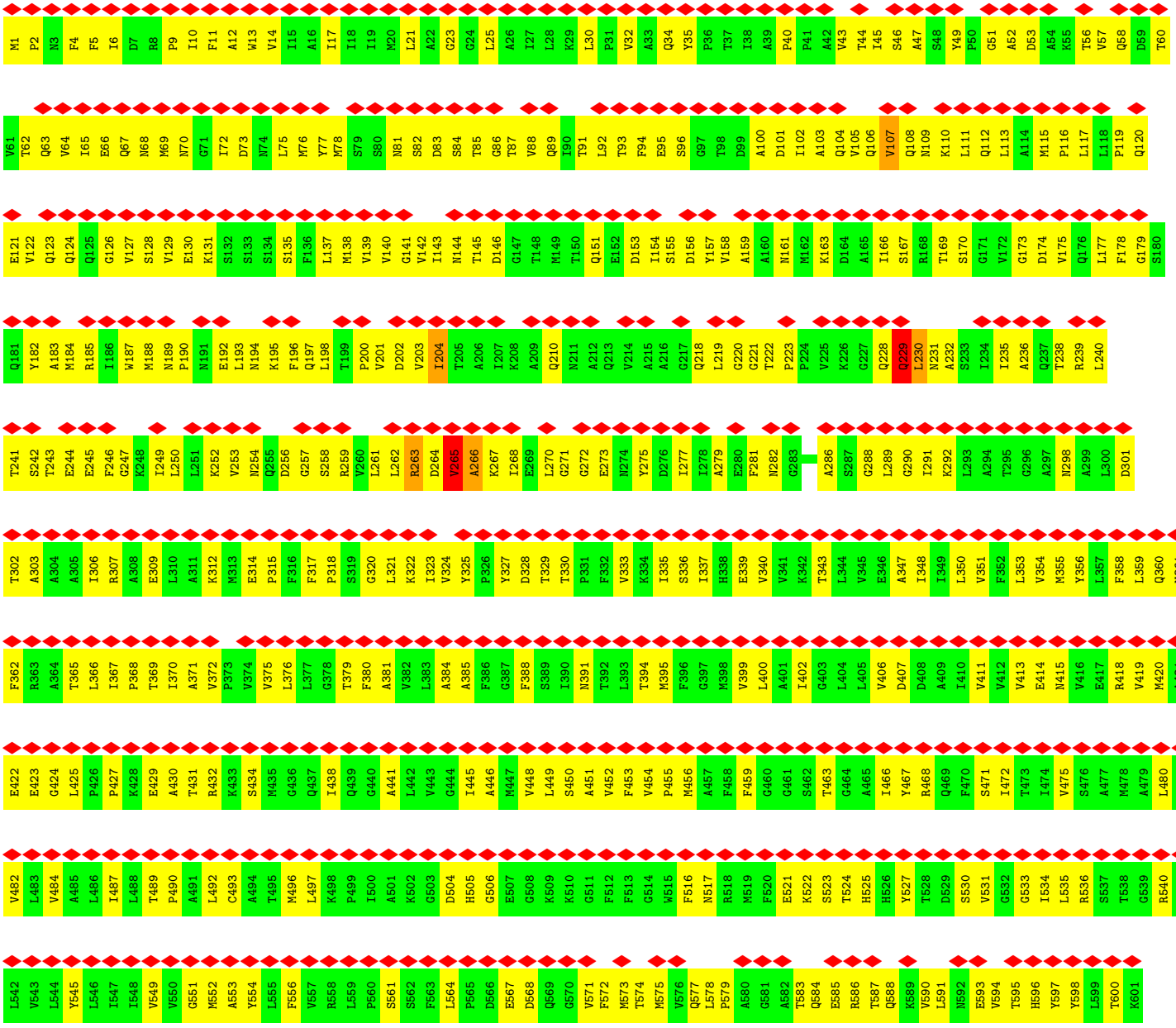

• Molecule 3: Multidrug efflux pump subunit AcrB

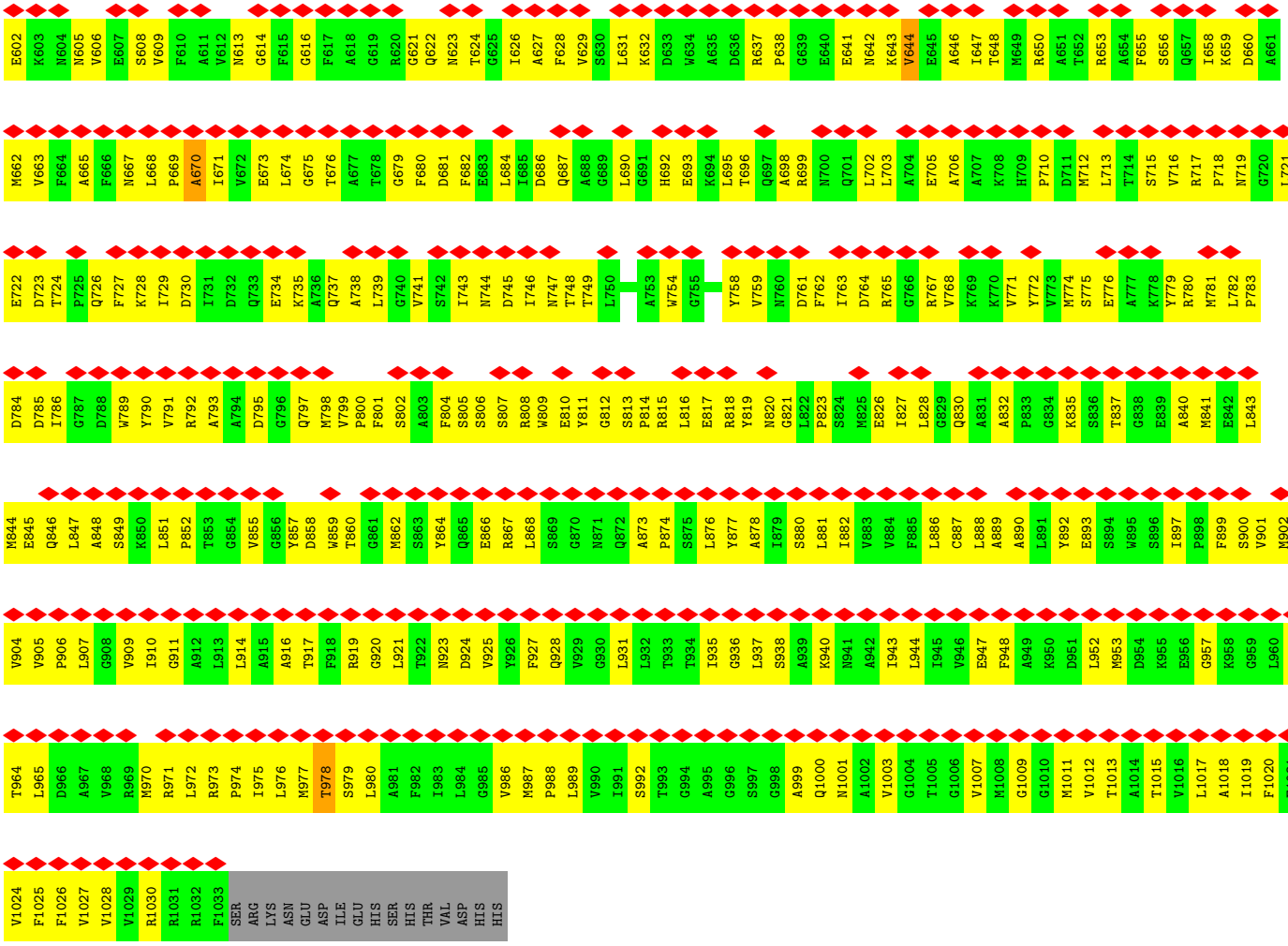

E121 V122 Q123 Q124 Q125 G126 V127 S128 V129 E130 K131 S132 S133 S134 S135 F136 L137 M138 V139 V140 G141 V142 I143 N144 T145 D146 G147 T148 M149 T150 Q151 E152 D153 I154 S155 D156 Y157 V158 A159 A160 N161 M162 K163 D164 A165 I166 S167 R168 T169 S170 G171 V172 G173 D174 V175 Q176 L177 F178 G179 S180
Q181 Y182 A183 M184 R185 I186 W187 M188 N189 P190 N191 E192 L193 N194 K195 F196 Q197 L198 T199 P200 V201 D202 V203 I204 T205 A206 I207 K208 A209 Q210 N211 A212 Q213 V214 A215 A216 G217 Q218 L219 G220 G221 T222 P223 P224 V225 K226 G227 Q228 Q229 L230 N231 A232 S233 I234 I235 A236 Q237 T238 R239 L240
T241 S242 T243 E244 E245 F246 G247 K248 I249 L250 L251 K252 V253 N254 Q255 D256 G257 S258 R259 V260 L261 L262 R263 D264 V265 A266 K267 I268 E269 L270 G271 G272 E273 N274 Y275 D276 I277 I278 A279 E280 F281 N282 G283 Q284 P285 A286 S287 G288 L289 G290 I291 K292 L293 A294 T295 G296 A297 N298 A299 L300
D301 T302 A303 A304 A305 I306 R307 A308 E309 L310 A311 K312 M313 E314 P315 F316 F317 P318 S319 G320 L321 K322 I323 V324 Y325 P326 Y327 D328 T329 T330 P331 F332 V333 K334 I335 S336 I337 H338 E339 V340 V341 K342 T343 L344 V345 E346 A347 I348 I349 L350 V351 F352 L353 V354 M355 Y356 L357 F358 L359 Q360
N361 F362 R363 A364 T365 L366 I367 P368 T369 I370 A371 V372 P373 V374 V375 L376 L377 G378 T379 F380 A381 V382 L383 A384 A385 F386 G387 F388 S389 I390 N391 T392 L393 T394 M395 F396 G397 M398 V399 L400 A401 I402 G403 L404 L405 V406 D407 D408 A409 I410 V411 V412 V413 E414 N415 V416 E417 R418 V419 M420
A421 E422 E423 G424 L425 P426 P427 K428 E429 A430 T431 R432 K433 S434 M435 G436 Q437 I438 Q439 G440 A441 L442 V443 G444 I445 A446 M447 V448 L449 S450 A451 V452 F453 V454 P455 M456 A457 F458 F459 G460 G461 S462 T463 G464 A465 I466 Y467 R468 Q469 F470 S471 I472 T473 I474 V475 S476 A477 M478 A479 L480
S481 V482 L483 V484 A485 L486 I487 L488 T489 P490 A491 L492 C493 A494 T495 M496 L497 K498 P499 I500 A501 K502 G503 D504 H505 G506 E507 G508 K509 K510 G511 F512 F513 G514 W515 F516 N517 R518 M519 F520 E521 K522 S523 T524 H525 H526 Y527 T528 D529 S530 V531 G532 G533 I534 L535 R536 S537 T538 G539 R540
Y541 L542 V543 L544 Y545 L546 I547 I548 V549 V550 G551 M552 A553 Y554 L555 F556 V557 R558 L559 P560 S561 S562 F563 L564 P565 D566 E567 D568 Q569 G570 V571 F572 M573 T574 M575 V576 Q577 L578 P579 A580 G581 A582 T583 Q584 E585 R586 T587 Q588 K589 V590 L591 N592 E593 V594 T595 H596 Y597 Y598 L599 T600
K601 E602 K603 N604 N605 V606 E607 S608 V609 F610 A611 V612 N613 G614 F615 G616 F617 A618 G619 R620 G621 Q622 N623 T624 G625 I626 A627 F628 V629 S630 L631 K632 D633 W634 A635 D636 R637 P638 G639 E640 E641 N642 K643 V644 E645 A646 I647 R650 A651 T652 R653 S656 Q657 I658 K659 D660 A661 M662
V663 F664 A665 F666 N667 L668 P669 A670 I671 V672 E673 L674 G675 T676 A677 T678 G679 F680 D681 F682 E683 L684 I685 D686 Q687 A688 G689 L690 G691 H692 E693 K694 L695 T696 Q697 A698 R699 N700 Q701 L702 L703 A704 E705 A706 A707 K708 H709 P710 D711 M712 L713 T714 S715 V716 R717 P718 N719 G720 L721 E722
D723 T724 P725 Q726 F727 K728 I729 D730 I731 D732 Q733 E734 K735 A736 Q737 A738 L739 G740 V741 S742 I743 N744 D745 I746 N747 T748 T749 L750 G751 A752 A753 W754 G755 Y758 V759 N760 D761 F762 I763 D764 R765 G766 R767 V768 K769 K770 V771 Y772 S775 E776 A777 K778 Y779 R780 M781 L782 P783 D784
D785 T786 G787 D788 W789 Y790 V791 R792 A793 A794 D795 G796 Q797 M798 V799 P800 F801 S802 A803 F804 S805 S806 S807 R808 W809 E810 Y811 G812 S813 P814 R815 L816 E817 R818 Y819 N820 G821 L822 P823 S824 M825 E826 I827 L828 G829 Q830 A831 A832 P833 G834 K835 S836 T837 G838 E839 A840 M841 E842 L843 M844
E845 Q846 L847 A848 S849 K850 L851 P852 T853 G854 V855 G856 Y857 D858 W859 T860 G861 M862 S863 Y864 Q865 E866 R867 L868 S869 G870 N871 Q872 A873 P874 S875 L876 Y877 A878 I879 S880 L881 I882 V883 V884 F885 L886 C887 L888 A889 A890 L891 Y892 E893 S894 W895 S896 I897 P898 F899 S900 V901 M902 L903 V904
V905 P906 L907 G908 V909 I910 G911 A912 L913 L914 A915 A916 T917 F918 R919 G920 L921 T922 N923 D924 V925 Y926 F927 Q928 V929 G930 L931 L932 T933 T934 I935 G936 L937 S938 A939 K940 N941 A942 I943 L944 I945 V946 E947 F948 A949 K950 D951 L952 M953 D954 K955 E956 G957 K958 G959 L960 I961 E962 A963 T964




• Molecule 3: Multidrug efflux pump subunit AcrB

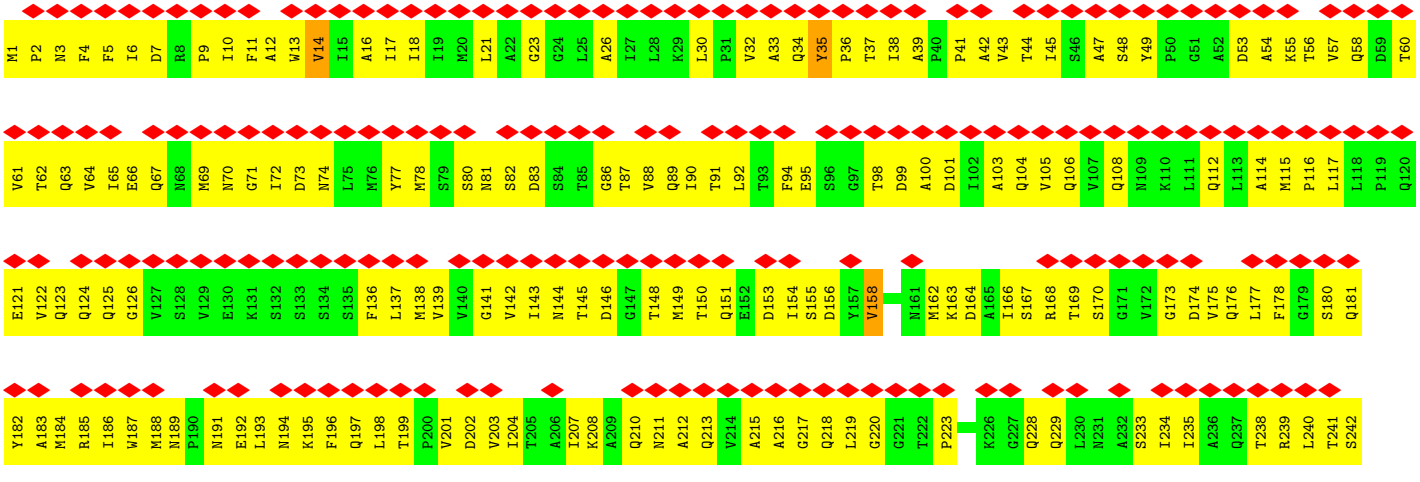
Chain K:

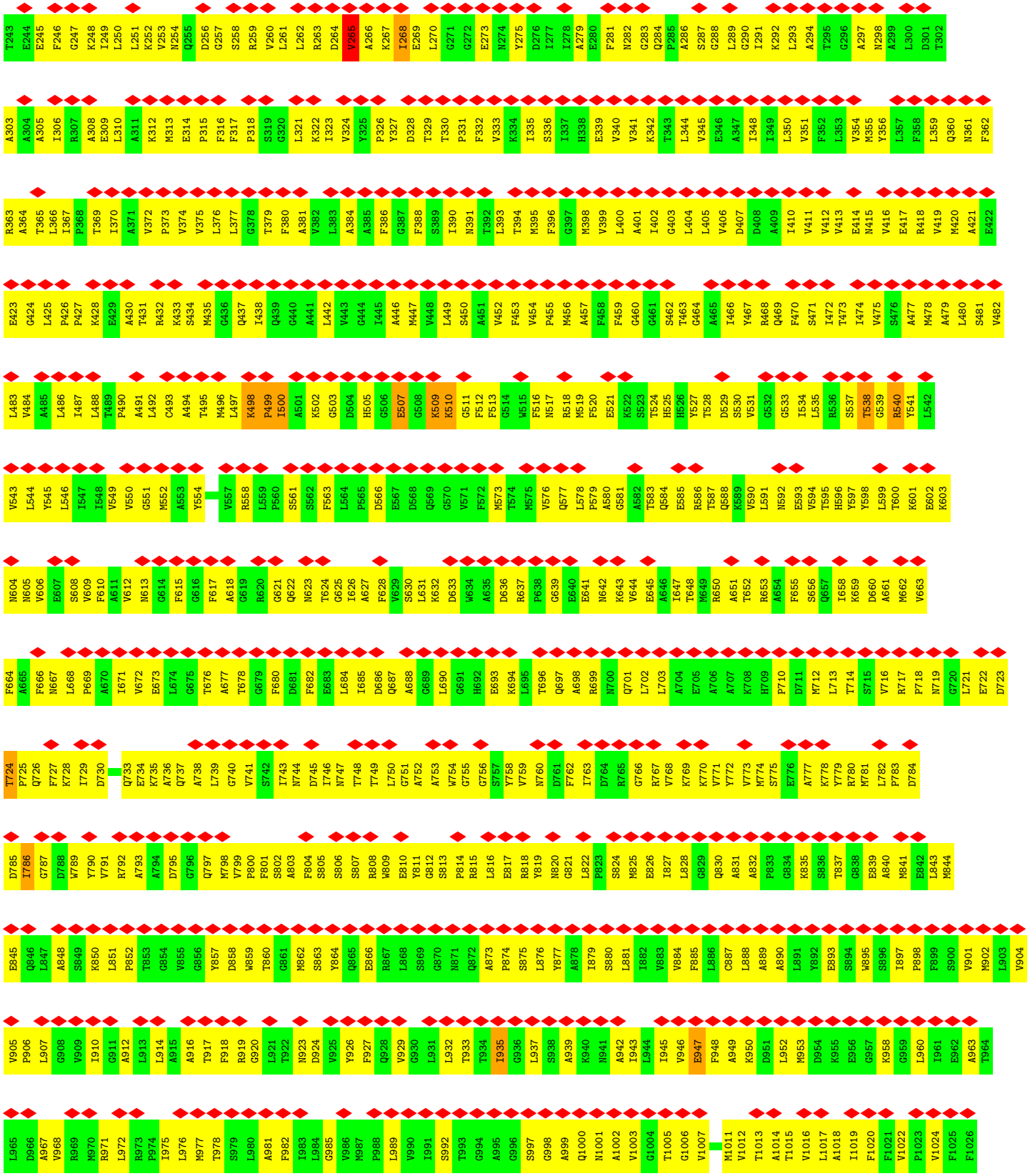



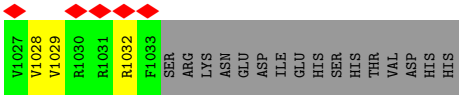



• Molecule 3: Multidrug efflux pump subunit AcrB

Chain L:

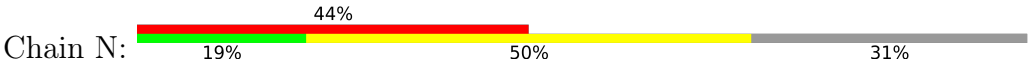

T243 E244 E245 F246 G247 K248 I249 L250 L251 K252 V253 N254 Q255 D256 G257 S258 R259 V260 L261 L262 R263 D264 V265 A266 K267 I268 E269 L270 G271 G272 E273 N274 Y275 D276 I277 I278 A279 E280 F281 N282 G283 Q284 P285 A286 S287 G288 L289 G290 I291 K292 L293 A294 T295 G296 A297 N298 A299 L300 D301 T302
A303 A304 A305 T306 R307 A308 E309 L310 A311 K312 M313 E314 P315 F316 F317 P318 S319 G320 L321 K322 I323 V324 Y325 P326 Y327 D328 T329 T330 P331 F332 V333 K334 I335 S336 I337 H338 E339 V340 V341 K342 T343 L344 V345 E346 A347 I348 I349 L350 V351 F352 L353 V354 M355 Y356 L357 F358 L359 Q360 N361 F362
R363 A364 T365 L366 I367 P368 T369 I370 A371 V372 P373 V374 V375 L376 L377 G378 T379 F380 A381 V382 L383 A384 A385 F386 G387 F388 S389 I390 N391 T392 L393 T394 M395 F396 G397 M398 V399 L400 A401 I402 G403 L404 L405 V406 D407 D408 A409 I410 V411 V412 V413 E414 N415 V416 E417 R418 V419 M420 A421 E422
E423 G424 L425 P426 P427 K428 E429 A430 T431 R432 K433 S434 M435 G436 Q437 I438 Q439 G440 A441 L442 V443 G444 I445 A446 M447 V448 L449 S450 A451 V452 F453 V454 P455 M456 A457 F458 F459 G460 G461 S462 T463 G464 A465 I466 Y467 R468 Q469 F470 S471 I472 T473 I474 V475 S476 A477 M478 A479 L480 S481 V482
L483 V484 A485 L486 I487 L488 T489 P490 A491 L492 C493 A494 T495 M496 L497 K498 P499 I500 A501 K502 G503 D504 H505 G506 E507 G508 K509 K510 G511 F512 F513 G514 W515 F516 N517 R518 M519 F520 E521 K522 S523 T524 H525 H526 Y527 T528 D529 S530 V531 G532 G533 I534 L535 R536 S537 T538 G539 R540 Y541 L542
V543 L544 Y545 L546 I547 I548 V549 V550 G551 M552 A553 Y554 V557 R558 L559 P560 S561 S562 F563 L564 P565 D566 E567 D568 Q569 G570 V571 F572 M573 T574 M575 V576 Q577 L578 P579 A580 G581 A582 T583 Q584 E585 R586 T587 Q588 K589 V590 L591 N592 E593 V594 T595 H596 Y597 Y598 L599 T600 K601 E602 K603
N604 N605 V606 E607 S608 V609 F610 A611 V612 N613 G614 F615 G616 F617 A618 G619 R620 G621 Q622 N623 T624 G625 I626 A627 F628 V629 S630 L631 K632 D633 W634 A635 D636 R637 F638 G639 E640 E641 N642 K643 V644 E645 A646 I647 T648 M649 R650 A651 T652 R653 A654 F655 S656 Q657 I658 K659 D660 A661 M662 V663
F664 A665 F666 N667 L668 P669 A670 I671 V672 E673 L674 G675 T676 A677 T678 G679 F680 D681 F682 E683 L684 I685 D686 Q687 A688 G689 L690 G691 H692 E693 K694 L695 T696 Q697 A698 R699 N700 Q701 L702 L703 A704 E705 A706 A707 K708 H709 P710 D711 M712 L713 T714 S715 V716 R717 P718 N719 G720 L721 E722 D723
T724 P725 Q726 F727 K728 I729 D730 Q733 E734 K735 A736 Q737 A738 L739 G740 V741 S742 I743 N744 D745 I746 N747 T748 T749 L750 G751 A752 A753 W754 G755 G756 S757 Y758 V759 N760 D761 F762 I763 D764 R765 G766 R767 V768 K769 K770 V771 Y772 V773 M774 S775 E776 A777 K778 Y779 R780 M781 L782 P783 D784
D785 I786 G787 D788 W789 Y790 V791 R792 A793 A794 D795 G796 Q797 M798 V799 P800 F801 S802 A803 F804 S805 S806 S807 R808 W809 E810 Y811 G812 S813 P814 R815 L816 E817 R818 Y819 N820 G821 L822 P823 S824 M825 E826 I827 L828 G829 Q830 A831 A832 P833 G834 K835 S836 T837 G838 E839 A840 M841 E842 L843 M844
E845 Q846 L847 A848 S849 K850 L851 P852 T853 G854 V855 G856 Y857 D858 W859 T860 G861 M862 S863 Y864 Q865 E866 R867 L868 S869 G870 N871 Q872 A873 P874 S875 L876 Y877 A878 I879 S880 L881 I882 V883 V884 F885 L886 C887 L888 A889 A890 L891 Y892 E893 S894 W895 S896 I897 P898 F899 S900 V901 M902 L903 V904
V905 P906 L907 G908 V909 I910 G911 A912 L913 L914 A915 A916 T917 F918 R919 G920 L921 T922 N923 D924 V925 Y926 F927 Q928 V929 G930 L931 L932 T933 P934 I935 G936 L937 S938 A939 K940 N941 A942 I943 L944 I945 V946 E947 F948 A949 K950 D951 L952 M953 D954 K955 E956 G957 K958 G959 L960 I961 E962 A963 T964
L965 D966 A967 V968 R969 M970 R971 L972 R973 P974 I975 L976 M977 T978 S979 L980 A981 F982 I983 L984 G985 V986 M987 P988 L989 V990 I991 S992 T993 G994 A995 G996 S997 G998 A999 Q1000 N1001 A1002 V1003 G1004 T1005 G1006 V1007 M1011 V1012 T1013 A1014 T1015 V1016 L1017 A1018 I1019 F1020 F1021 V1022 P1023 V1024 F1025 F1026




• Molecule 4: Multidrug efflux pump accessory protein AcrZ

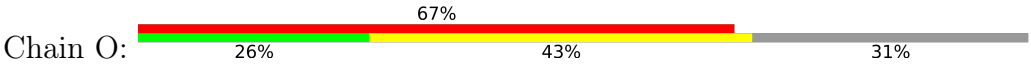


• Molecule 4: Multidrug efflux pump accessory protein AcrZ





• Molecule 4: Multidrug efflux pump accessory protein AcrZ




# 4 Experimental information (i)

| Property | Value | Source |
|---|---|---|
| EM reconstruction method | SINGLE PARTICLE | Depositor |
| Imposed symmetry | POINT, Not provided | |
| Number of particles used | 26950 | Depositor |
| Resolution determination method | FSC 0.143 CUT-OFF | Depositor |
| CTF correction method | NONE | Depositor |
| Microscope | FEI TITAN KRIOS | Depositor |
| Voltage (kV) | 300 | Depositor |
| Electron dose ($e^-/Å^2$) | 2 | Depositor |
| Minimum defocus (nm) | Not provided | |
| Maximum defocus (nm) | Not provided | |
| Magnification | Not provided | |
| Image detector | GATAN K2 SUMMIT (4k x 4k) | Depositor |
| Maximum map value | 0.143 | Depositor |
| Minimum map value | -0.084 | Depositor |
| Average map value | 0.000 | Depositor |
| Map value standard deviation | 0.011 | Depositor |
| Recommended contour level | 0.05 | Depositor |
| Map size (Å) | 414.72, 414.72, 414.72 | wwPDB |
| Map dimensions | 256, 256, 256 | wwPDB |
| Map angles (°) | 90.0, 90.0, 90.0 | wwPDB |
| Pixel spacing (Å) | 1.62, 1.62, 1.62 | Depositor |

# 5 Model quality

## 5.1 Standard geometry

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 | A | 0.36 | 0/3345 | 0.51 | 0/4544 |
| 1 | B | 0.38 | 0/3345 | 0.50 | 0/4544 |
| 1 | C | 0.38 | 0/3345 | 0.50 | 0/4544 |
| 2 | D | 0.41 | 0/2585 | 0.60 | 0/3512 |
| 2 | E | 0.46 | 0/2585 | 0.61 | 2/3512 (0.1%) |
| 2 | F | 0.41 | 0/2585 | 0.60 | 2/3512 (0.1%) |
| 2 | G | 0.46 | 0/2585 | 0.61 | 2/3512 (0.1%) |
| 2 | H | 0.40 | 0/2585 | 0.59 | 0/3512 |
| 2 | I | 0.44 | 0/2585 | 0.59 | 1/3512 (0.0%) |
| 3 | J | 0.53 | 1/8060 (0.0%) | 0.63 | 2/10947 (0.0%) |
| 3 | K | 0.52 | 0/7995 | 0.62 | 0/10859 |
| 3 | L | 0.58 | 3/7995 (0.0%) | 0.69 | 6/10859 (0.1%) |
| 4 | M | 0.44 | 0/281 | 0.57 | 0/380 |
| 4 | N | 0.44 | 0/287 | 0.64 | 0/388 |
| 4 | O | 0.42 | 0/287 | 0.61 | 0/388 |
| All | All | 0.48 | 4/50450 (0.0%) | 0.61 | 15/68525 (0.0%) |

All (4) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|---|---|---|---|---|---|---|---|
| 3 | L | 283 | GLY | C-N | -6.72 | 1.18 | 1.34 |
| 3 | L | 586 | ARG | CZ-NH1 | 5.90 | 1.40 | 1.33 |
| 3 | L | 812 | GLY | C-N | -5.81 | 1.20 | 1.34 |
| 3 | J | 117 | LEU | C-N | -5.80 | 1.20 | 1.34 |

The worst 5 of 15 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed($^o$) | Ideal($^o$) |
|---|---|---|---|---|---|---|---|
| 3 | L | 586 | ARG | NE-CZ-NH2 | -21.27 | 109.66 | 120.30 |
| 3 | L | 586 | ARG | NH1-CZ-NH2 | 6.62 | 126.68 | 119.40 |
| 2 | F | 277 | ARG | NE-CZ-NH1 | -6.60 | 117.00 | 120.30 |
| 3 | L | 586 | ARG | NE-CZ-NH1 | 6.58 | 123.59 | 120.30 |
| 3 | J | 250 | LEU | CA-CB-CG | 6.11 | 129.36 | 115.30 |

There are no chirality outliers.

There are no planarity outliers.

## 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 | A | 3304 | 0 | 3251 | 929 | 0 |
| 1 | B | 3304 | 0 | 3254 | 1031 | 0 |
| 1 | C | 3304 | 0 | 3254 | 1011 | 0 |
| 2 | D | 2553 | 0 | 2607 | 803 | 0 |
| 2 | E | 2553 | 0 | 2610 | 857 | 0 |
| 2 | F | 2553 | 0 | 2608 | 776 | 0 |
| 2 | G | 2553 | 0 | 2610 | 861 | 0 |
| 2 | H | 2553 | 0 | 2610 | 732 | 0 |
| 2 | I | 2553 | 0 | 2610 | 928 | 0 |
| 3 | J | 7908 | 0 | 8018 | 708 | 0 |
| 3 | K | 7845 | 0 | 7990 | 755 | 0 |
| 3 | L | 7845 | 0 | 7988 | 1028 | 0 |
| 4 | M | 277 | 0 | 313 | 22 | 0 |
| 4 | N | 283 | 0 | 318 | 27 | 0 |
| 4 | O | 283 | 0 | 318 | 28 | 0 |
| All | All | 49671 | 0 | 50359 | 9656 | 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 97.

The worst 5 of 9656 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) |
|---|---|---|---|
| 3:J:865:GLN:CG | 3:J:868:LEU:HD11 | 1.23 | 1.65 |
| 2:H:63:TYR:CG | 2:H:64:ARG:HD2 | 1.25 | 1.65 |
| 2:H:63:TYR:CB | 2:H:64:ARG:HD2 | 1.28 | 1.62 |
| 2:H:93:LEU:H | 2:H:176:VAL:CG1 | 1.07 | 1.62 |
| 2:H:63:TYR:CB | 2:H:64:ARG:HB2 | 1.31 | 1.57 |

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 | A | 426/493 (86%) | 371 (87%) | 46 (11%) | 9 (2%) | 7 | 36 |
| 1 | B | 426/493 (86%) | 377 (88%) | 44 (10%) | 5 (1%) | 13 | 50 |
| 1 | C | 426/493 (86%) | 378 (89%) | 44 (10%) | 4 (1%) | 17 | 56 |
| 2 | D | 338/373 (91%) | 296 (88%) | 31 (9%) | 11 (3%) | 4 | 26 |
| 2 | E | 338/373 (91%) | 287 (85%) | 45 (13%) | 6 (2%) | 8 | 40 |
| 2 | F | 338/373 (91%) | 294 (87%) | 34 (10%) | 10 (3%) | 4 | 28 |
| 2 | G | 338/373 (91%) | 283 (84%) | 47 (14%) | 8 (2%) | 6 | 33 |
| 2 | H | 338/373 (91%) | 302 (89%) | 29 (9%) | 7 (2%) | 7 | 36 |
| 2 | I | 338/373 (91%) | 288 (85%) | 48 (14%) | 2 (1%) | 25 | 65 |
| 3 | J | 1042/1049 (99%) | 971 (93%) | 64 (6%) | 7 (1%) | 22 | 62 |
| 3 | K | 1031/1049 (98%) | 982 (95%) | 41 (4%) | 8 (1%) | 19 | 60 |
| 3 | L | 1031/1049 (98%) | 953 (92%) | 64 (6%) | 14 (1%) | 11 | 46 |
| 4 | M | 34/54 (63%) | 32 (94%) | 2 (6%) | 0 | 100 | 100 |
| 4 | N | 35/54 (65%) | 33 (94%) | 2 (6%) | 0 | 100 | 100 |
| 4 | O | 35/54 (65%) | 33 (94%) | 2 (6%) | 0 | 100 | 100 |
| All | All | 6514/7026 (93%) | 5880 (90%) | 543 (8%) | 91 (1%) | 15 | 46 |

5 of 91 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 1 | A | 75 | ILE |
| 1 | A | 77 | ASP |
| 2 | D | 62 | ALA |
| 2 | D | 137 | TYR |
| 2 | D | 178 | SER |

### 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 | A | 358/412 (87%) | 357 (100%) | 1 (0%) | 92 94 |
| 1 | B | 358/412 (87%) | 358 (100%) | 0 | 100 100 |
| 1 | C | 358/412 (87%) | 357 (100%) | 1 (0%) | 92 94 |
| 2 | D | 274/299 (92%) | 269 (98%) | 5 (2%) | 59 77 |
| 2 | E | 274/299 (92%) | 272 (99%) | 2 (1%) | 84 90 |
| 2 | F | 274/299 (92%) | 269 (98%) | 5 (2%) | 59 77 |
| 2 | G | 274/299 (92%) | 270 (98%) | 4 (2%) | 65 80 |
| 2 | H | 274/299 (92%) | 268 (98%) | 6 (2%) | 52 71 |
| 2 | I | 274/299 (92%) | 270 (98%) | 4 (2%) | 65 80 |
| 3 | J | 840/855 (98%) | 837 (100%) | 3 (0%) | 91 94 |
| 3 | K | 838/855 (98%) | 834 (100%) | 4 (0%) | 88 93 |
| 3 | L | 838/855 (98%) | 834 (100%) | 4 (0%) | 88 93 |
| 4 | M | 31/46 (67%) | 31 (100%) | 0 | 100 100 |
| 4 | N | 32/46 (70%) | 32 (100%) | 0 | 100 100 |
| 4 | O | 32/46 (70%) | 32 (100%) | 0 | 100 100 |
| All | All | 5329/5733 (93%) | 5290 (99%) | 39 (1%) | 84 90 |

5 of 39 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 3 | J | 218 | GLN |
| 3 | L | 265 | VAL |
| 3 | J | 676 | THR |
| 3 | K | 230 | LEU |
| 3 | L | 509 | LYS |

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 104 such sidechains are listed below:

| Mol | Chain | Res | Type |
|---|---|---|---|
| 2 | H | 304 | ASN |
| 3 | J | 254 | ASN |
| 3 | L | 254 | ASN |
| 2 | I | 51 | GLN |
| 3 | J | 68 | ASN |

#### 5.3.3 RNA

There are no RNA molecules in this entry.

### 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

There are no ligands in this entry.

### 5.7 Other polymers

There are no such residues in this entry.

### 5.8 Polymer linkage issues

The following chains have linkage breaks:

| Mol | Chain | Number of breaks |
|---|---|---|
| 3 | L | 1 |

All chain breaks are listed below:

| Model | Chain | Residue-1 | Atom-1 | Residue-2 | Atom-2 | Distance (Å) |
|---|---|---|---|---|---|---|
| 1 | L | 283:GLY | C | 284:GLN | N | 1.18 |

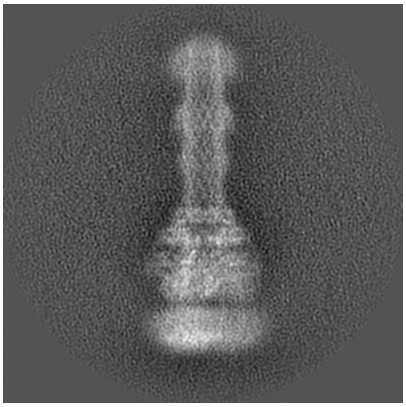
# 6 Map visualisation

This section contains visualisations of the EMDB entry EMD-8640. These allow visual inspection of the internal detail of the map and identification of artifacts.

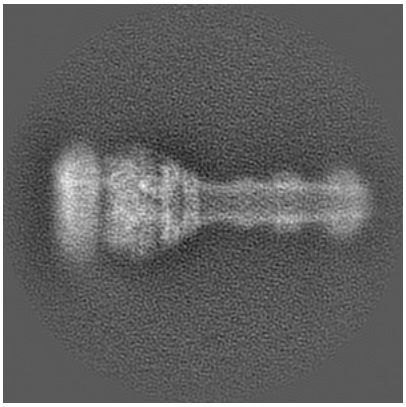
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

## 6.1 Orthogonal projections

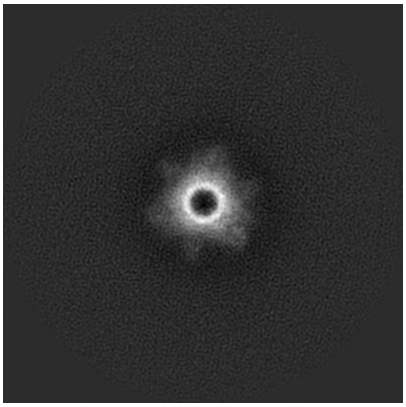
### 6.1.1 Primary map



X



Y

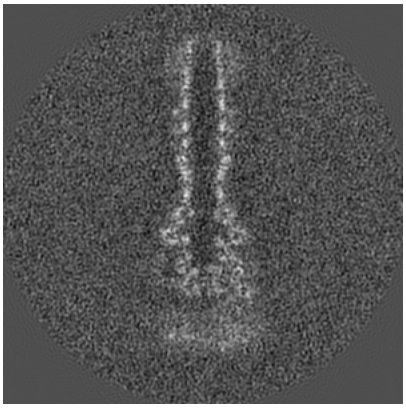


Z

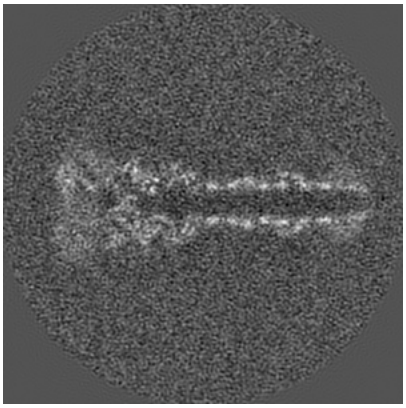
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices

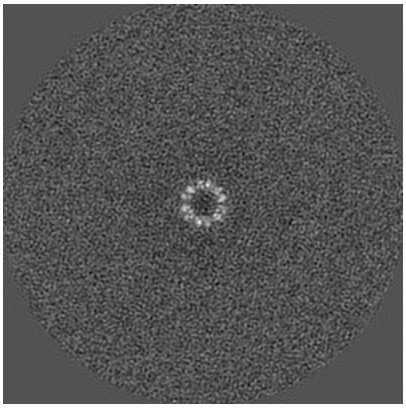
### 6.2.1 Primary map



X Index: 128



Y Index: 128

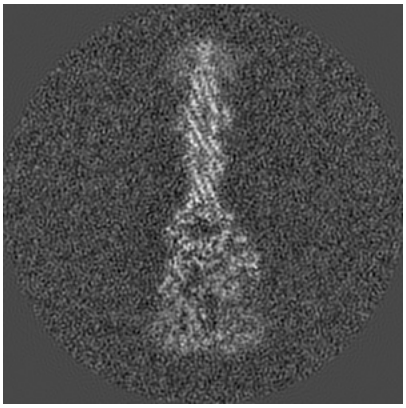


Z Index: 128

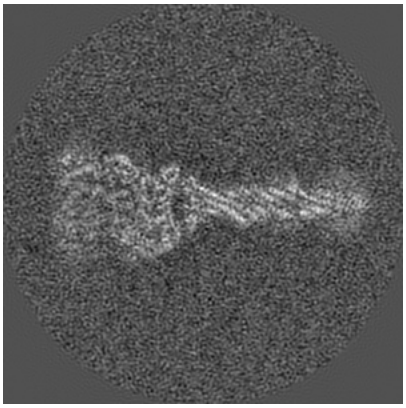
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices (i)

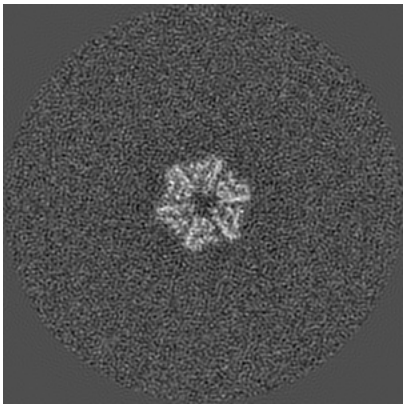
### 6.3.1 Primary map



X Index: 138



Y Index: 118

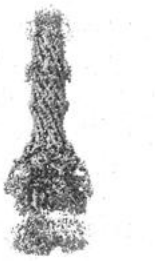


Z Index: 105

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.

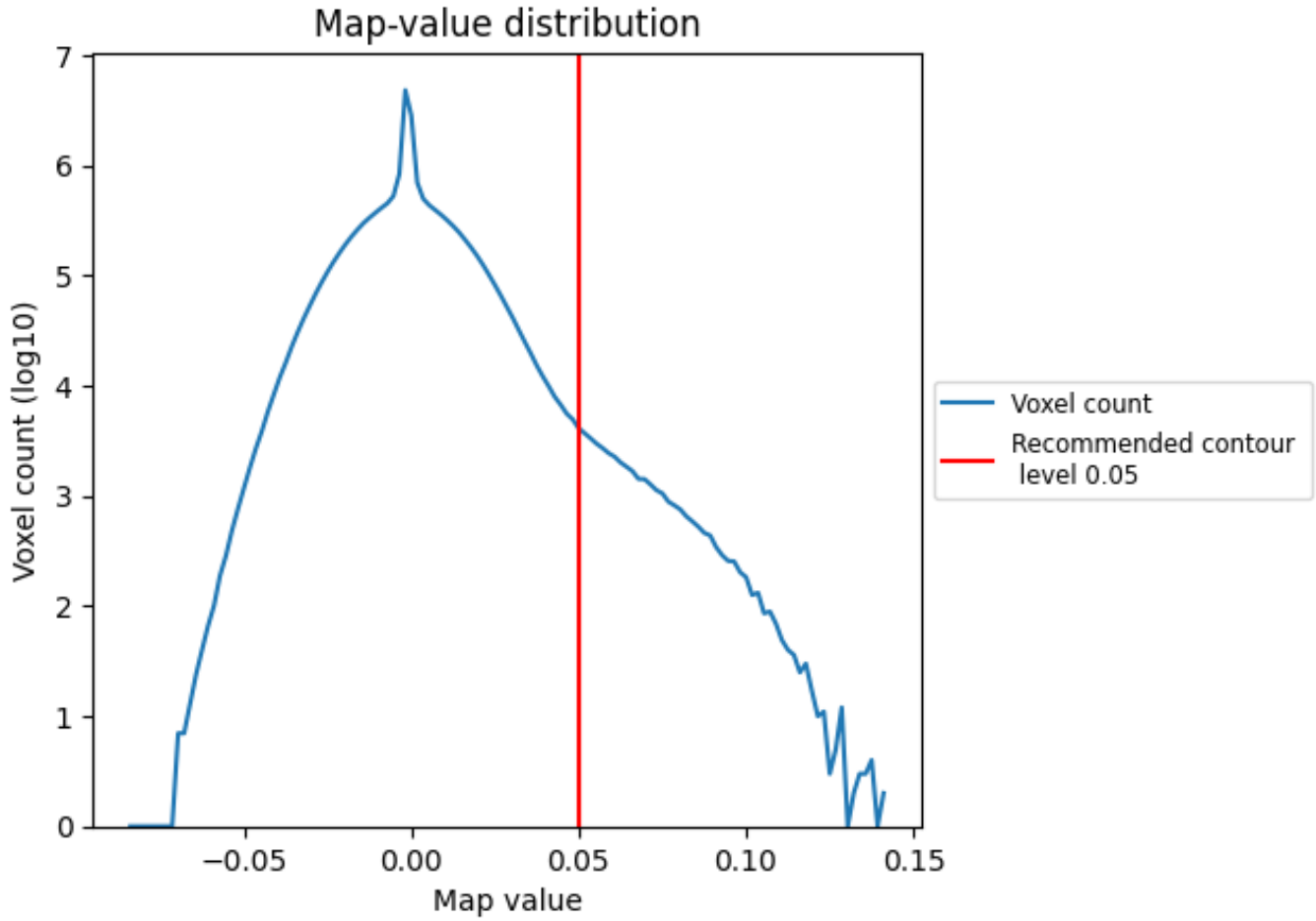
## 6.5 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

# 7 Map analysis

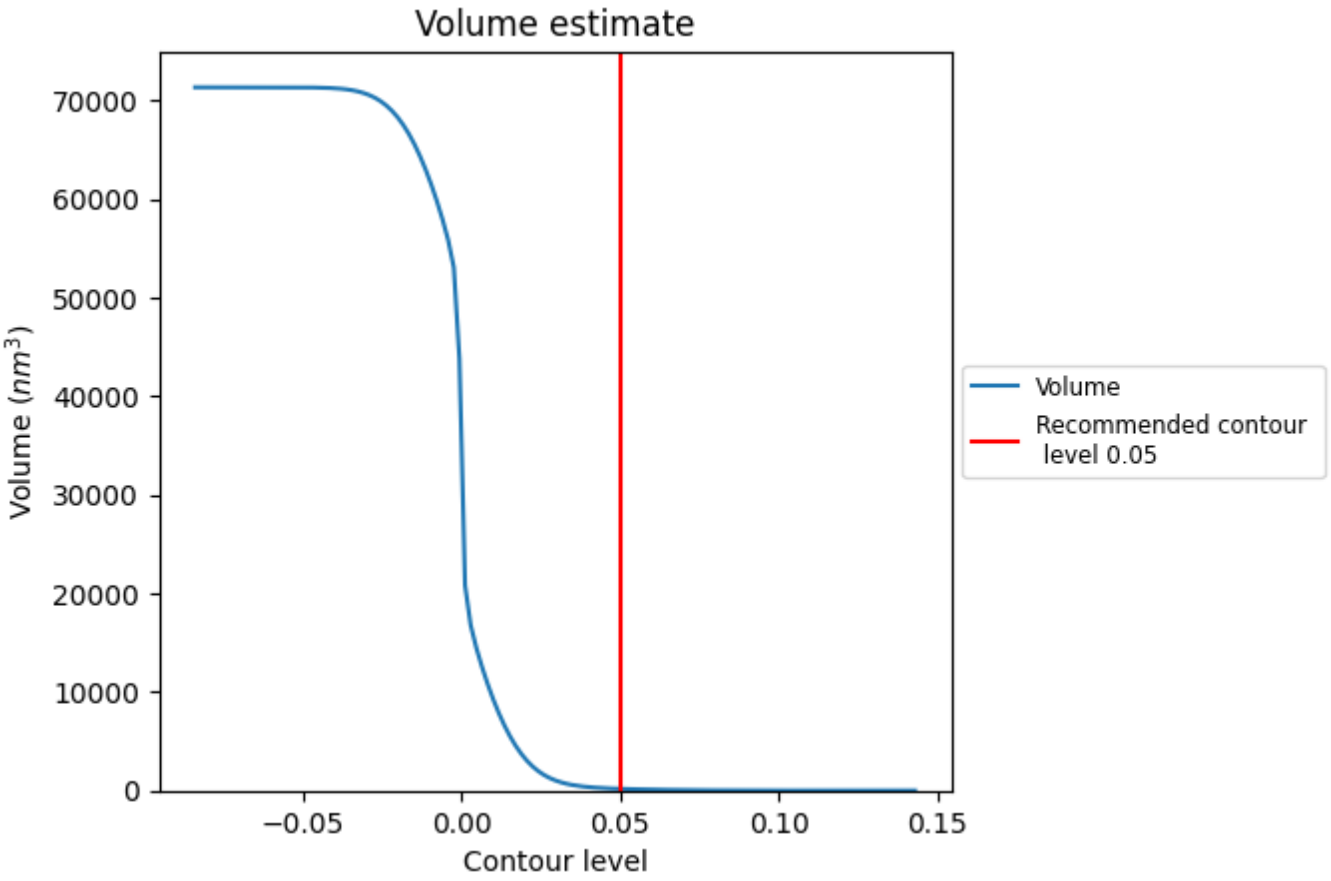
This section contains the results of statistical analysis of the map.

## 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.

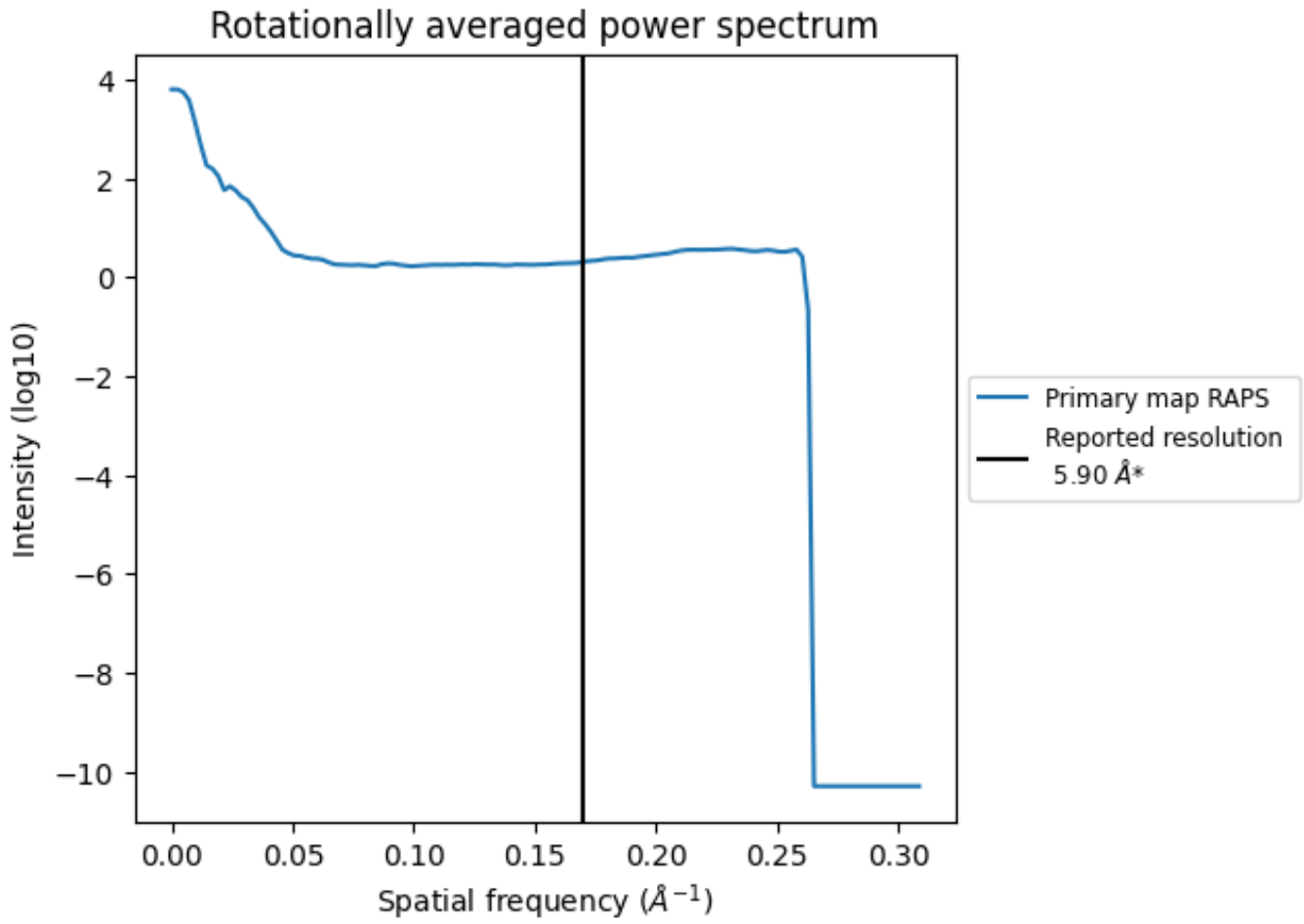
## 7.2 Volume estimate (i)




The volume at the recommended contour level is 175 $nm^3$; this corresponds to an approximate mass of 158 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)

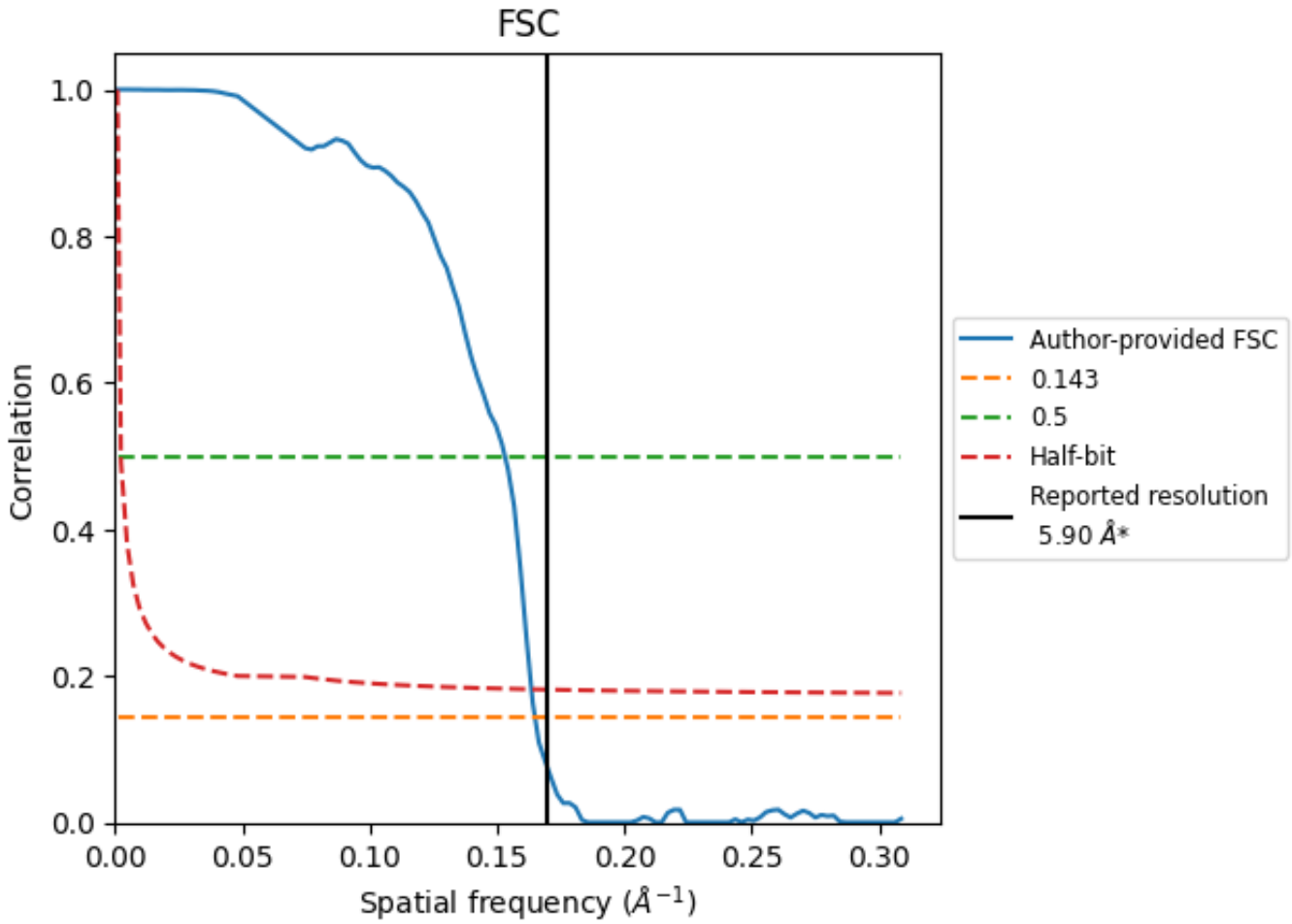



*Reported resolution corresponds to spatial frequency of 0.169 Å$^{-1}$

# 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 0.169 Å$^{-1}$

## 8.2 Resolution estimates (i)

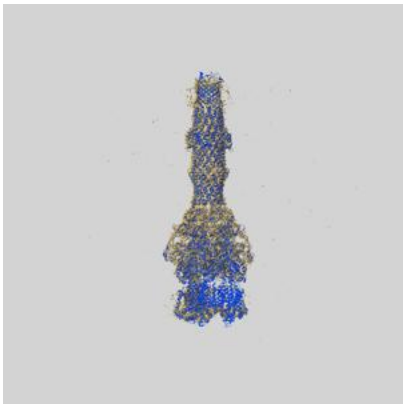
| Resolution estimate (Å) | Estimation criterion (FSC cut-off) | | |
|---|---|---|---|
| | 0.143 | 0.5 | Half-bit |
| Reported by author | 5.90 | - | - |
| Author-provided FSC curve | 6.06 | 6.54 | 6.12 |
| Unmasked-calculated* | - | - | - |

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

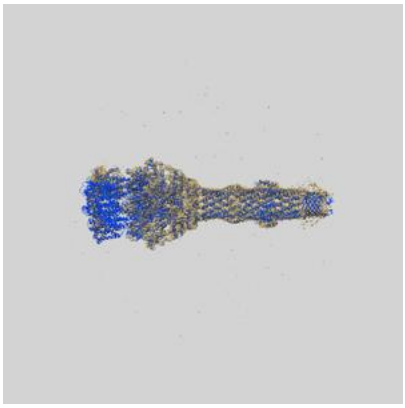
# 9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-8640 and PDB model 5O66. Per-residue inclusion information can be found in section 3 on page 7.

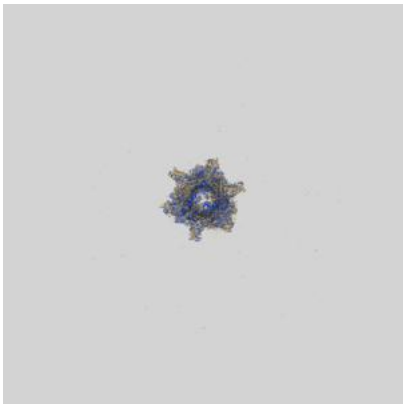
## 9.1 Map-model overlay



X



Y



Z

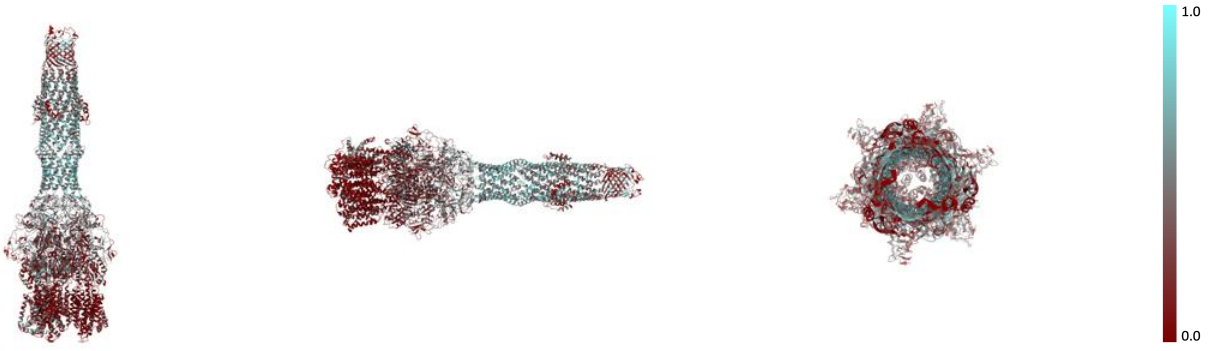
The images above show the 3D surface view of the map at the recommended contour level 0.05 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model (i)


X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

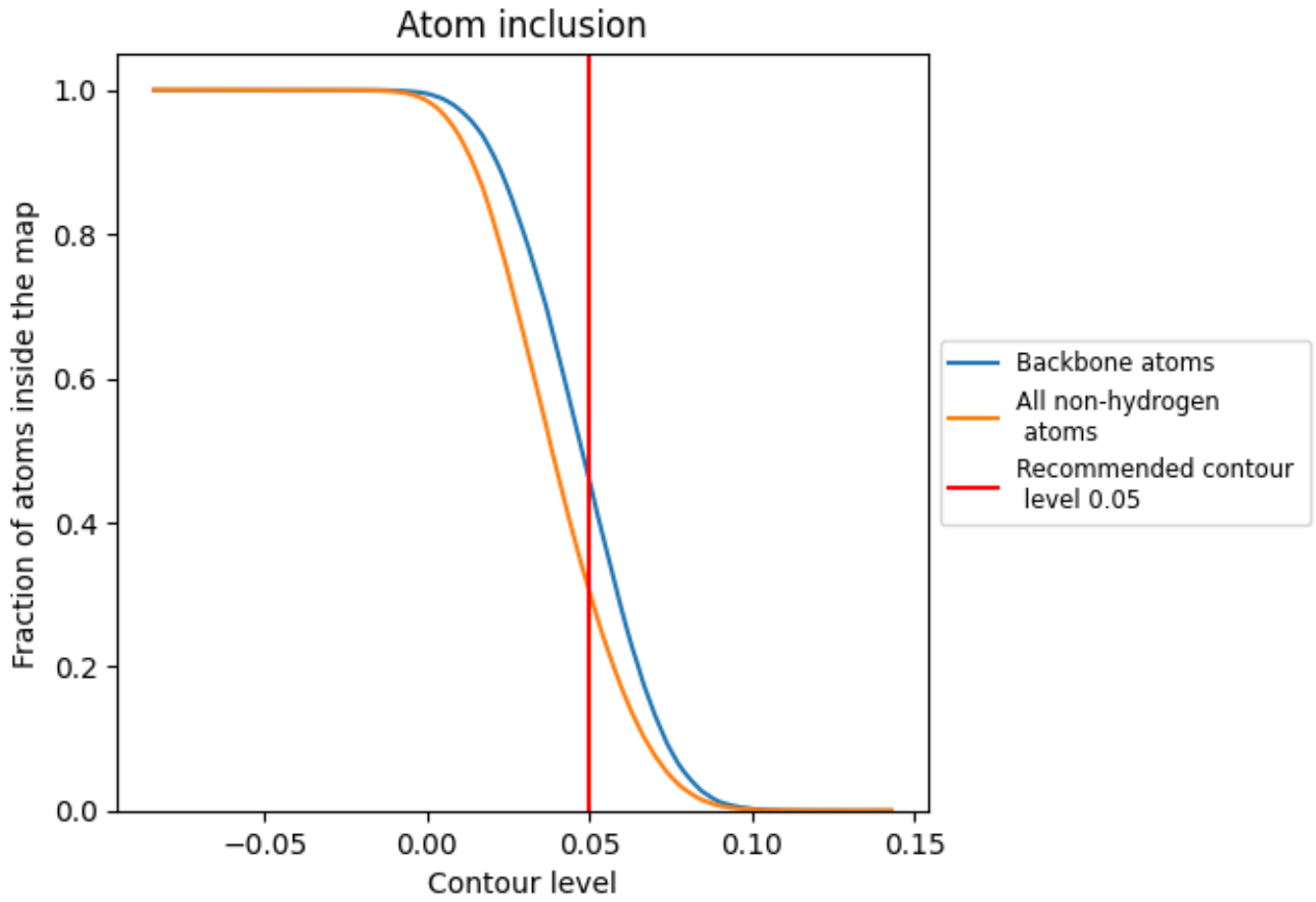
## 9.3 Atom inclusion mapped to coordinate model (i)




X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.05).

## 9.4 Atom inclusion (i)




At the recommended contour level, 46% of all backbone atoms, 30% of all non-hydrogen atoms, are inside the map.

## 9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.05) and Q-score for the entire model and for each chain.

| Chain | Atom inclusion | Q-score |
|---|---|---|
| All | 0.3041 | 0.2400 |
| A | 0.4246 | 0.2250 |
| B | 0.4215 | 0.2100 |
| C | 0.4141 | 0.2190 |
| D | 0.4221 | 0.3200 |
| E | 0.4146 | 0.2910 |
| F | 0.4054 | 0.3040 |
| G | 0.3919 | 0.2740 |
| H | 0.4066 | 0.3180 |
| I | 0.4620 | 0.2920 |
| J | 0.1635 | 0.2060 |
| K | 0.1507 | 0.2220 |
| L | 0.2508 | 0.2070 |
| M | 0.0797 | 0.2000 |
| N | 0.2766 | 0.1970 |
| O | 0.0709 | 0.1850 |