wwPDB EM Validation Summary Report

Nov 5, 2024 – 04:27 AM EST

PDB ID	:	9E1I
EMDB ID	:	EMD-47395
Title	:	Structure of RyR1 in the open state in the presence of oxopyricid
Authors	:	Miotto, M.C.; Marks, A.R.
Deposited on	:	2024-10-21
Resolution	:	3.20 Å(reported)
Based on initial model	:	7TZC

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

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

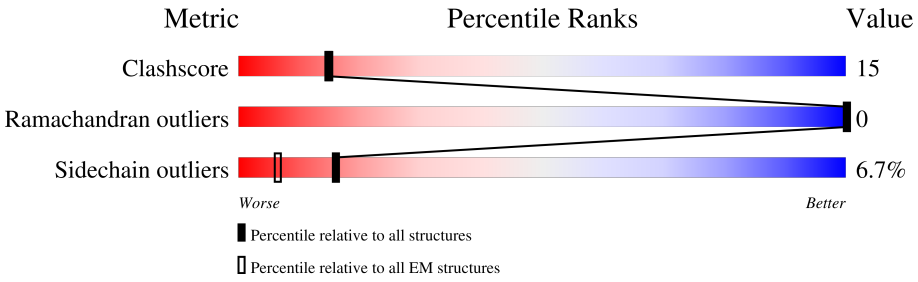
EMDB validation analysis	:	0.0.1.dev113
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 3.20 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	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	5037	43% 58% 27% • 13%
1	B	5037	43% 58% 27% • 13%
1	C	5037	43% 58% 27% • 13%
1	D	5037	43% 58% 27% • 13%
2	E	108	79% 69% 29% • •
2	F	108	77% 73% 24% • •
2	G	108	78% 70% 26% • •
2	H	108	77% 71% 26% • •

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 144120 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.

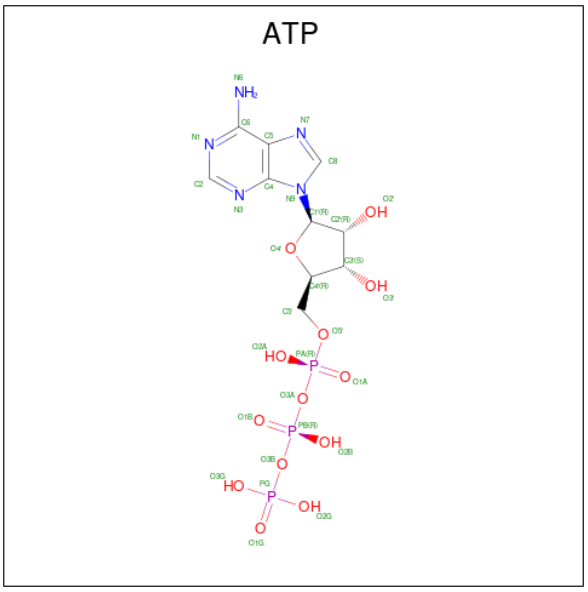
- Molecule 1 is a protein called Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	4404	Total 35150	C 22365	N 6063	O 6485	S 237	9	0
1	B	4404	Total 35150	C 22365	N 6063	O 6485	S 237	9	0
1	D	4404	Total 35150	C 22365	N 6063	O 6485	S 237	9	0
1	C	4404	Total 35150	C 22365	N 6063	O 6485	S 237	9	0

- Molecule 2 is a protein called Peptidyl-prolyl cis-trans isomerase FKBP1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	E	107	Total 831	C 527	N 146	O 154	S 4	0	0
2	H	107	Total 831	C 527	N 146	O 154	S 4	0	0
2	G	107	Total 831	C 527	N 146	O 154	S 4	0	0
2	F	107	Total 831	C 527	N 146	O 154	S 4	0	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					AltConf
3	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
3	B	1	Total	C	N	O	P	0
			31	10	5	13	3	
3	D	1	Total	C	N	O	P	0
			31	10	5	13	3	
3	C	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total	Ca	0
			1	1	
4	B	1	Total	Ca	0
			1	1	
4	D	1	Total	Ca	0
			1	1	
4	C	1	Total	Ca	0
			1	1	

- Molecule 5 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
5	A	1	Total	Zn	0
			1	1	

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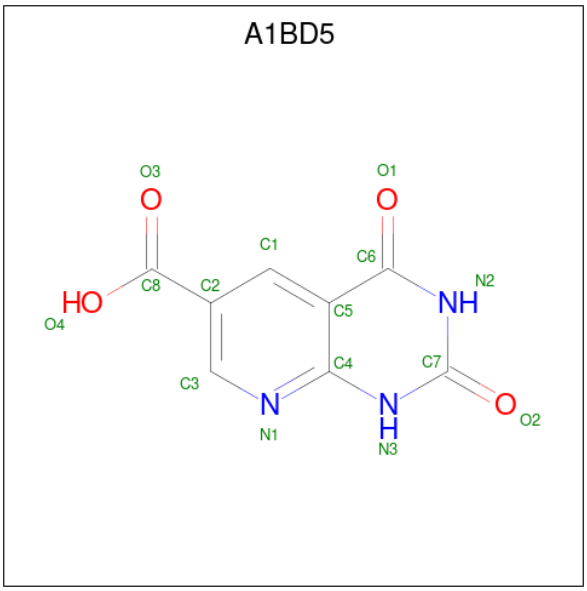
Mol	Chain	Residues	Atoms	AltConf
5	B	1	Total Zn 1 1	0
5	D	1	Total Zn 1 1	0
5	C	1	Total Zn 1 1	0

- Molecule 6 is oxopyricid (three-letter code: A1BD5) (formula: $C_8H_5N_3O_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
6	A	1	Total C N O 15 8 3 4	0
6	B	1	Total C N O 15 8 3 4	0
6	D	1	Total C N O 15 8 3 4	0
6	C	1	Total C N O 15 8 3 4	0

- Molecule 7 is water.

Mol	Chain	Residues	Atoms	AltConf
7	A	1	Total O 1 1	0
7	B	1	Total O 1 1	0

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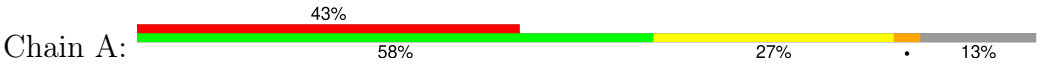
Mol	Chain	Residues	Atoms	AltConf
7	D	1	Total O 1 1	0
7	C	1	Total O 1 1	0

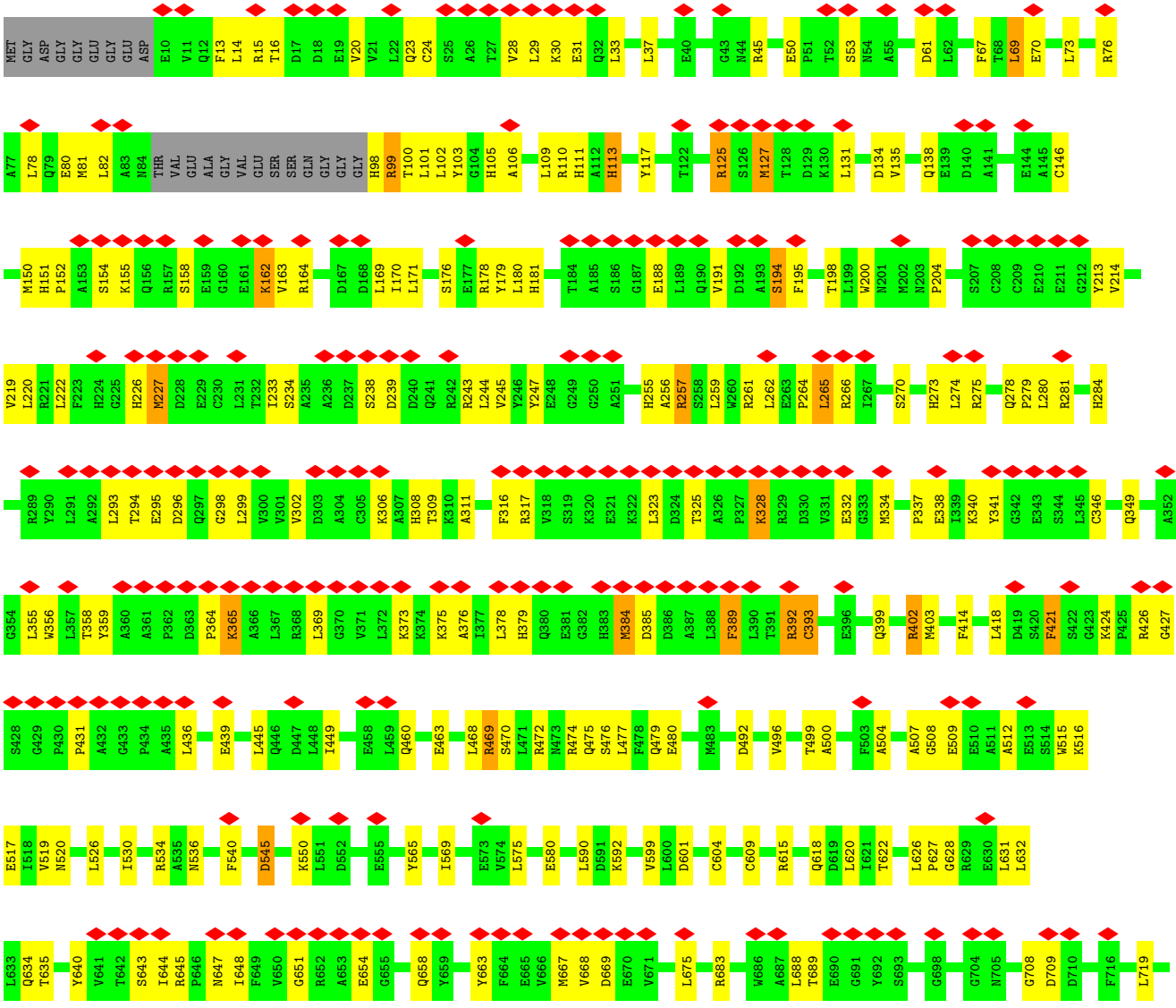
3 Residue-property plots (i)

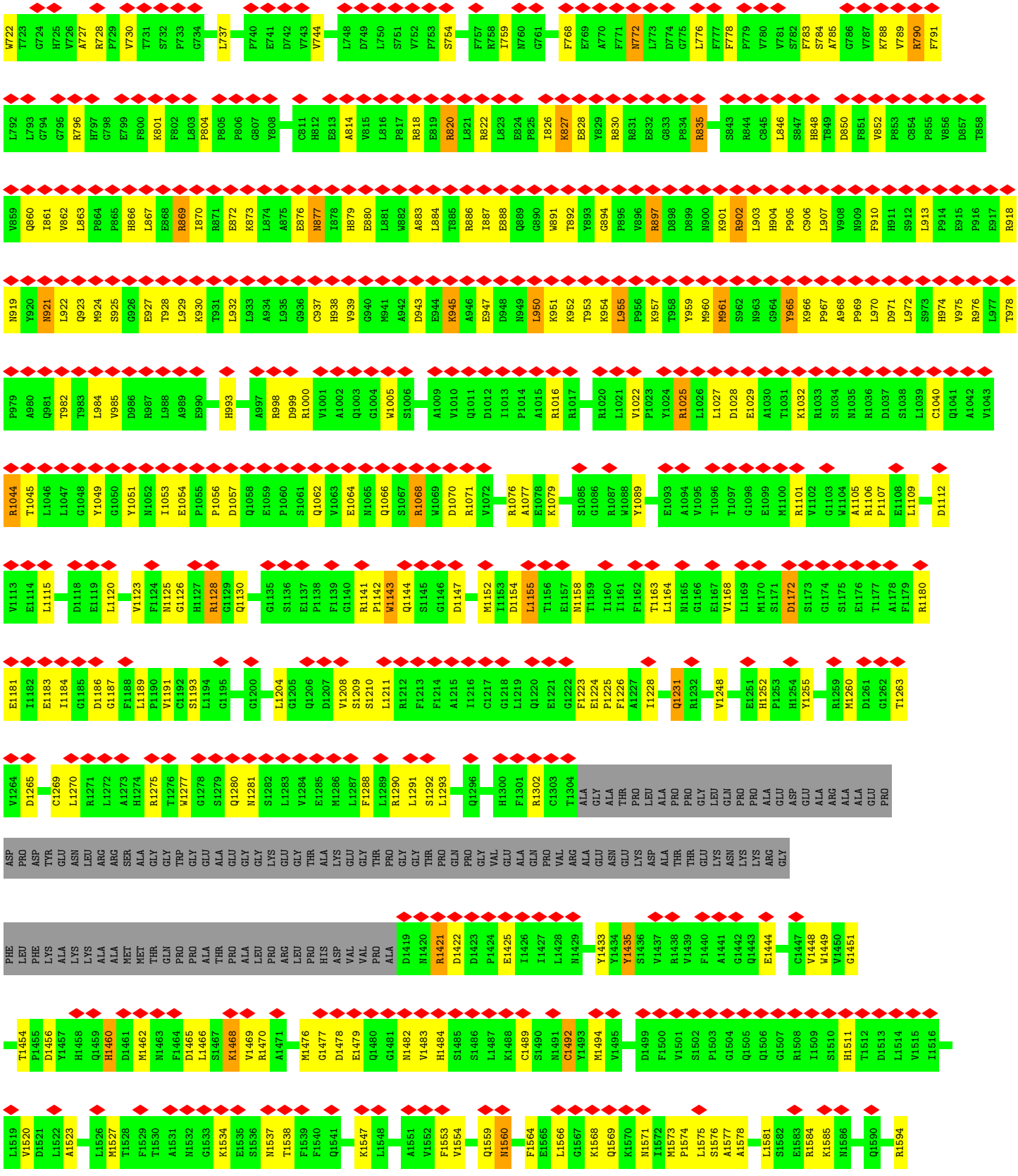
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Ryanodine receptor 1

Chain A:



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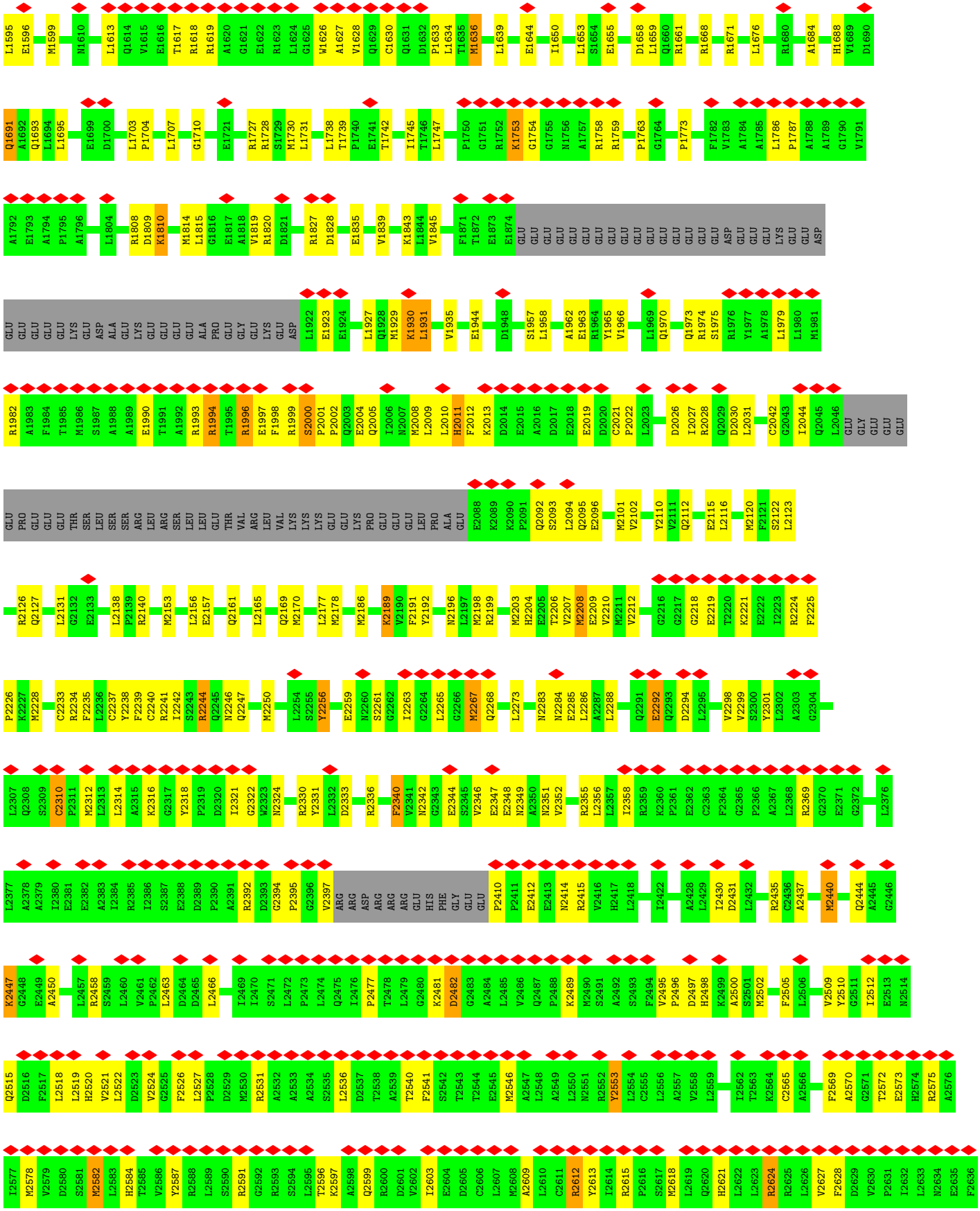
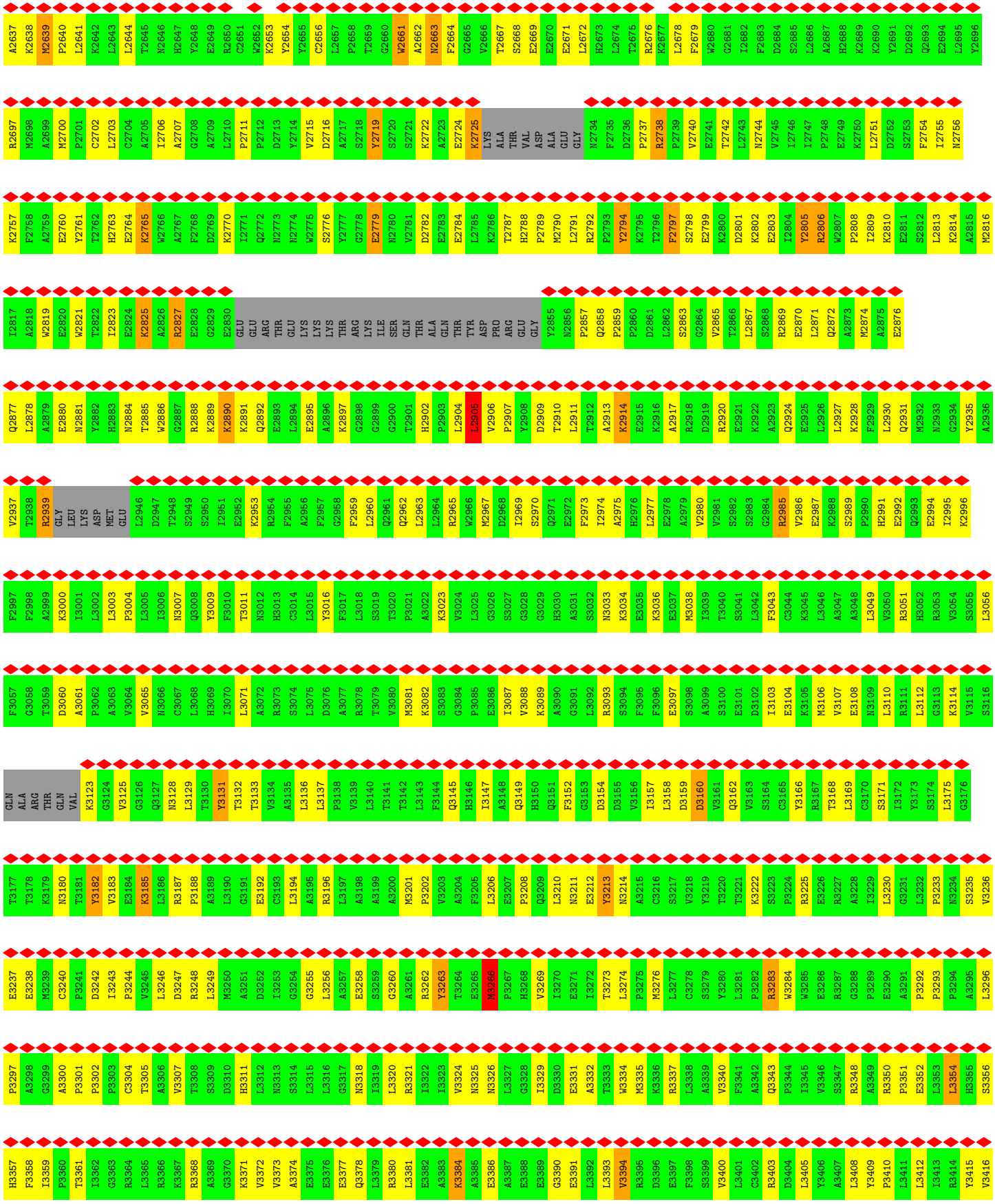
L792 L793 G794 G795 R796 H797 G798 E799 F800 K801 F802 L803 P804 P805 P806 G807 Y808 C811 H812 E813 A814 V815 L816 P817 R818 E819 R820 L821 R822 L823 E824 P825 I826 K827 E828 Y829 R830 R831 E832 G833 P834 R835 S843 R844 C845 L846 S847 H848 T849 D850 F851 V852 P853 C854 P855 V856 D857 T858
V859 Q860 I861 V862 L863 P864 P865 H866 L867 E868 R869 I870 R871 E872 K873 L874 A875 E876 N877 I878 H879 E880 L881 V882 A883 L884 T885 R886 I887 E888 Q889 G890 W891 T892 Y893 G894 P895 V896 R897 D898 D899 N900 K901 R902 L903 H904 P905 C906 L907 V908 N909 F910 H911 S912 L913 P914 E915 P916 E917 R918
N919 Y920 N921 L922 Q923 M924 S925 G926 E927 T928 L929 K930 T931 L932 L933 A934 L935 G936 C937 H938 V939 G940 M941 A942 D943 E944 K945 A946 E947 D948 N949 L950 K951 K952 T953 K954 L955 P956 K957 T958 Y959 M960 M961 S962 N963 G964 Y965 K966 P967 A968 P969 L970 D971 L972 S973 H974 V975 R976 L977 T978
P979 A980 Q981 T982 T983 L984 V985 D986 R987 L988 A989 E990 H993 A997 R998 D999 R1000 V1001 A1002 Q1003 G1004 W1005 S1006 A1009 V1010 Q1011 D1012 I1013 P1014 A1015 R1016 R1017 R1020 L1021 V1022 P1023 Y1024 R1025 L1026 L1027 D1028 E1029 A1030 T1031 K1032 R1033 S1034 N1035 R1036 D1037 S1038 L1039 C1040 Q1041 A1042 V1043
R1044 T1045 L1046 L1047 G1048 Y1049 G1050 Y1051 N1052 I1053 E1054 P1055 P1056 D1057 Q1058 E1059 P1060 S1061 Q1062 V1063 E1064 N1065 Q1066 S1067 R1068 W1069 D1070 R1071 V1072 R1076 A1077 E1078 K1079 S1085 G1086 R1087 W1088 Y1089 E1093 A1094 V1095 T1096 T1097 G1098 E1099 M1100 R1101 V1102 G1103 W1104 A1105 R1106 P1107 E1108 L1109 D1112
V1113 E1114 L1115 D1118 E1119 L1120 V1123 F1124 N1125 G1126 H1127 R1128 G1129 Q1130 G1135 S1136 E1137 P1138 F1139 G1140 R1141 P1142 W1143 Q1144 S1145 G1146 D1147 M1152 I1153 D1154 L1155 T1156 E1157 N1158 T1159 I1160 I1161 F1162 T1163 L1164 N1165 G1166 E1167 V1168 L1169 M1170 S1171 D1172 S1173 G1174 S1175 E1176 T1177 A1178 F1179 R1180
E1181 I1182 E1183 I1184 G1185 D1186 G1187 F1188 L1189 P1190 V1191 C1192 S1193 L1194 G1195 G1200 L1204 G1205 Q1206 D1207 V1208 S1209 S1210 L1211 R1212 F1213 F1214 A1215 I1216 C1217 G1218 L1219 Q1220 E1221 G1222 F1223 E1224 P1225 F1226 A1227 I1228 Q1231 R1232 V1248 E1251 H1252 P1253 H1254 Y1255 R1259 M1260 D1261 G1262 T1263
V1264 D1265 C1269 L1270 R1271 L1272 A1273 H1274 R1275 T1276 W1277 G1278 S1279 Q1280 N1281 S1282 L1283 V1284 E1285 M1286 L1287 F1288 L1289 R1290 L1291 S1292 L1293 Q1296 H1300 F1301 R1302 C1303 T1304 ALA GLY ALA THR PRO LEU ALA PRO PRO GLY LEU GLN PRO PRO ALA GLU ASP GLU ALA ARG ALA ALA GLU PRO
ASP PRO ASP TYR GLU ASN LEU ARG ARG SER ALA GLY GLY TRP GLY GLU ALA GLU GLY GLY LYS GLU GLY THR ALA LYS GLU GLY THR PRO GLN PRO GLY VAL GLU ALA GLN PRO VAL ARG ALA GLU ASN GLU LYS ASP ALA THR THR GLU LYS ASN LYS LYS ARG GLY
PHE LEU PHE LYS ALA LYS LYS ALA ALA MET MET THR GLN PRO PRO ALA THR PRO ALA LEU PRO ARG LEU PRO HIS ASP VAL VAL PRO ALA D1419 N1420 R1421 D1422 D1423 P1424 E1425 I1426 I1427 L1428 N1429 Y1433 Y1434 Y1435 S1436 V1437 R1438 V1439 F1440 A1441 G1442 Q1443 E1444 C1447 V1448 W1449 V1450 G1451
T1454 P1455 D1456 Y1457 H1458 Q1459 H1460 D1461 M1462 N1463 F1464 D1465 L1466 S1467 K1468 V1469 R1470 A1471 M1476 G1477 D1478 E1479 Q1480 G1481 N1482 V1483 H1484 S1485 S1486 L1487 K1488 C1489 S1490 N1491 C1492 Y1493 M1494 V1495 D1499 F1500 V1501 S1502 P1503 G1504 Q1505 Q1506 G1507 R1508 I1509 S1510 H1511 T1512 D1513 L1514 V1515 I1516
L1519 V1520 D1521 L1522 A1523 L1526 M1527 T1528 F1529 T1530 A1531 N1532 G1533 K1534 E1535 S1536 N1537 T1538 F1539 F1540 Q1541 K1547 L1548 A1551 V1552 F1553 V1554 Q1559 N1560 F1564 E1565 L1566 G1567 K1568 Q1569 K1570 N1571 I1572 M1573 P1574 L1575 S1576 A1577 A1578 L1581 S1582 E1583 R1584 K1585 N1586 Q1590 R1594

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R2697 M2698 A2699 M2700 P2701 C2702 L2703 C2704 A2705 I2706 A2707 G2708 A2709 L2710 P2711 P2712 D2713 Y2714 V2715 D2716 A2717 S2718 Y2719 S2720 S2721 K2722 A2723 E2724 K2725 LYS ALA THR VAL ASP ALA GLU GLY N2734 F2735 D2736 P2737 R2738 P2739 V2740 E2741 T2742 L2743 N2744 V2745 I2746 I2747 P2748 E2749 K2750 L2751 D2752 S2753 F2754 I2755 N2756
K2757 F2758 A2759 E2760 Y2761 T2762 H2763 E2764 K2765 W2766 A2767 F2768 D2769 K2770 I2771 Q2772 N2773 N2774 W2775 S2776 Y2777 G2778 E2779 N2780 V2781 D2782 E2783 E2784 L2785 K2786 T2787 H2788 P2789 M2790 L2791 R2792 P2793 Y2794 K2795 T2796 F2797 S2798 E2799 K2800 D2801 K2802 E2803 I2804 Y2805 R2806 W2807 P2808 I2809 K2810 E2811 S2812 L2813 K2814 A2815 M2816
I2817 A2818 W2819 E2820 W2821 T2822 I2823 E2824 K2825 A2826 R2827 E2828 G2829 E2830 GLU GLU ARG THR GLU LYS LYS LYS THR ARG LYS ILE SER GLN THR ALA GLN THR TYR ASP PRO ARG GLU GLY Y2855 N2856 P2857 Q2858 P2859 P2860 D2861 L2862 S2863 G2864 V2865 T2866 L2867 S2868 R2869 E2870 L2871 Q2872 A2873 M2874 A2875 E2876
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T3177 T3178 K3179 N3180 T3181 Y3182 V3183 E3184 K3185 L3186 R3187 P3188 A3189 L3190 G3191 E3192 C3193 L3194 A3195 R3196 L3197 A3198 A3199 A3200 M3201 P3202 V3203 A3204 F3205 L3206 E3207 P3208 Q3209 L3210 N3211 E3212 Y3213 N3214 A3215 C3216 S3217 V3218 Y3219 T3220 T3221 K3222 S3223 P3224 R3225 E3226 R3227 A3228 I3229 L3230 G3231 L3232 P3233 N3234 S3235 V3236
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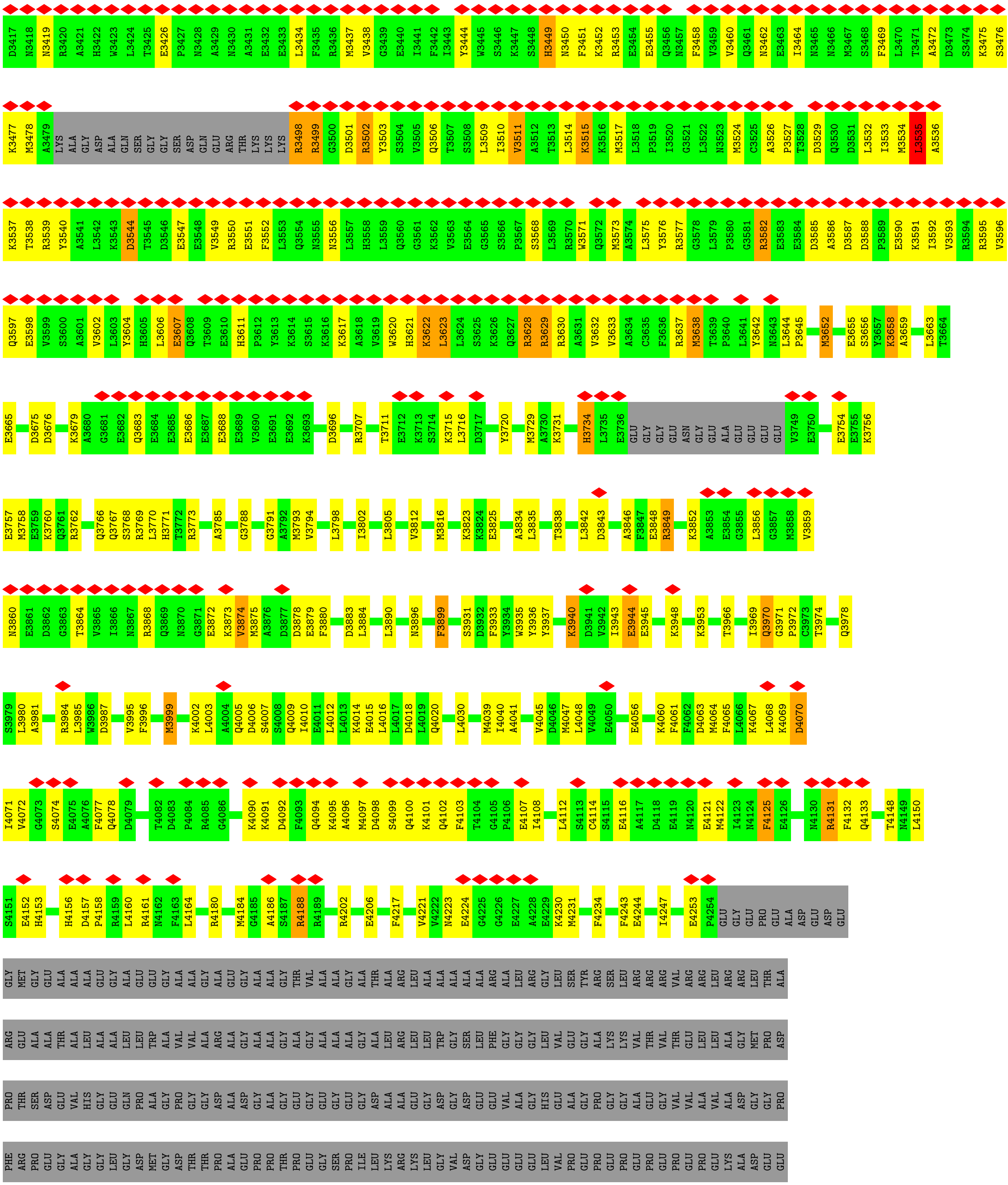
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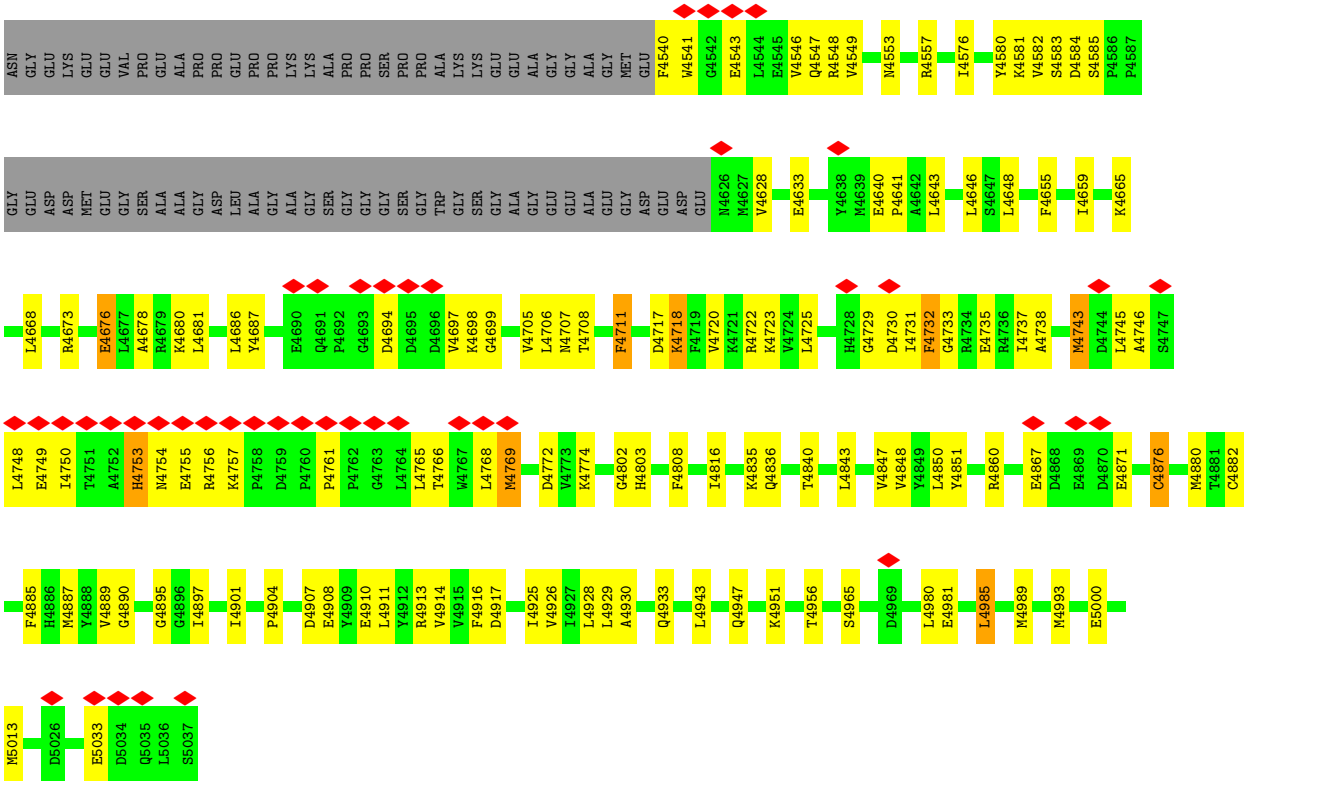
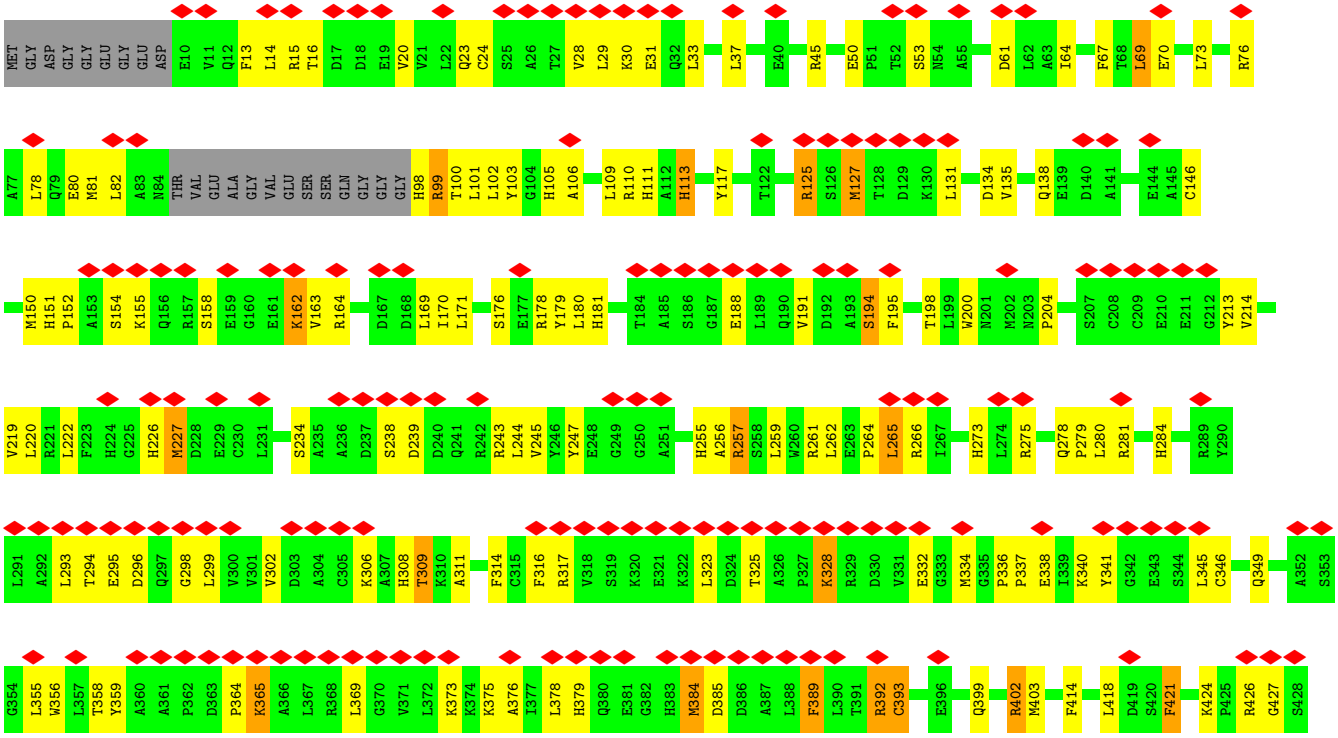
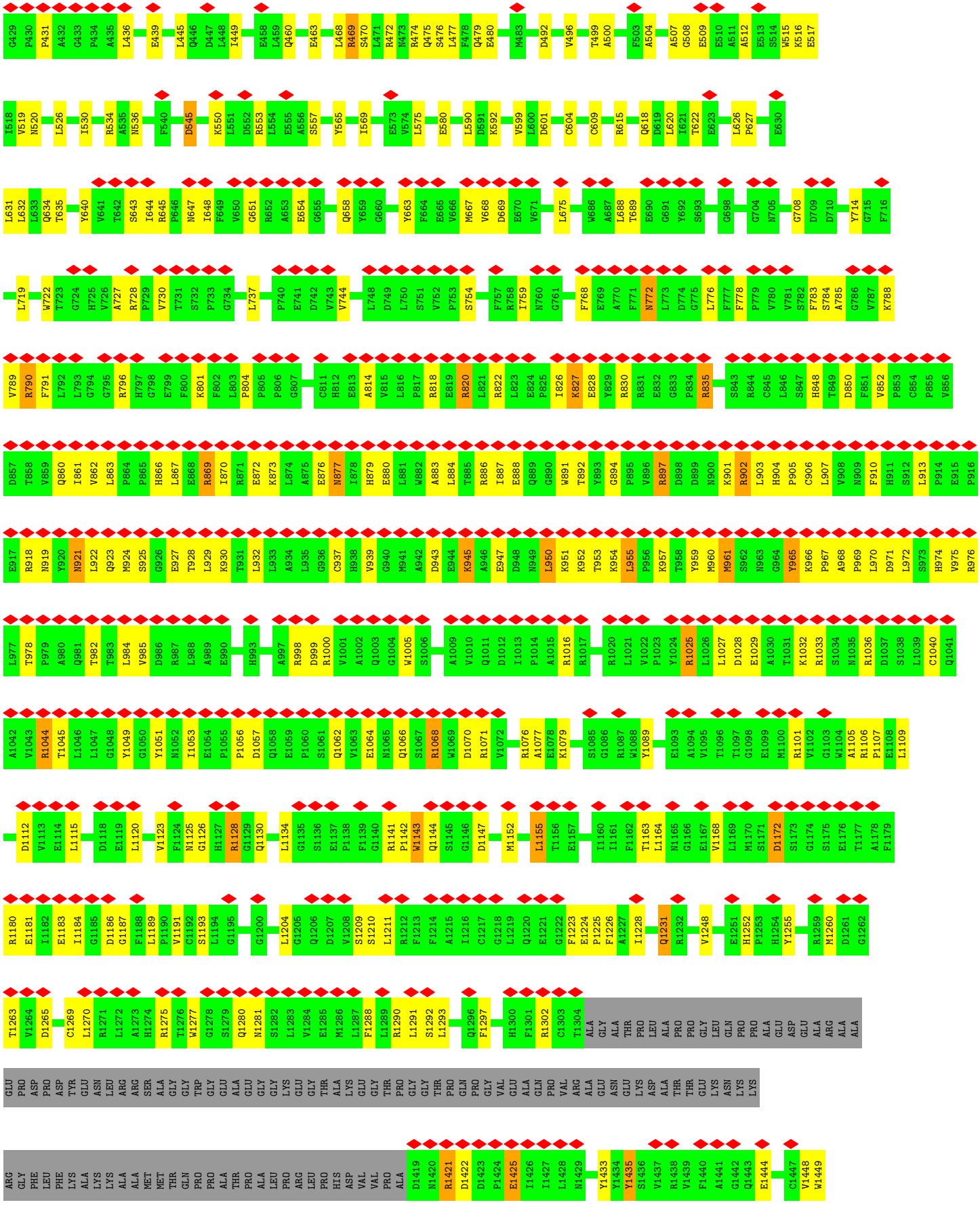


• Molecule 1: Ryanodine receptor 1

Chain B:

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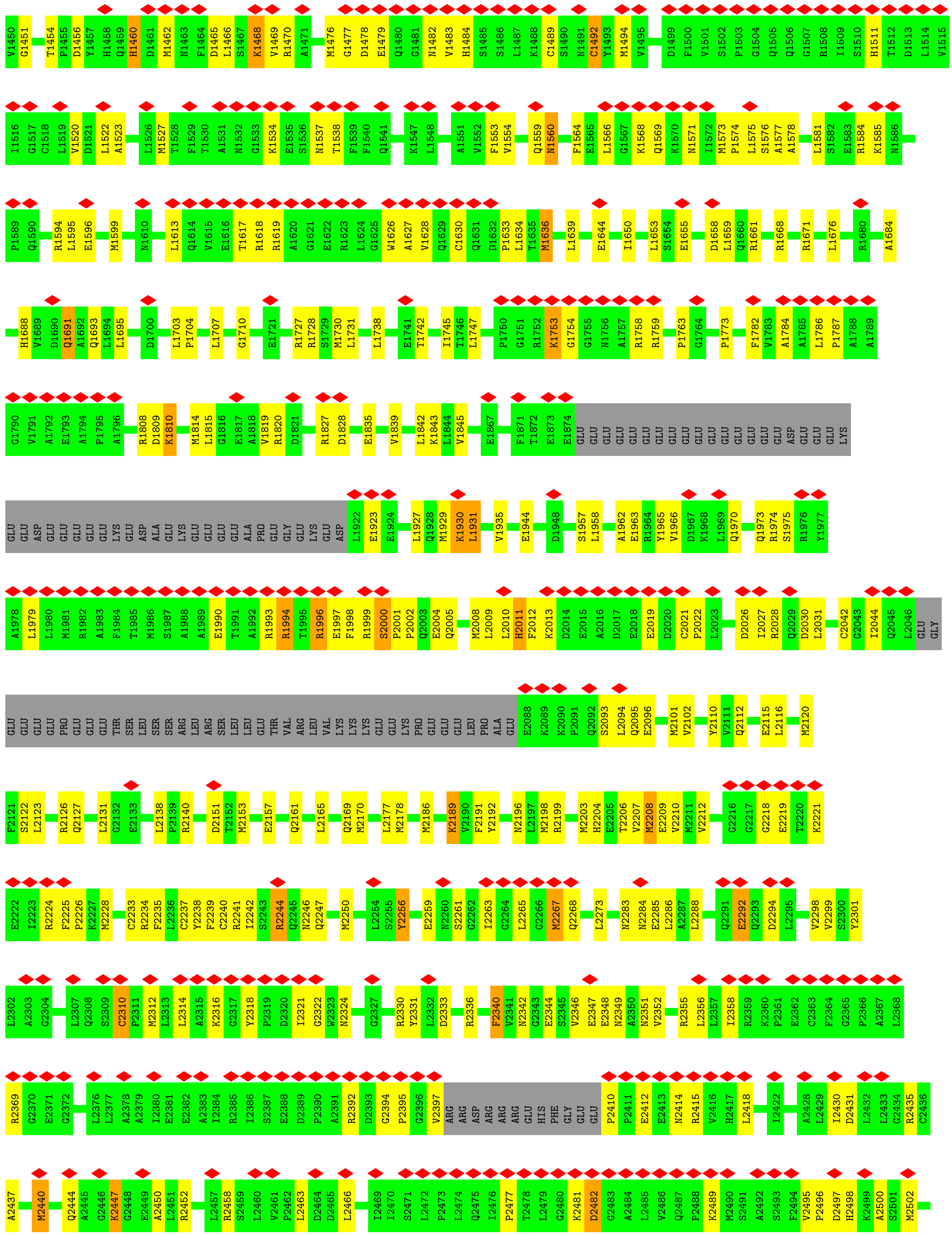
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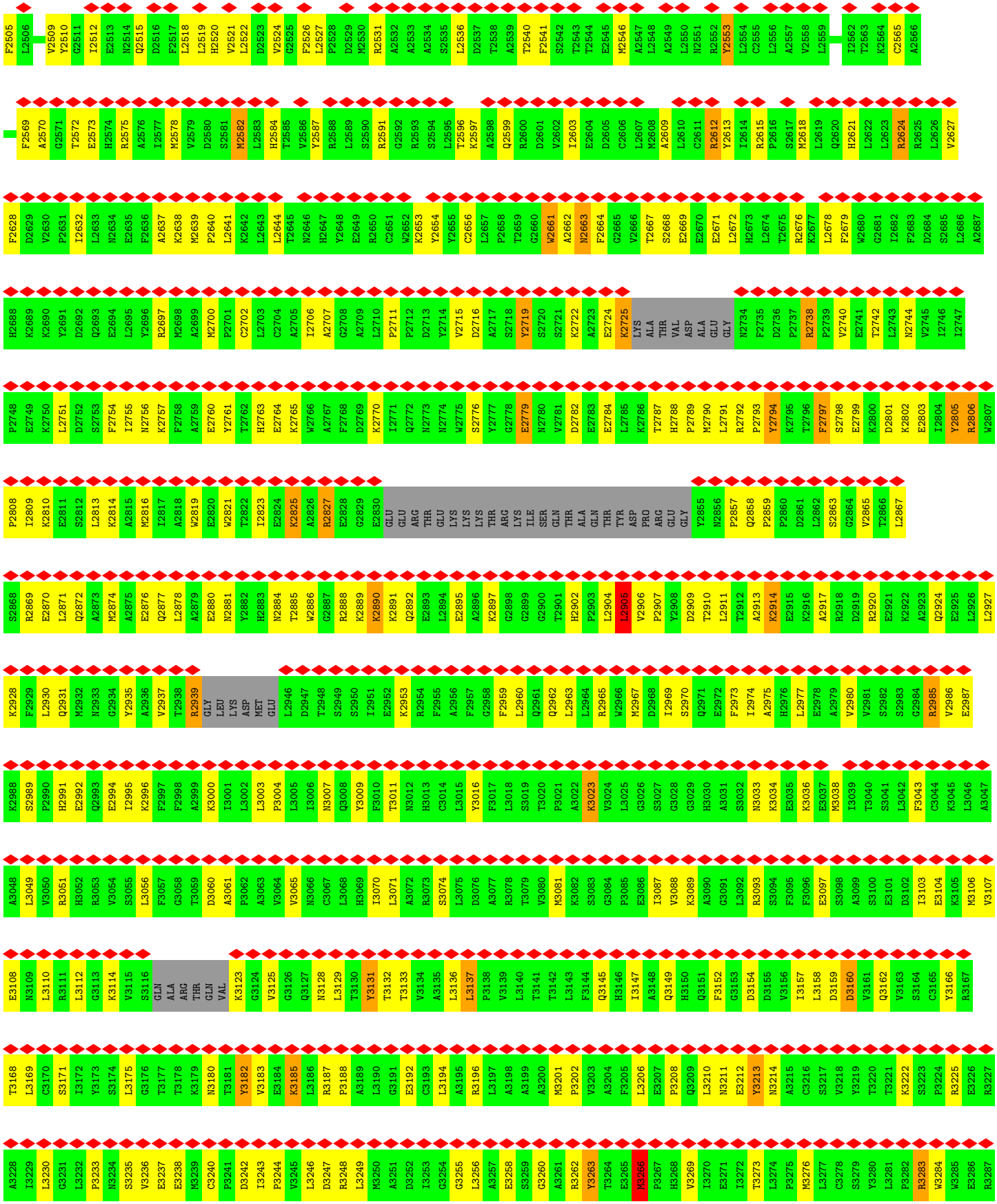
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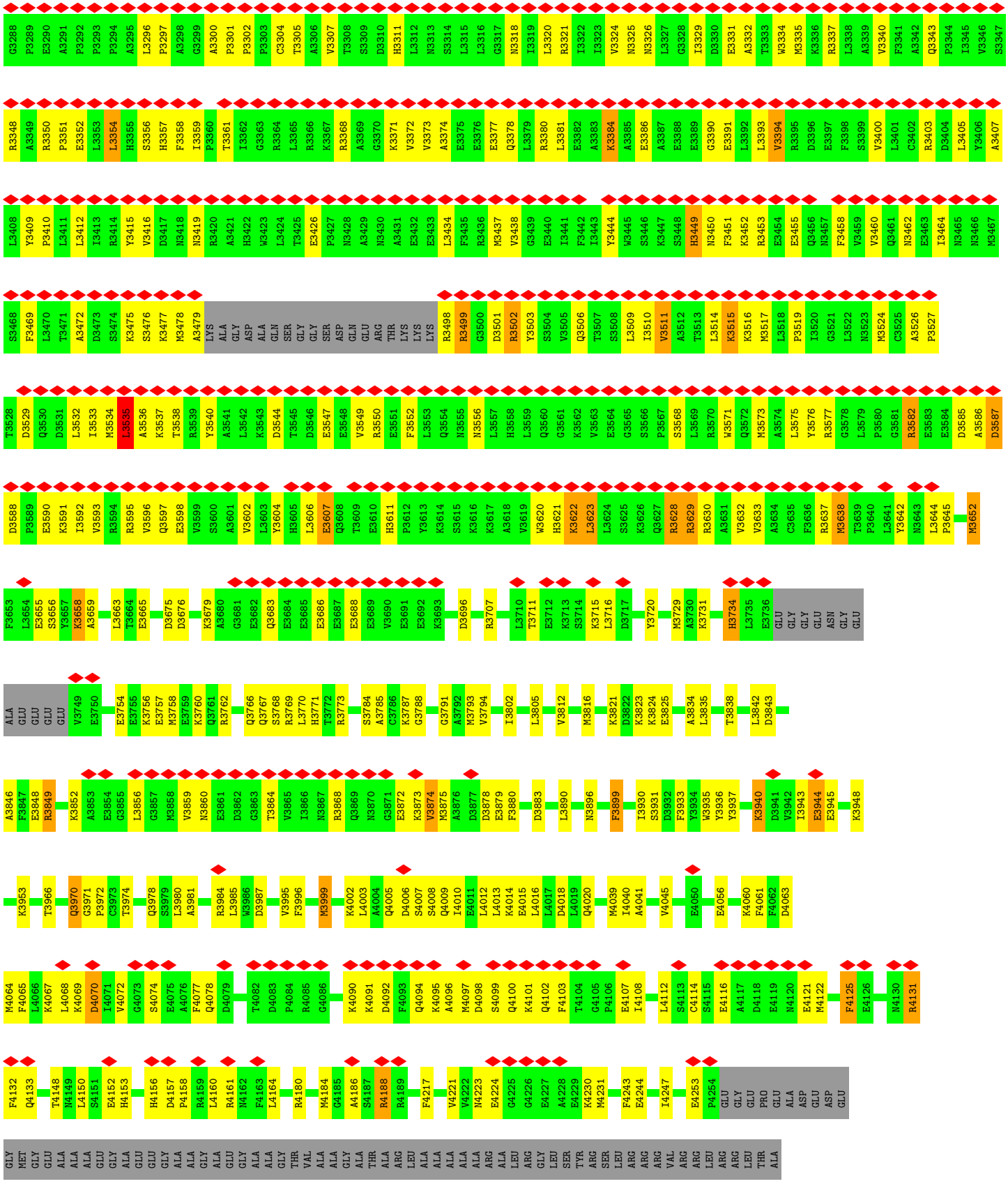
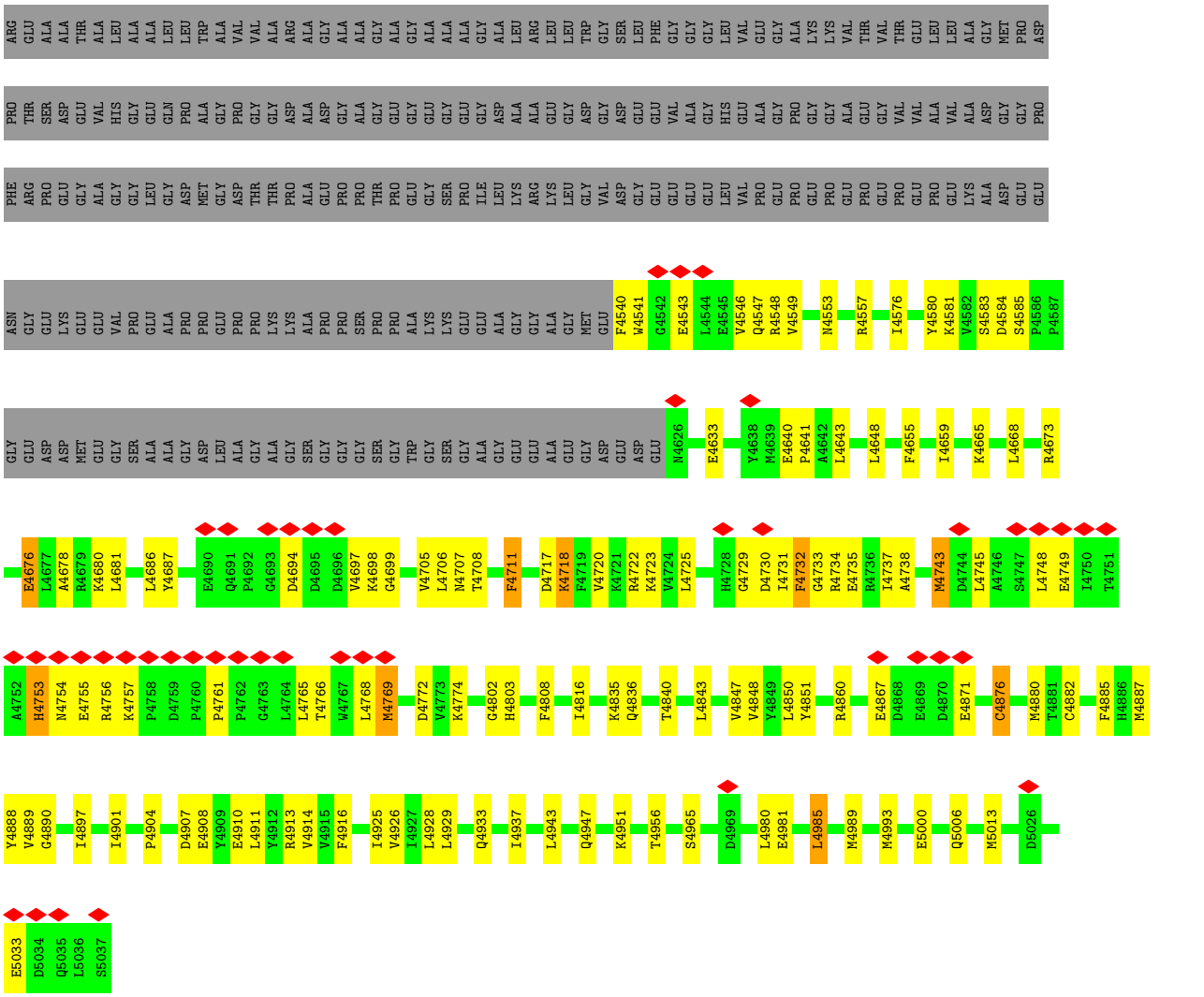
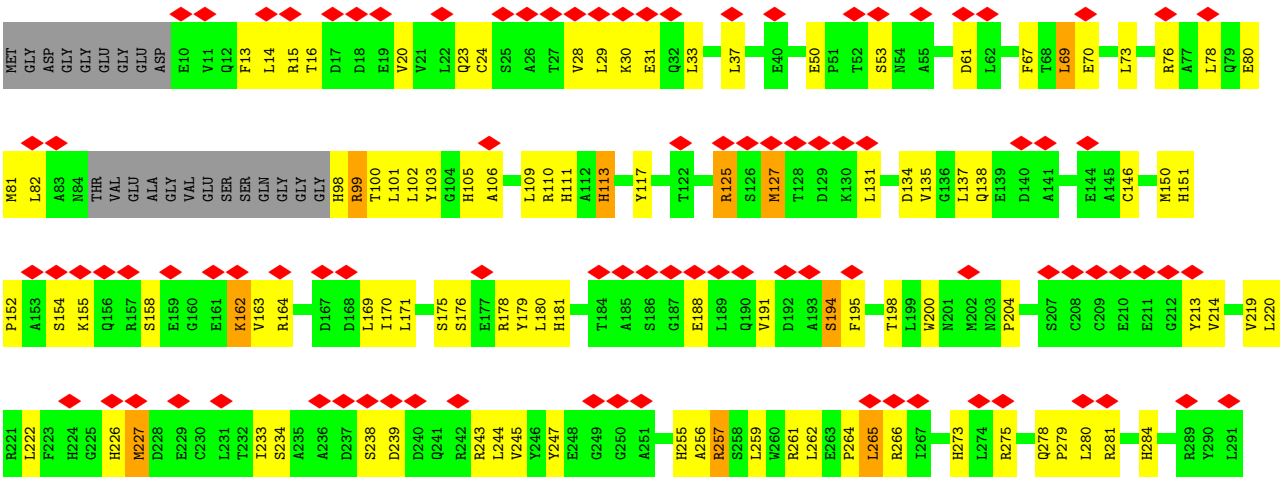
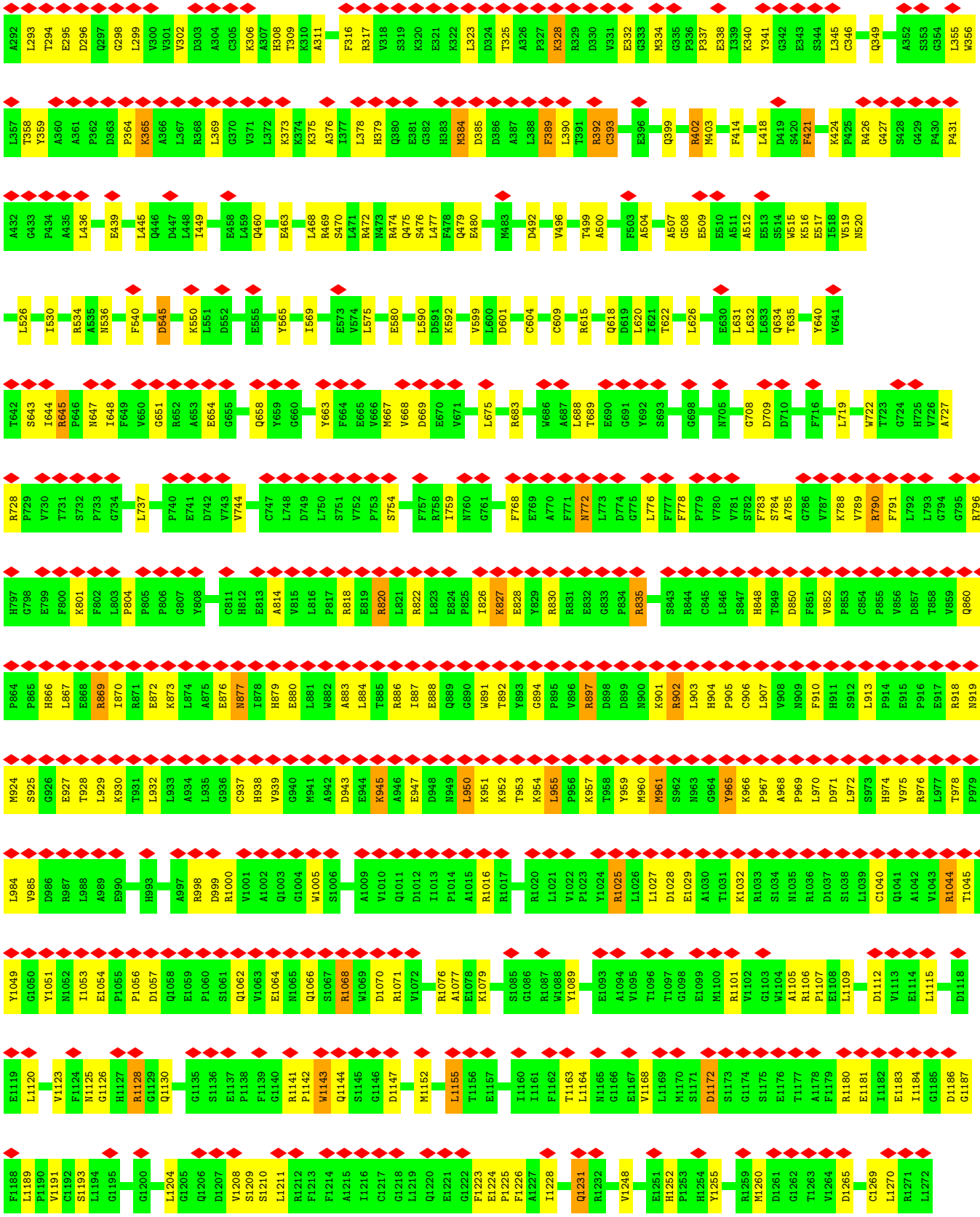




• Molecule 1: Ryanodine receptor 1

Chain D:

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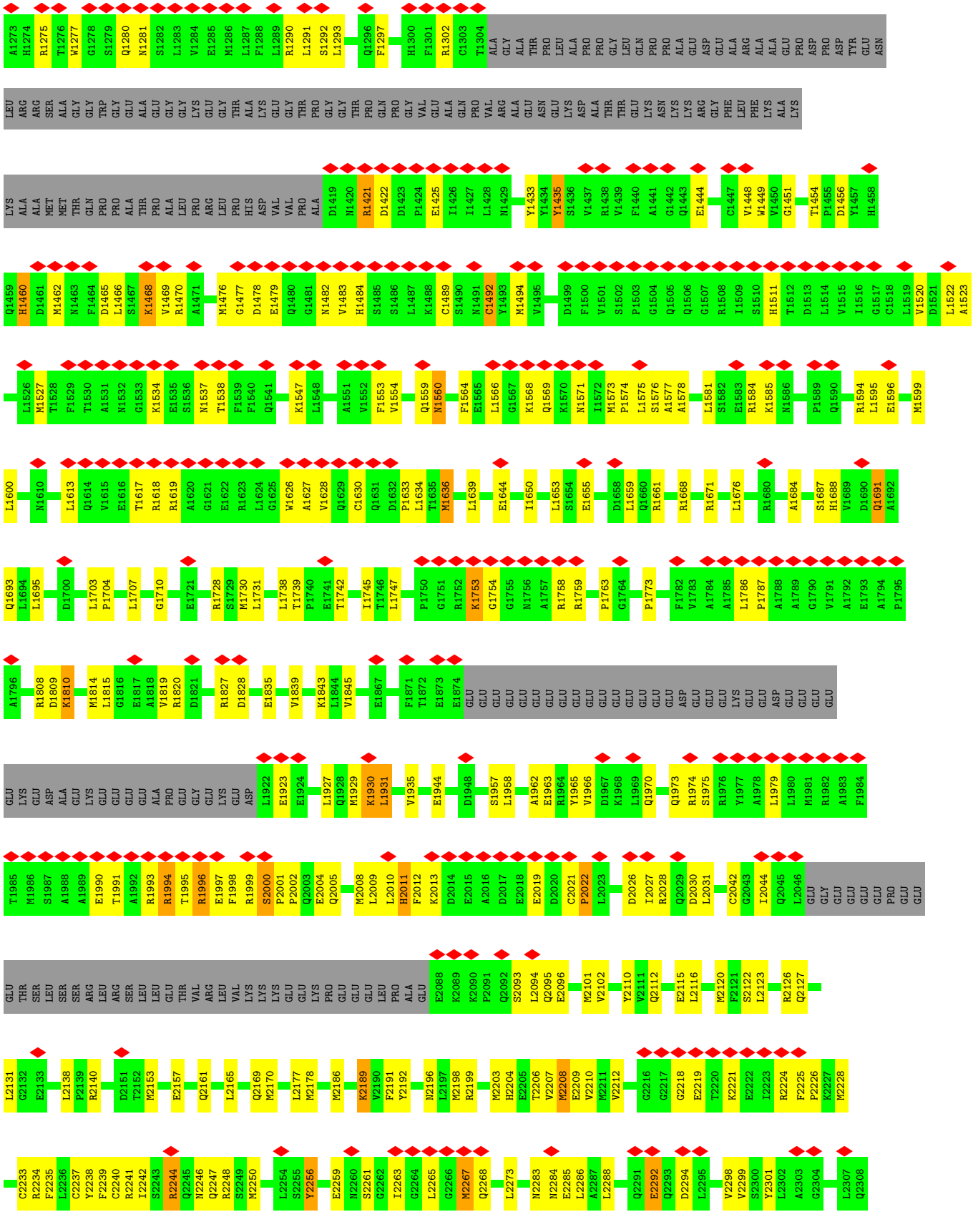
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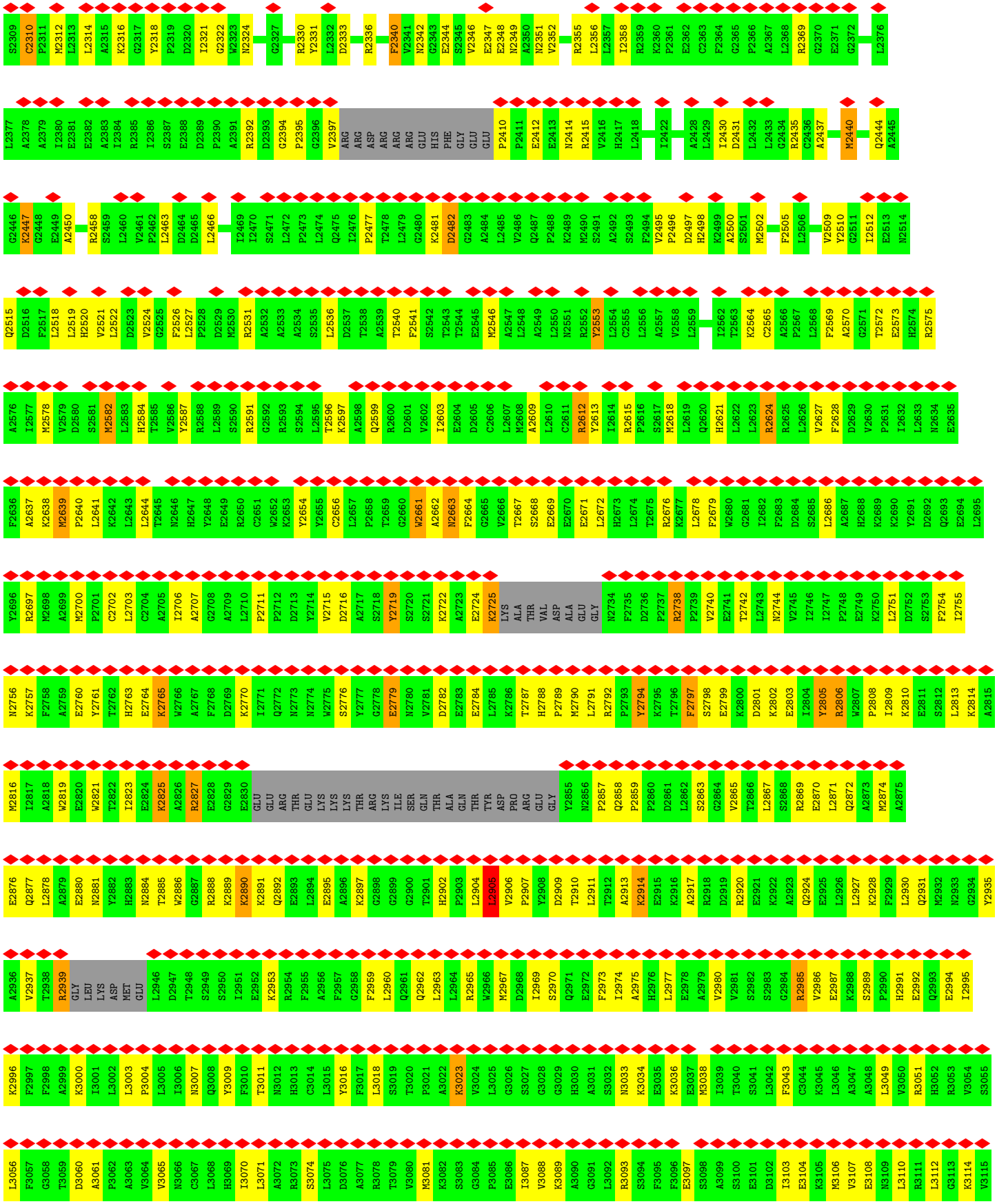
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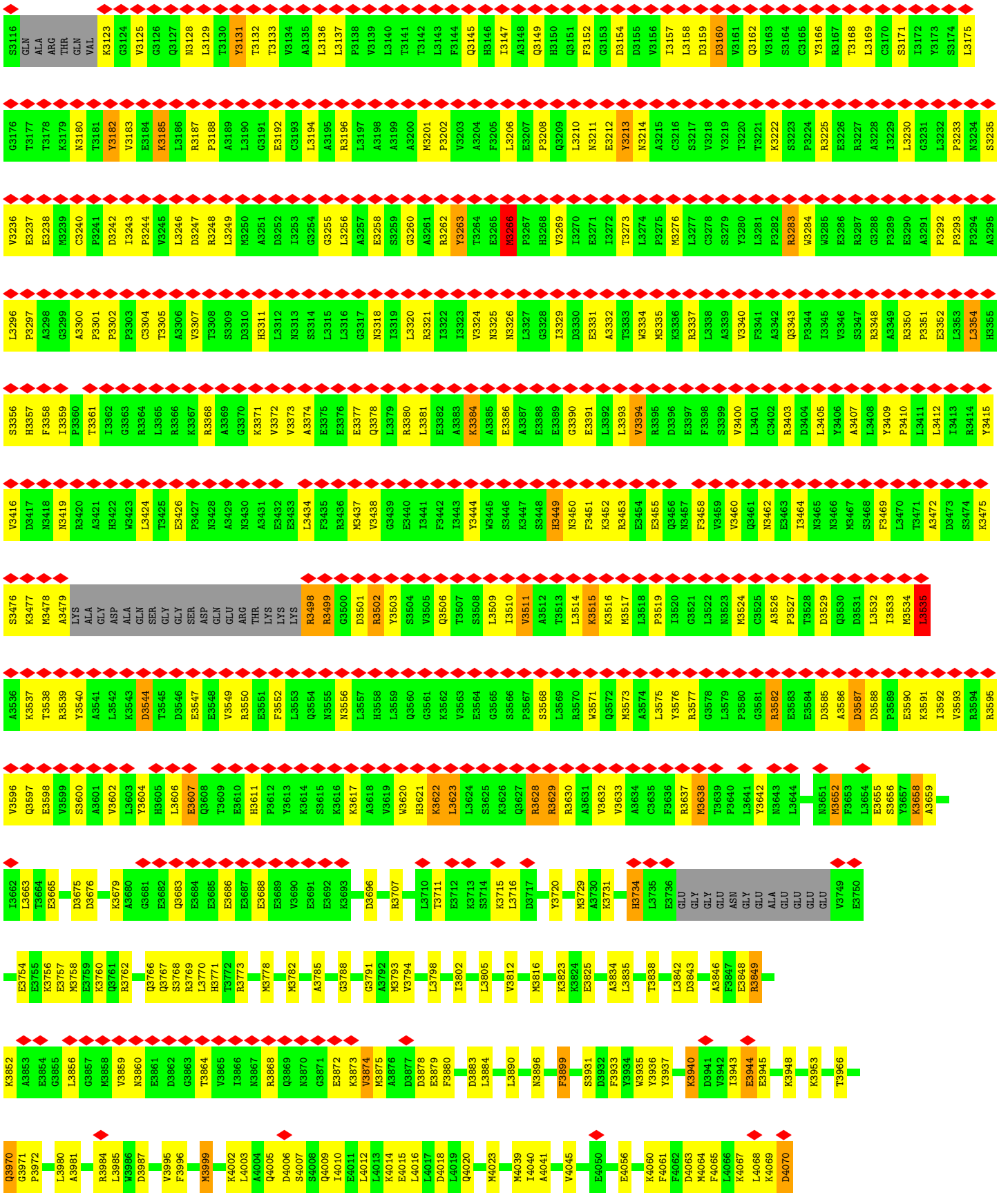
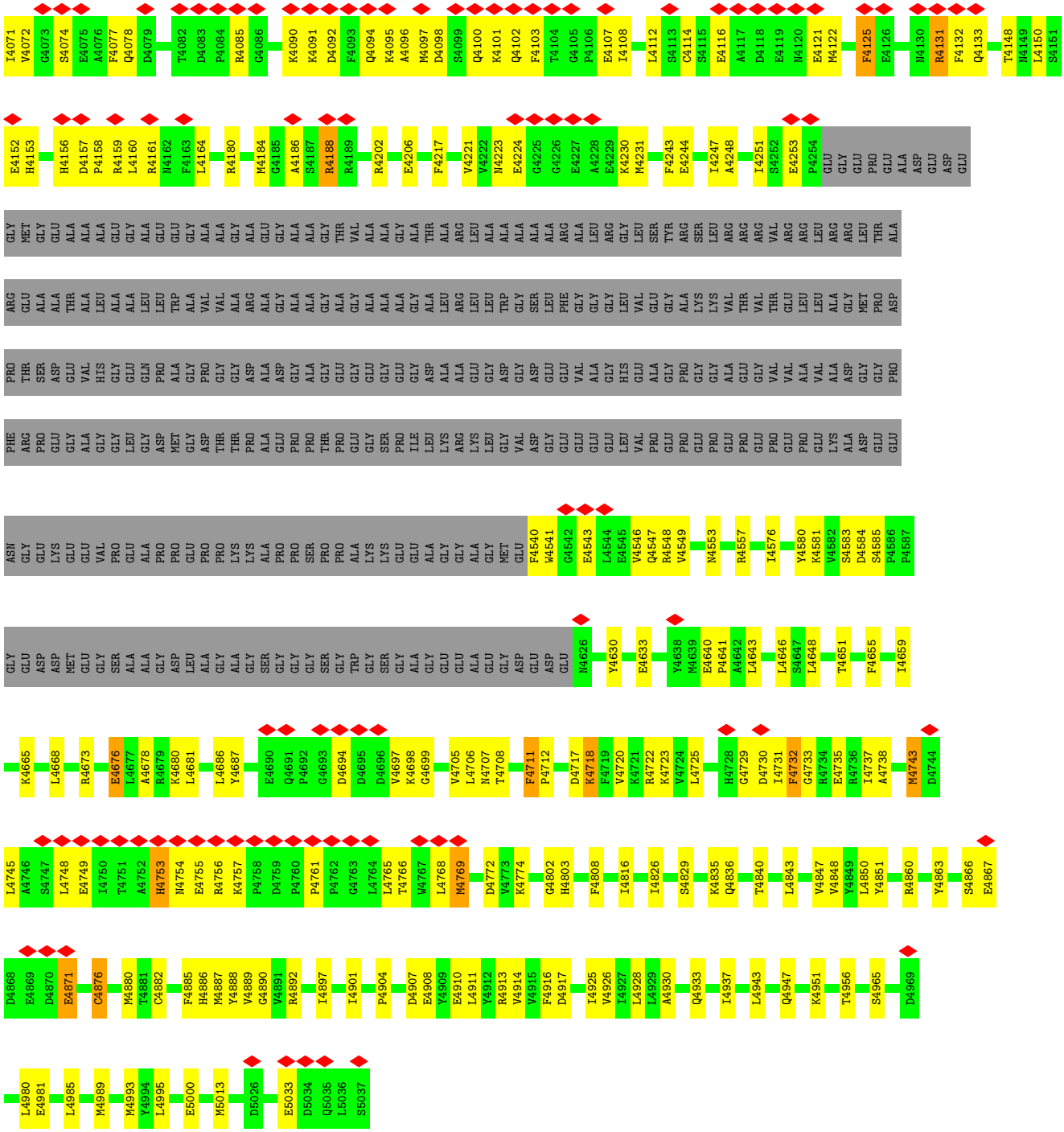
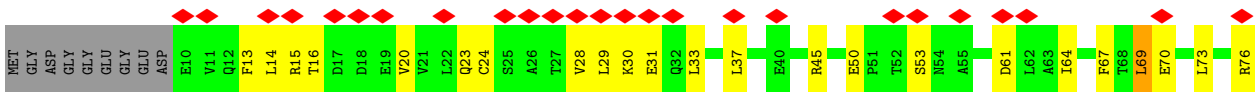
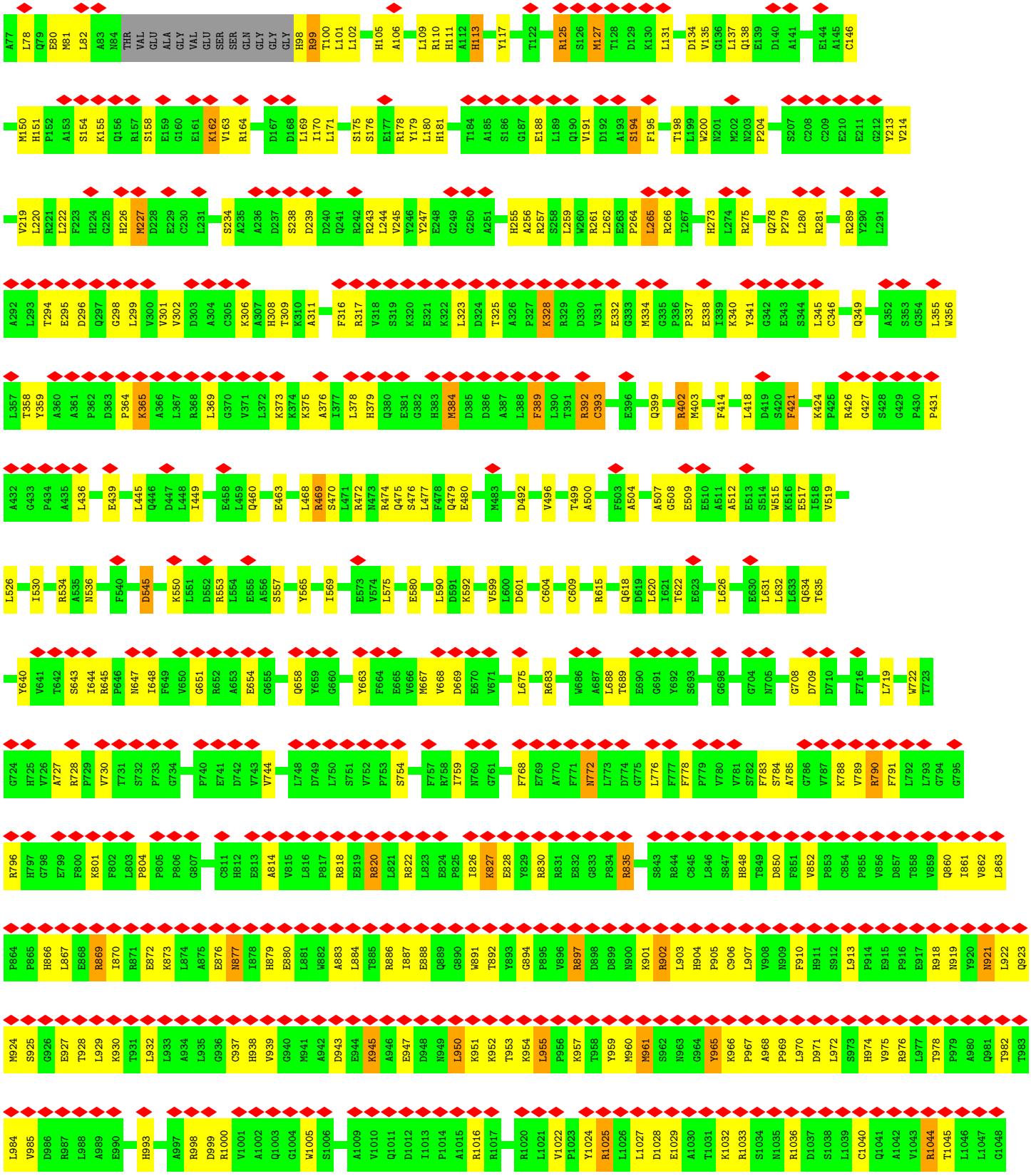




• Molecule 1: Ryanodine receptor 1

Chain C:

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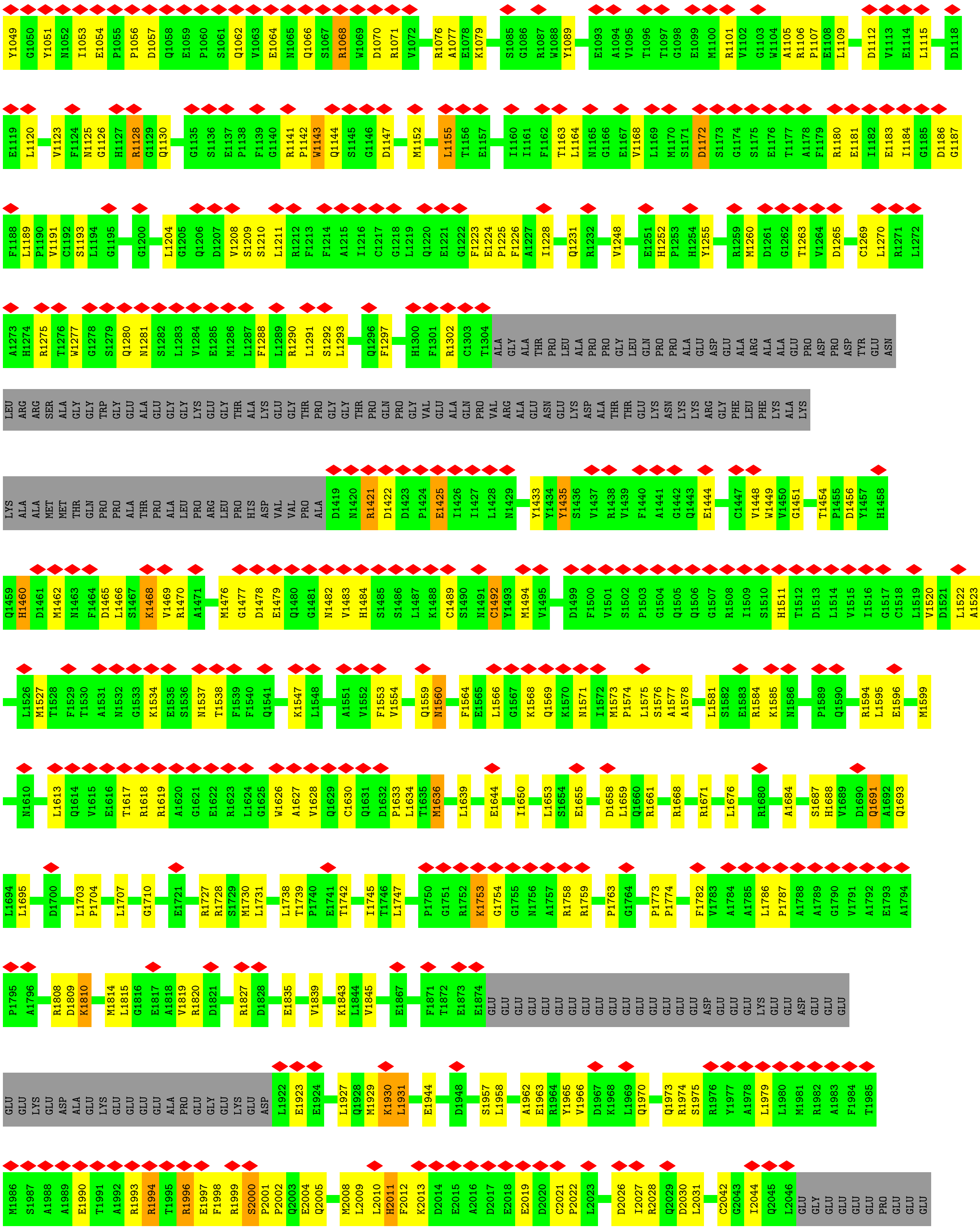
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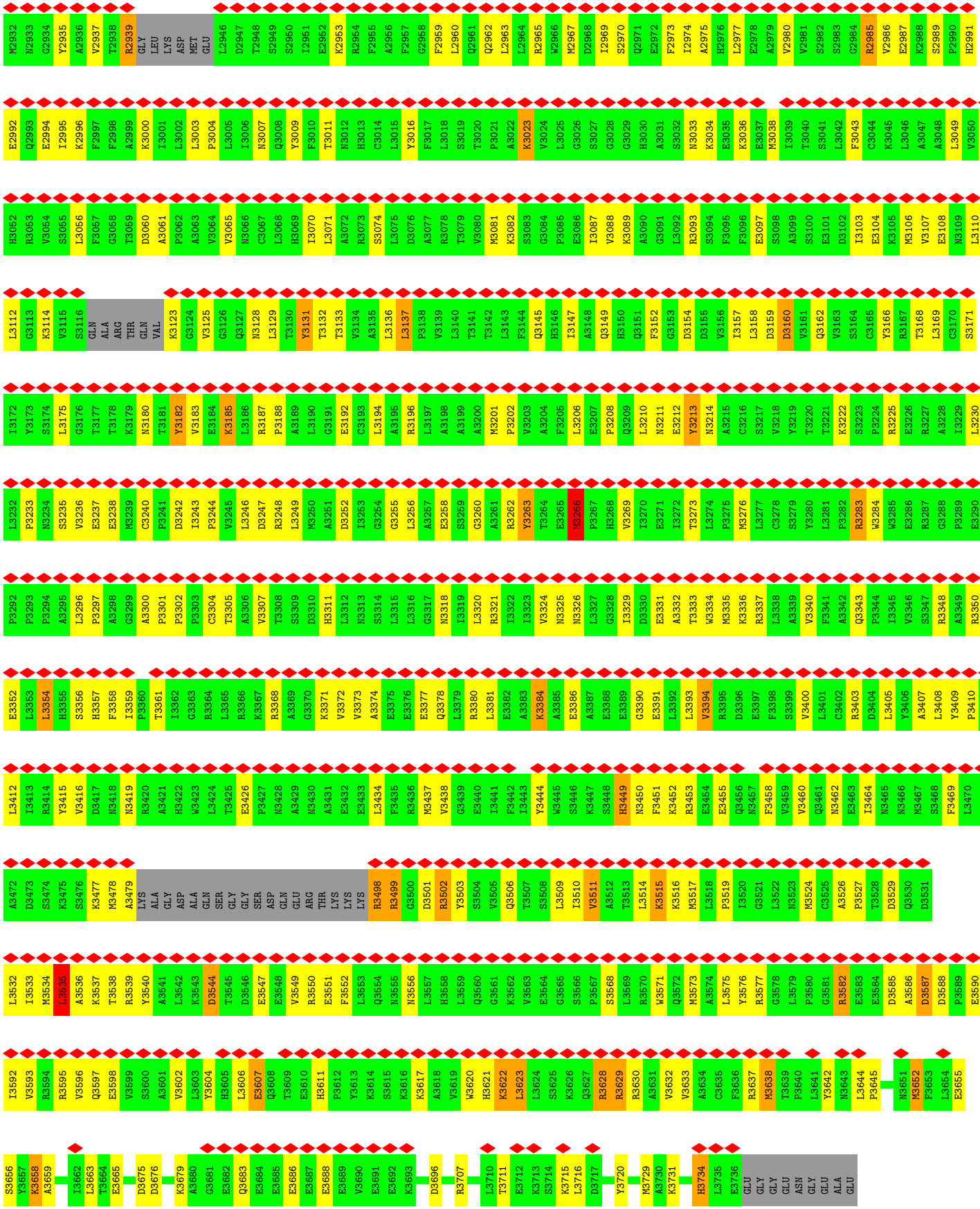
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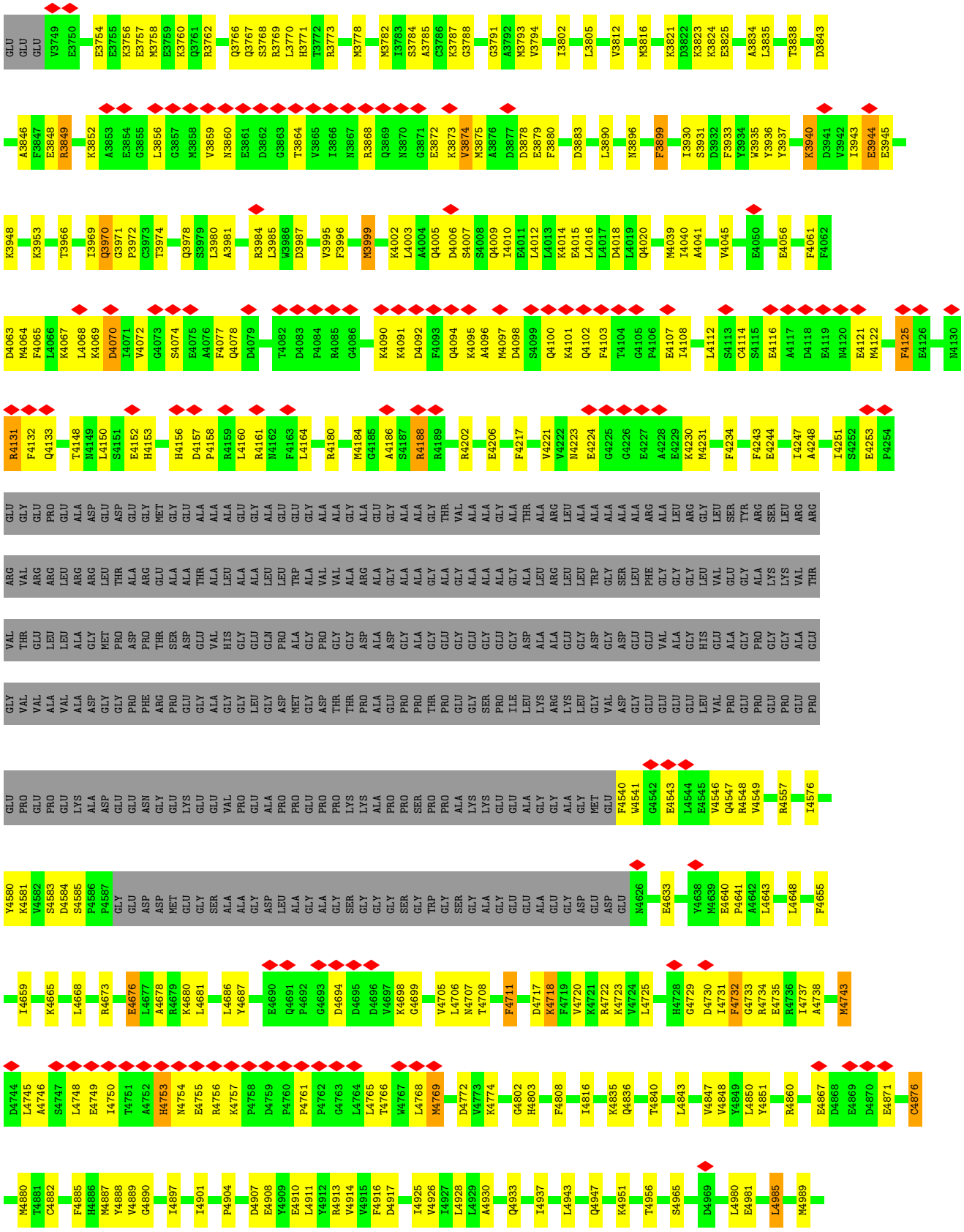
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ARG VAL ARG ARG LEU ARG ARG LEU THR ALA ARG GLU ALA ALA THR ALA LEU ALA ALA LEU LEU TRP ALA VAL VAL ALA ARG ALA GLY ALA ALA GLY ALA GLY GLY ALA LEU ARG LEU LEU TRP GLY SER LEU PHE GLY GLY GLY LEU ARG GLY LEU VAL GLU GLY ALA SER LEU ARG ARG
VAL THR GLU LEU ALA GLY MET PRO ASP PRO THR SER ASP GLU VAL HIS GLY GLU GLN PRO ALA GLY PRO GLY GLY ASP ALA ASP GLY ALA GLY GLU GLY GLU GLY GLU GLY GLY GLU GLY ASP GLY ASP GLU GLU VAL ALA GLY HIS GLU GLU ALA GLY PRO GLY GLY ALA GLU
GLY VAL VAL ALA VAL ALA ASP GLY GLY PRO PHE ARG PRO GLU GLY ALA GLY GLY LEU GLY ASP MET GLY ASP THR THR PRO ALA GLU PRO PRO THR PRO GLU GLY SER PRO ILE LEU LYS ARG LYS LEU GLY VAL ASP GLY GLU GLU GLU GLU GLU GLU GLY GLU GLU GLU PRO GLU PRO GLU PRO
GLU PRO GLU PRO GLU LYS ALA ASP GLU GLU ASN GLY GLU LYS GLU GLU VAL PRO GLU ALA PRO PRO GLU PRO PRO LYS LYS ALA PRO PRO SER PRO PRO ALA LYS LYS GLU GLU ALA GLY GLY ALA GLY GLU F4540 W4541 G4542 E4543 L4544 E4545 V4546 Q4547 R4548 V4549 R4557 I4576
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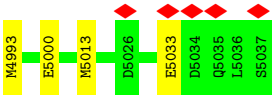

• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

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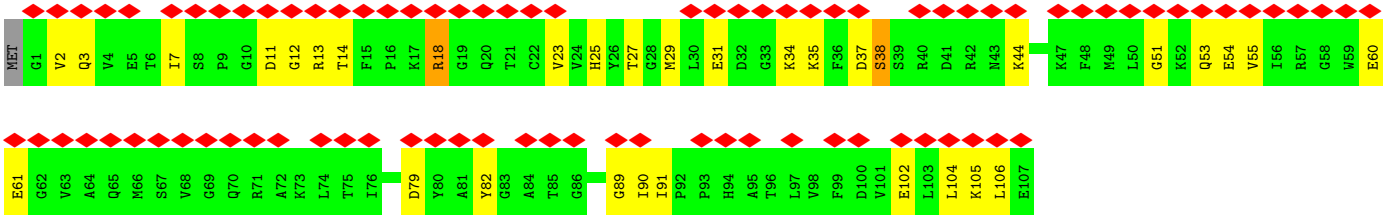

• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

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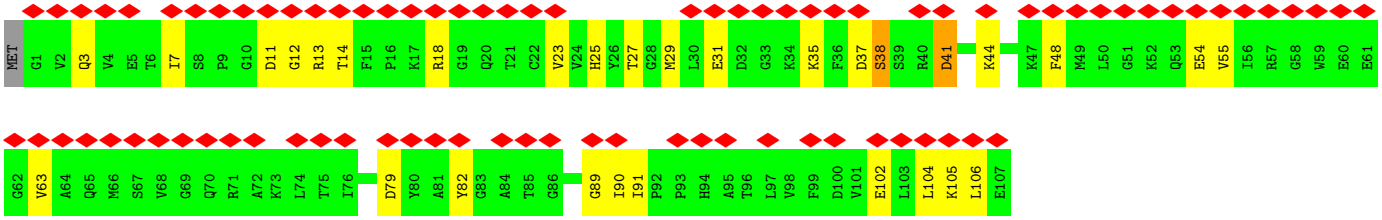

• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

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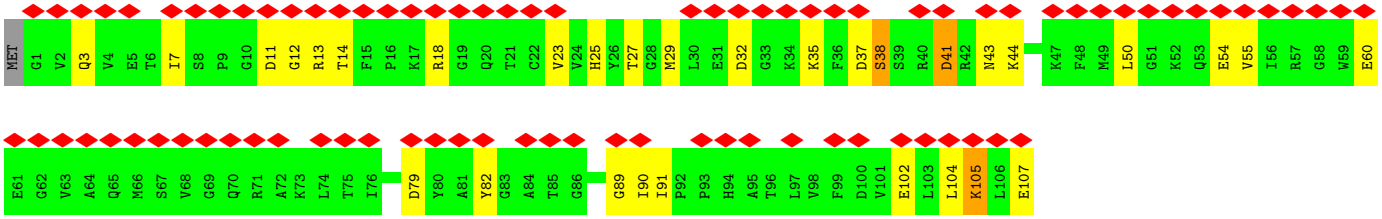

• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

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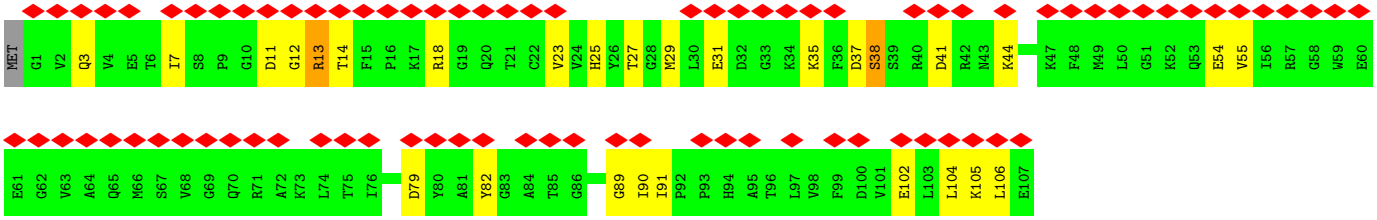

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	33308	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	58	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.428	Depositor
Minimum map value	-0.219	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	423.68, 423.68, 423.68	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8275, 0.8275, 0.8275	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, A1BD5, ZN, CA

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	0.28	1/35977 (0.0%)	0.54	7/48726 (0.0%)
1	B	0.28	1/35977 (0.0%)	0.54	7/48726 (0.0%)
1	C	0.28	1/35977 (0.0%)	0.54	7/48726 (0.0%)
1	D	0.28	1/35977 (0.0%)	0.54	7/48726 (0.0%)
2	E	0.31	0/850	0.61	0/1146
2	F	0.30	0/850	0.62	0/1146
2	G	0.32	0/850	0.62	0/1146
2	H	0.30	0/850	0.61	0/1146
All	All	0.28	4/147308 (0.0%)	0.54	28/199488 (0.0%)

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	A	0	1
1	B	0	1
1	C	0	1
1	D	0	1
All	All	0	4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	2237	CYS	CB-SG	6.17	1.92	1.82
1	C	2237	CYS	CB-SG	6.17	1.92	1.82
1	A	2237	CYS	CB-SG	6.15	1.92	1.82
1	D	2237	CYS	CB-SG	6.14	1.92	1.82

The worst 5 of 28 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	C	227	MET	CA-CB-CG	7.46	125.98	113.30
1	A	227	MET	CA-CB-CG	7.44	125.95	113.30
1	B	227	MET	CA-CB-CG	7.43	125.93	113.30
1	D	227	MET	CA-CB-CG	7.41	125.90	113.30
1	D	2905	LEU	CA-CB-CG	6.32	129.83	115.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	2244	ARG	Sidechain
1	B	2244	ARG	Sidechain
1	C	2244	ARG	Sidechain
1	D	2244	ARG	Sidechain

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	35150	0	34794	1088	0
1	B	35150	0	34792	1077	0
1	C	35150	0	34792	1066	0
1	D	35150	0	34792	1074	0
2	E	831	0	831	25	0
2	F	831	0	831	21	0
2	G	831	0	831	27	0
2	H	831	0	831	27	0
3	A	31	0	12	1	0
3	B	31	0	12	1	0
3	C	31	0	12	1	0
3	D	31	0	12	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	D	1	0	0	0	0
6	A	15	0	0	0	0
6	B	15	0	0	0	0
6	C	15	0	0	0	0
6	D	15	0	0	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
All	All	144120	0	142542	4265	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 15.

The worst 5 of 4265 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)
1:A:3477:LYS:HE3	1:B:1141:ARG:CZ	1.20	1.58
1:A:3477:LYS:CE	1:B:1141:ARG:NH1	1.69	1.54
1:A:3477:LYS:CE	1:B:1141:ARG:HD3	1.33	1.53
1:A:1141:ARG:NH1	1:D:3477:LYS:CE	1.70	1.43
1:A:3477:LYS:CE	1:B:1141:ARG:CZ	1.93	1.38

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	4385/5037 (87%)	4306 (98%)	79 (2%)	0	100	100
1	B	4385/5037 (87%)	4305 (98%)	80 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	4385/5037 (87%)	4307 (98%)	78 (2%)	0	100	100
1	D	4385/5037 (87%)	4304 (98%)	81 (2%)	0	100	100
2	E	105/108 (97%)	103 (98%)	2 (2%)	0	100	100
2	F	105/108 (97%)	103 (98%)	2 (2%)	0	100	100
2	G	105/108 (97%)	103 (98%)	2 (2%)	0	100	100
2	H	105/108 (97%)	104 (99%)	1 (1%)	0	100	100
All	All	17960/20580 (87%)	17635 (98%)	325 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	3836/4276 (90%)	3577 (93%)	259 (7%)	13	43
1	B	3836/4276 (90%)	3575 (93%)	261 (7%)	13	43
1	C	3836/4276 (90%)	3577 (93%)	259 (7%)	13	43
1	D	3836/4276 (90%)	3577 (93%)	259 (7%)	13	43
2	E	89/90 (99%)	83 (93%)	6 (7%)	13	44
2	F	89/90 (99%)	83 (93%)	6 (7%)	13	44
2	G	89/90 (99%)	81 (91%)	8 (9%)	8	30
2	H	89/90 (99%)	84 (94%)	5 (6%)	17	50
All	All	15700/17464 (90%)	14637 (93%)	1063 (7%)	16	43

5 of 1063 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	2582	MET
1	C	2825	LYS
1	C	2578	MET
1	C	4541	TRP

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Mol	Chain	Res	Type
1	B	2256	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 35 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	2284	ASN
1	C	2324	ASN
1	C	3325	ASN
1	B	2324	ASN
1	B	2284	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 16 ligands modelled in this entry, 8 are monoatomic - leaving 8 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	$\#\|Z\| > 2$
6	A1BD5	D	5304	-	16,16,16	0.93	1 (6%)	21,23,23	0.76	0
3	ATP	D	5301	-	28,33,33	0.63	0	34,52,52	0.81	2 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
6	A1BD5	B	5304	-	16,16,16	0.94	1 (6%)	21,23,23	0.77	0
3	ATP	B	5301	-	28,33,33	0.63	0	34,52,52	0.82	2 (5%)
6	A1BD5	A	5304	-	16,16,16	0.96	1 (6%)	21,23,23	0.77	0
3	ATP	A	5301	-	28,33,33	0.63	0	34,52,52	0.81	2 (5%)
3	ATP	C	5301	-	28,33,33	0.63	0	34,52,52	0.81	2 (5%)
6	A1BD5	C	5304	-	16,16,16	0.94	1 (6%)	21,23,23	0.76	0

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
6	A1BD5	D	5304	-	-	4/4/4/4	0/2/2/2
3	ATP	D	5301	-	-	2/18/38/38	0/3/3/3
6	A1BD5	B	5304	-	-	4/4/4/4	0/2/2/2
3	ATP	B	5301	-	-	2/18/38/38	0/3/3/3
6	A1BD5	A	5304	-	-	4/4/4/4	0/2/2/2
3	ATP	A	5301	-	-	2/18/38/38	0/3/3/3
3	ATP	C	5301	-	-	2/18/38/38	0/3/3/3
6	A1BD5	C	5304	-	-	4/4/4/4	0/2/2/2

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	5304	A1BD5	C1-C2	-2.21	1.36	1.39
6	B	5304	A1BD5	C1-C2	-2.18	1.36	1.39
6	D	5304	A1BD5	C1-C2	-2.14	1.36	1.39
6	C	5304	A1BD5	C1-C2	-2.14	1.36	1.39

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	5301	ATP	C4'-O4'-C1'	-3.22	106.97	109.92
3	A	5301	ATP	C4'-O4'-C1'	-3.18	107.02	109.92
3	C	5301	ATP	C4'-O4'-C1'	-3.15	107.04	109.92
3	D	5301	ATP	C4'-O4'-C1'	-3.13	107.05	109.92
3	C	5301	ATP	C5-C6-N6	2.34	123.87	120.31

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	5304	A1BD5	C3-C2-C8-O3
6	A	5304	A1BD5	C3-C2-C8-O4
6	B	5304	A1BD5	C3-C2-C8-O3
6	B	5304	A1BD5	C3-C2-C8-O4
6	D	5304	A1BD5	C3-C2-C8-O3

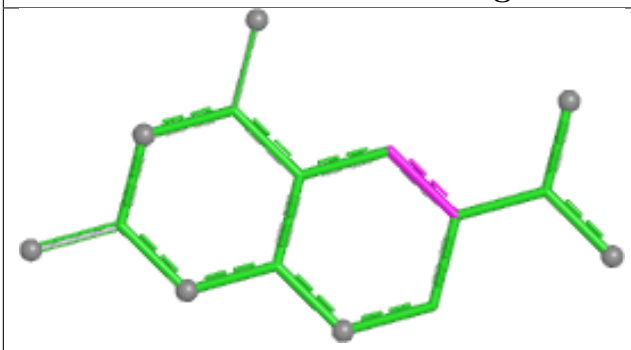
There are no ring outliers.

3 monomers are involved in 3 short contacts:

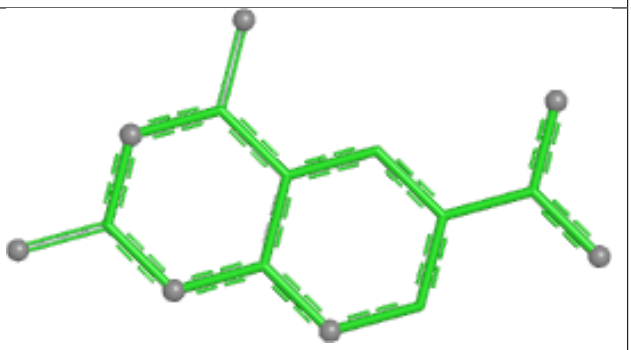
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	5301	ATP	1	0
3	A	5301	ATP	1	0
3	C	5301	ATP	1	0

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.

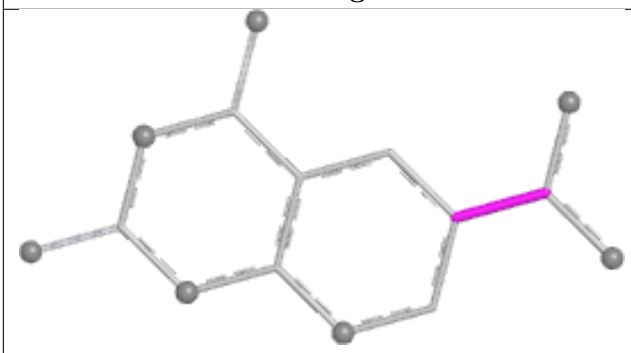
Ligand A1BD5 D 5304



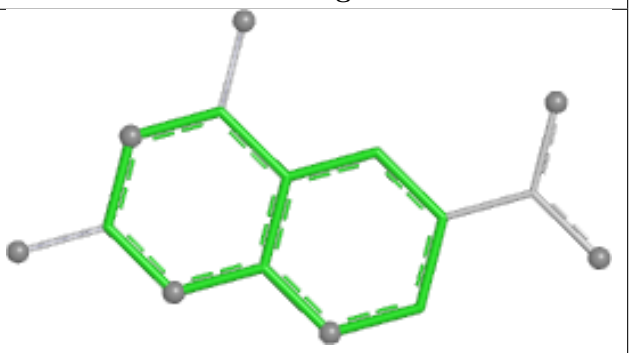
Bond lengths



Bond angles

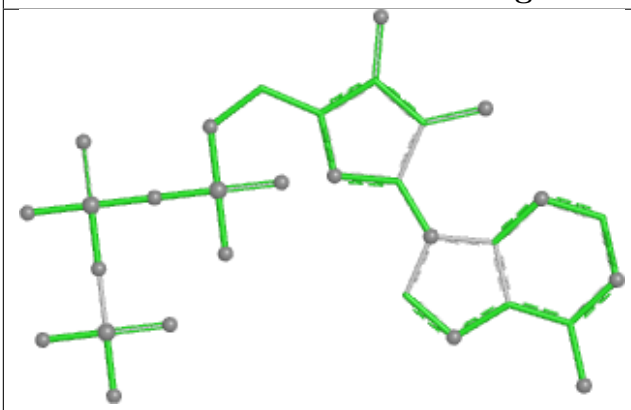


Torsions



Rings

Ligand ATP D 5301



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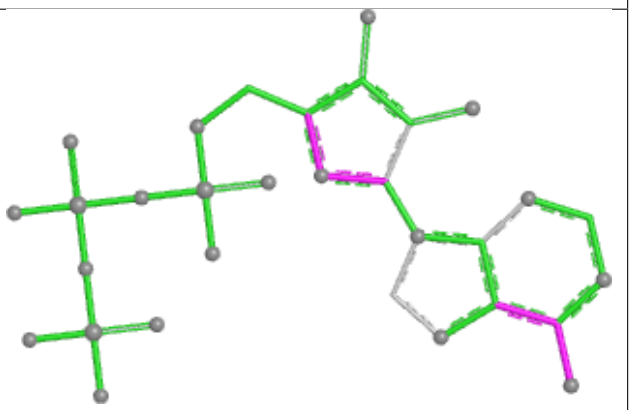

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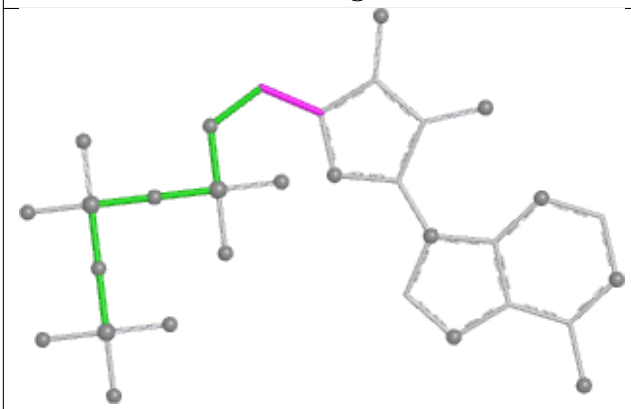

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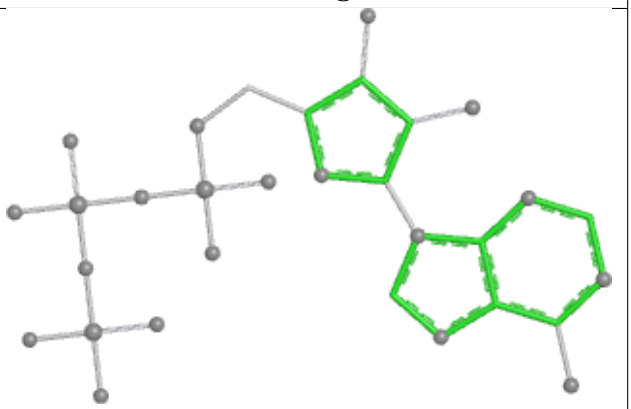
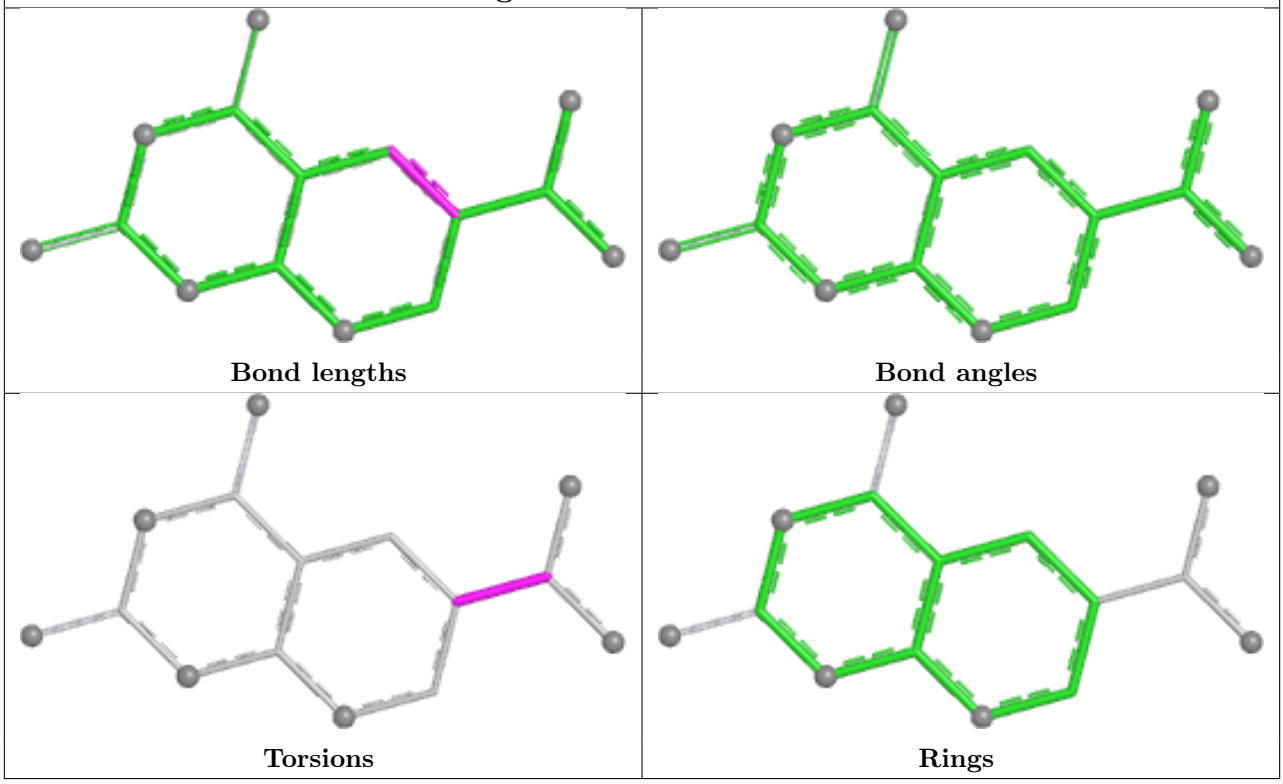


Rings

Ligand A1BD5 B 5304



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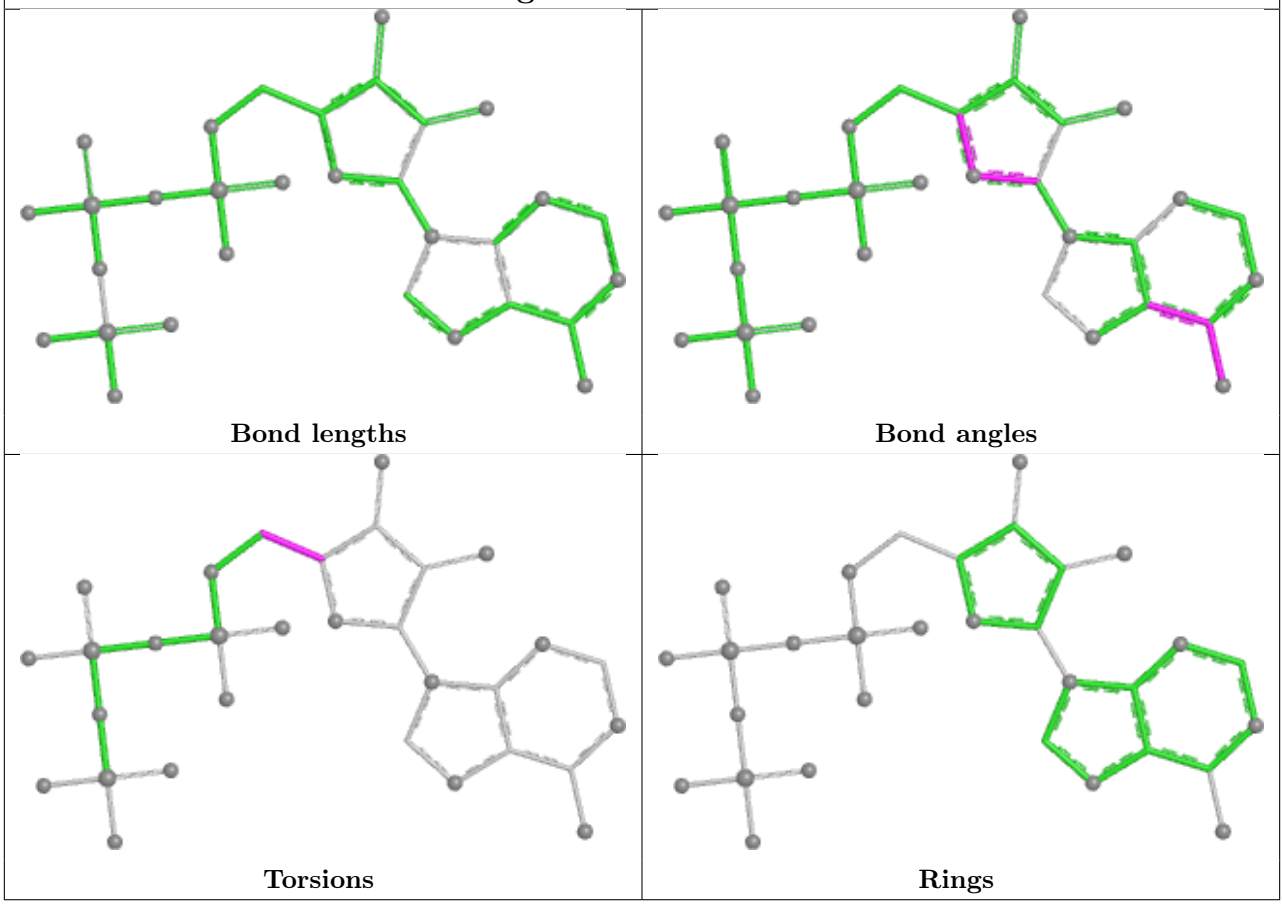

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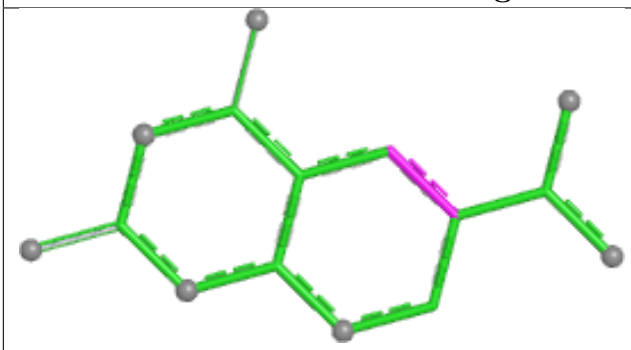
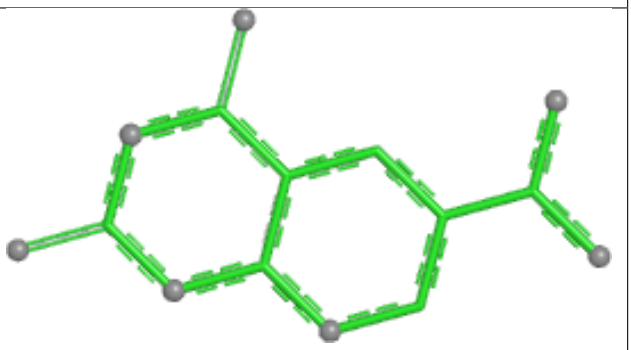
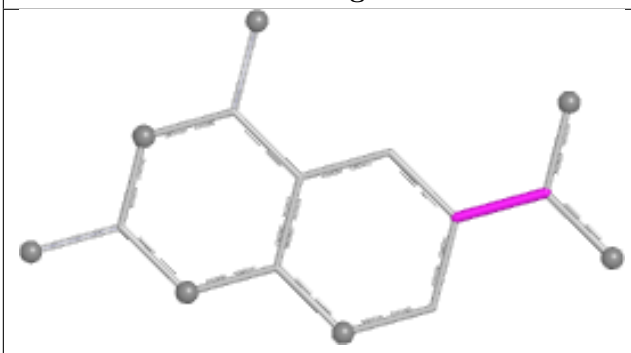


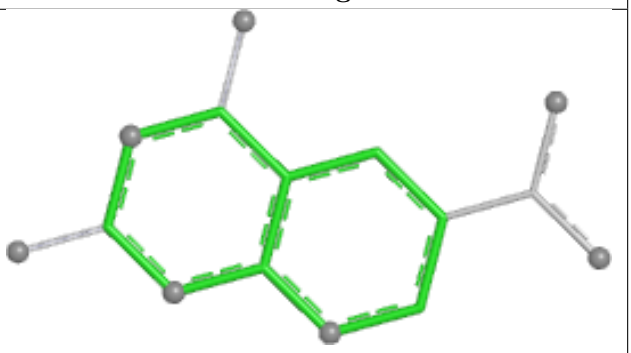
Bond lengths



Bond angles

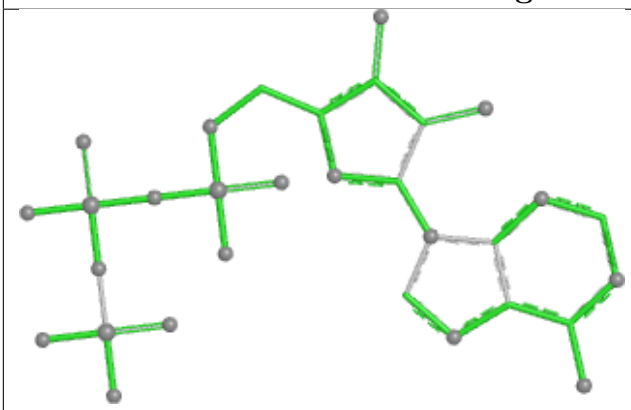


Torsions

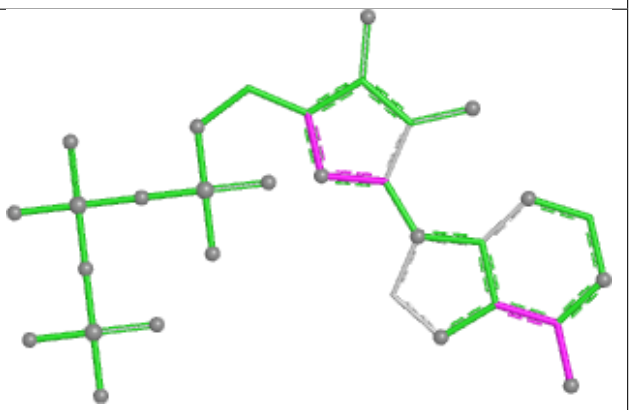


Rings

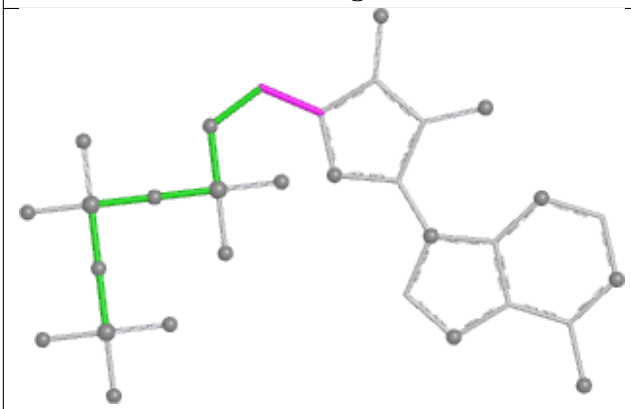
Ligand ATP A 5301



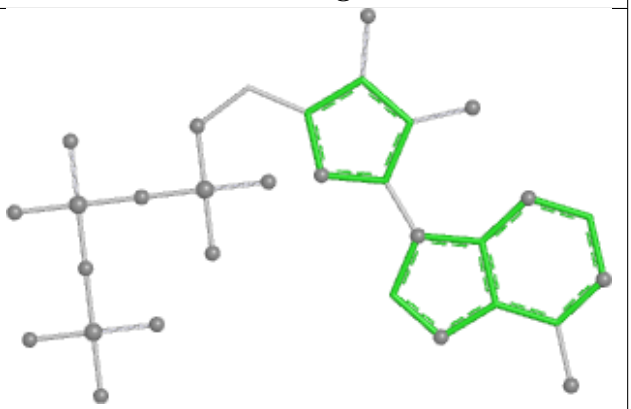
Bond lengths



Bond angles

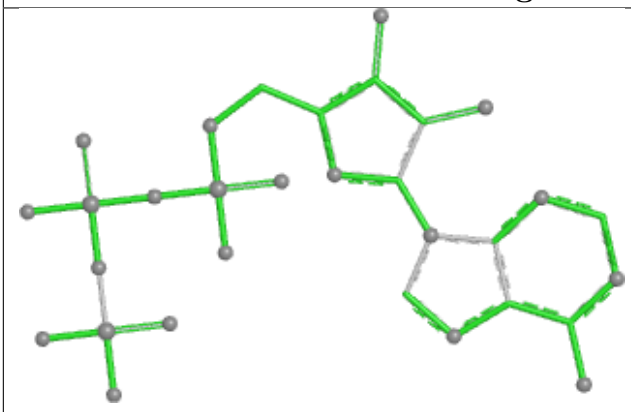


Torsions

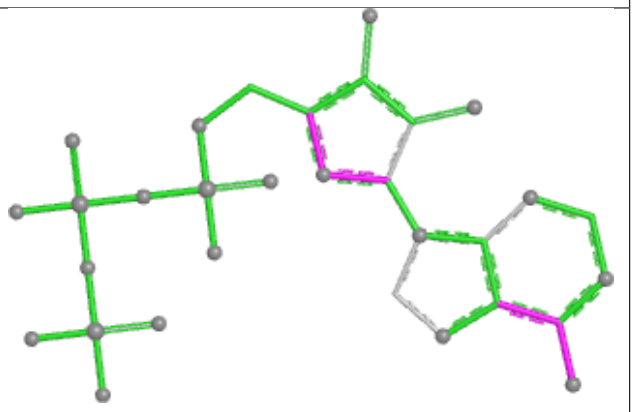


Rings

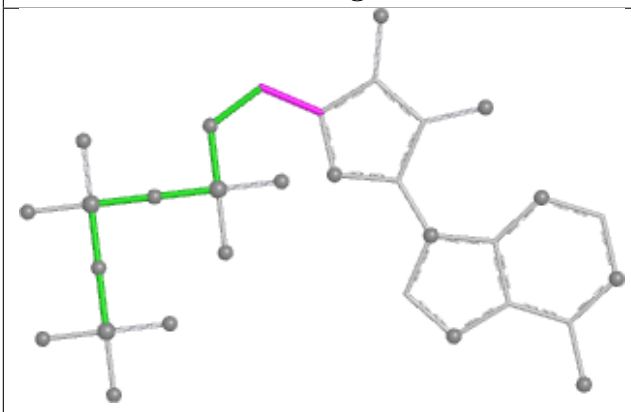
Ligand ATP C 5301



Bond lengths



Bond angles



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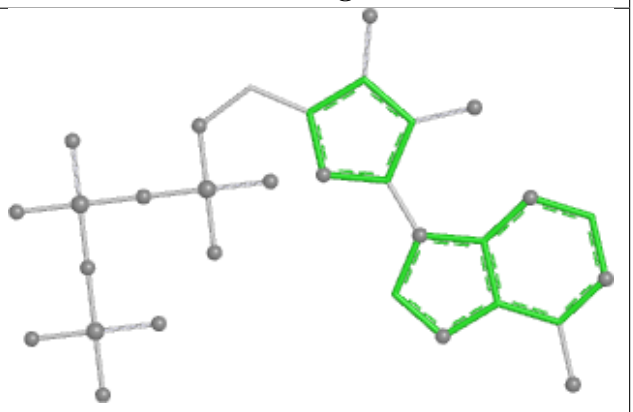
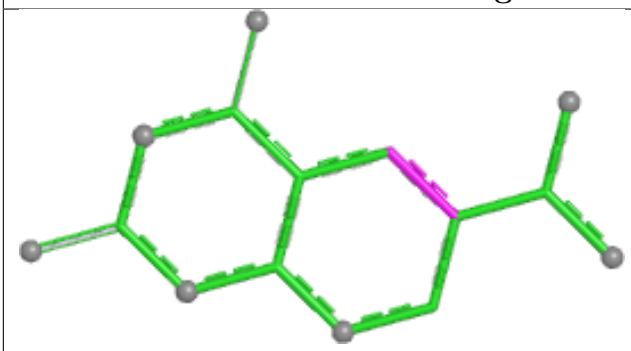
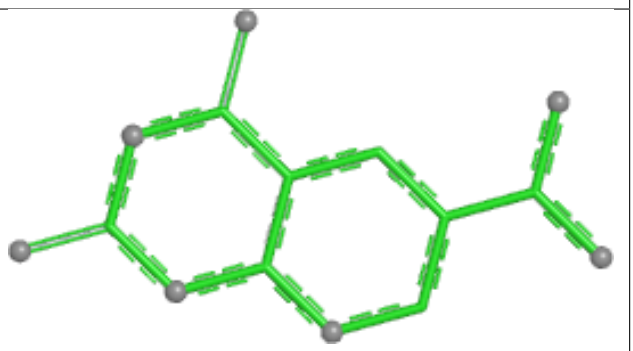


Rings

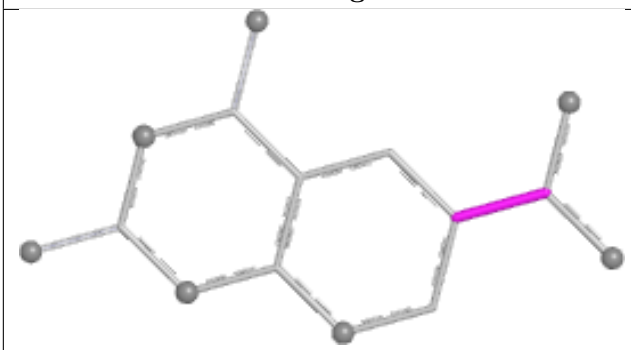
Ligand A1BD5 C 5304



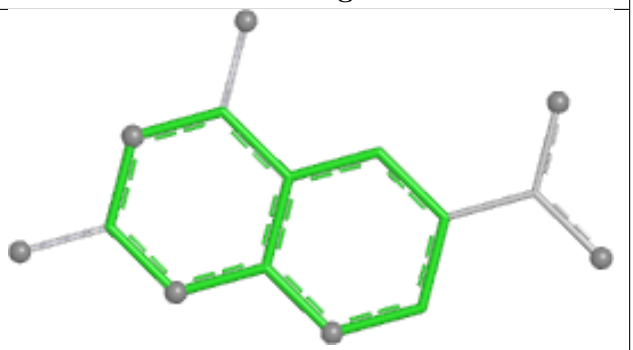
Bond lengths



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.

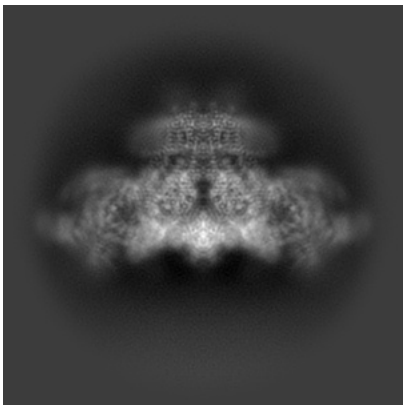
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-47395. These allow visual inspection of the internal detail of the map and identification of artifacts.

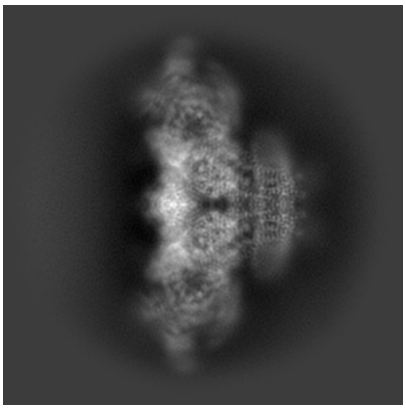
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

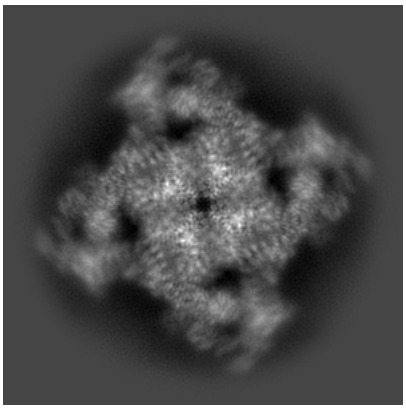
6.1.1 Primary map



X

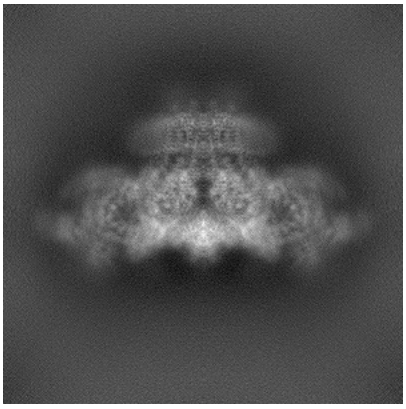


Y

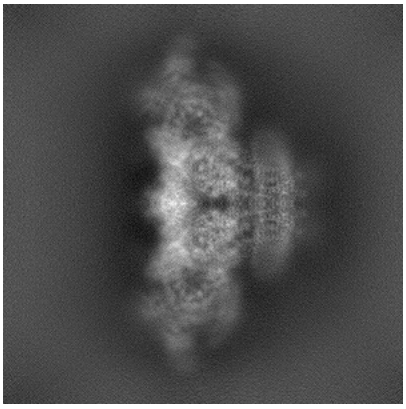


Z

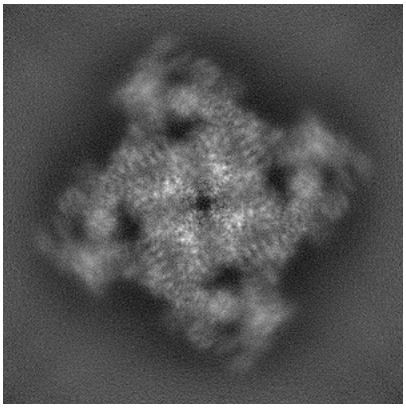
6.1.2 Raw map



X



Y

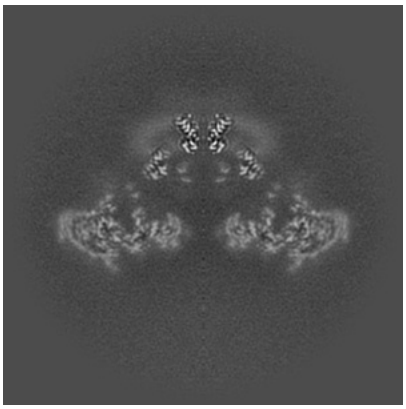


Z

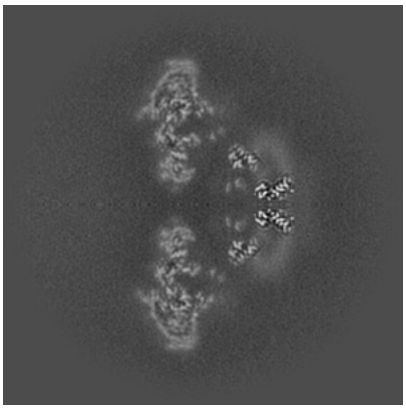
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

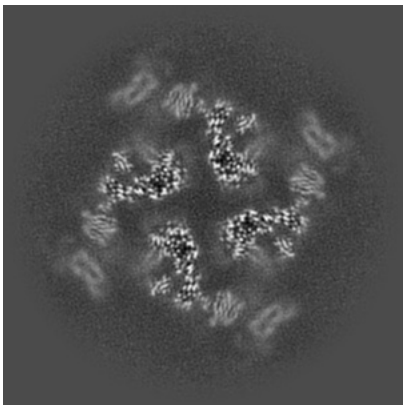
6.2.1 Primary map



X Index: 256

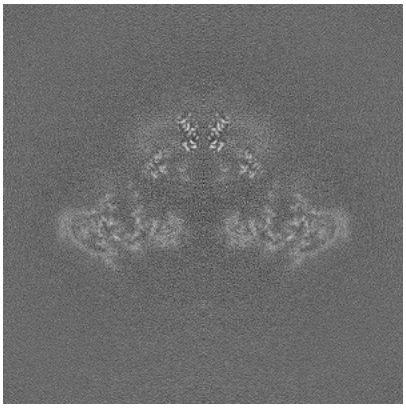


Y Index: 256

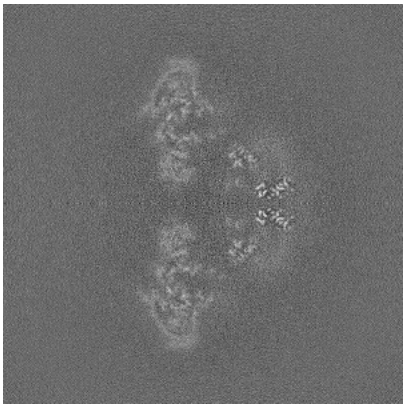


Z Index: 256

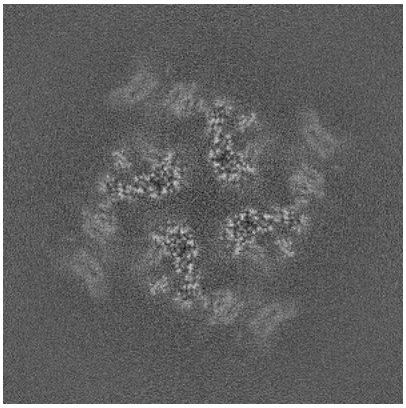
6.2.2 Raw map



X Index: 256



Y Index: 256

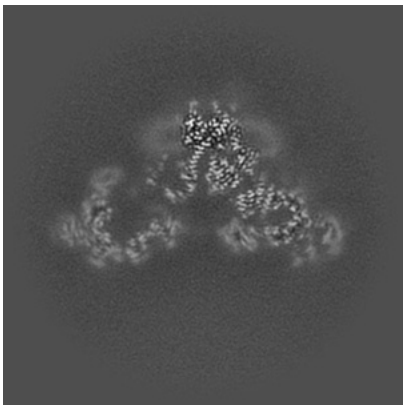


Z Index: 256

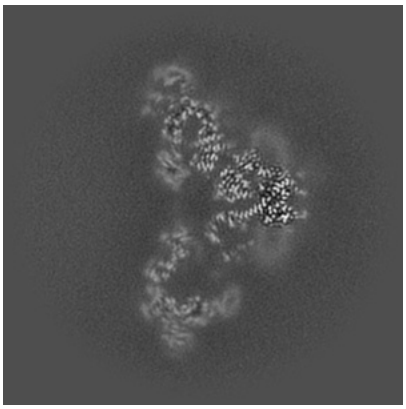
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

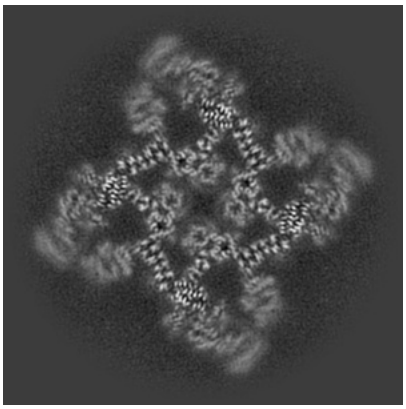
6.3.1 Primary map



X Index: 270

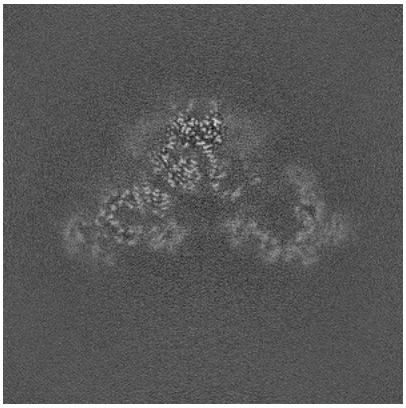


Y Index: 242

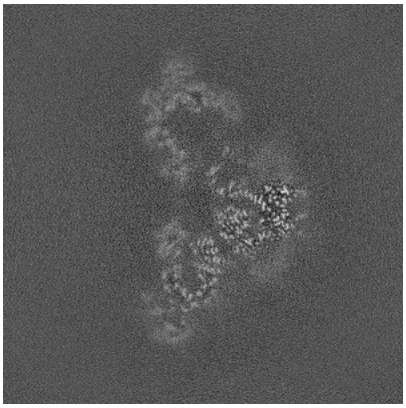


Z Index: 227

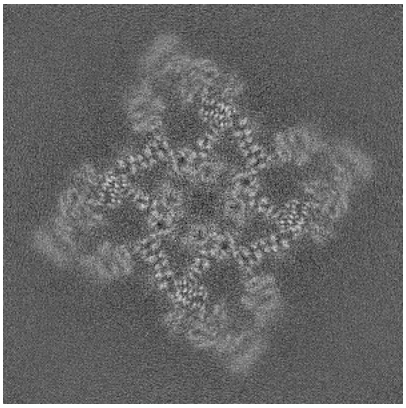
6.3.2 Raw map



X Index: 242



Y Index: 270

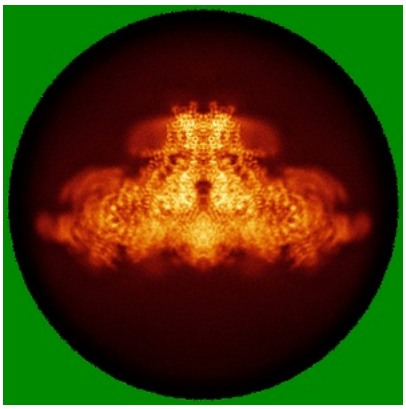


Z Index: 227

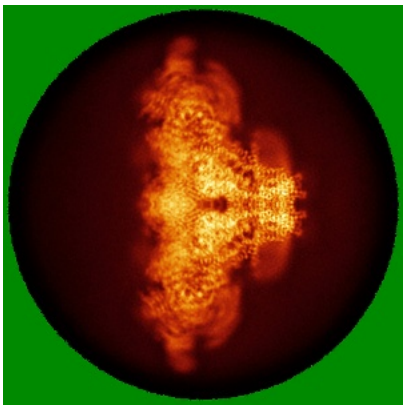
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

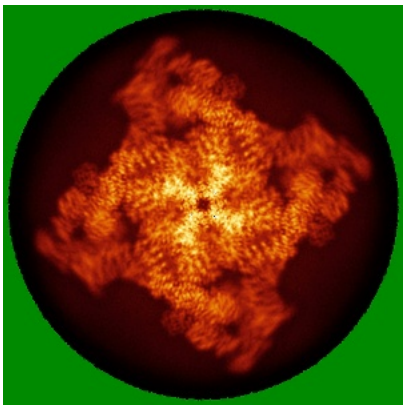
6.4.1 Primary map



X

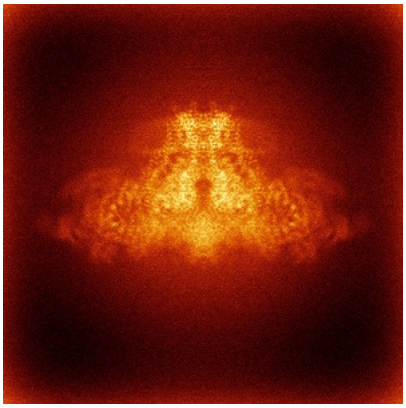


Y

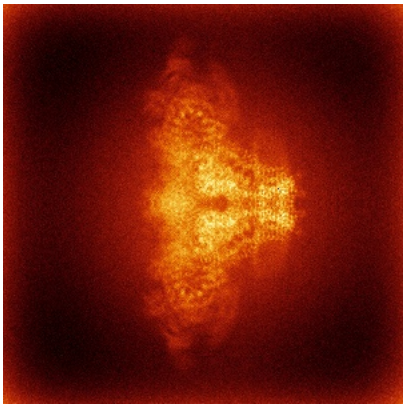


Z

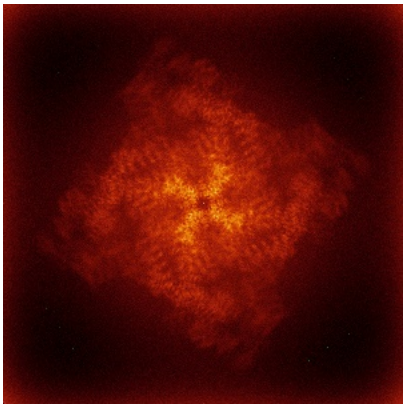
6.4.2 Raw map



X



Y

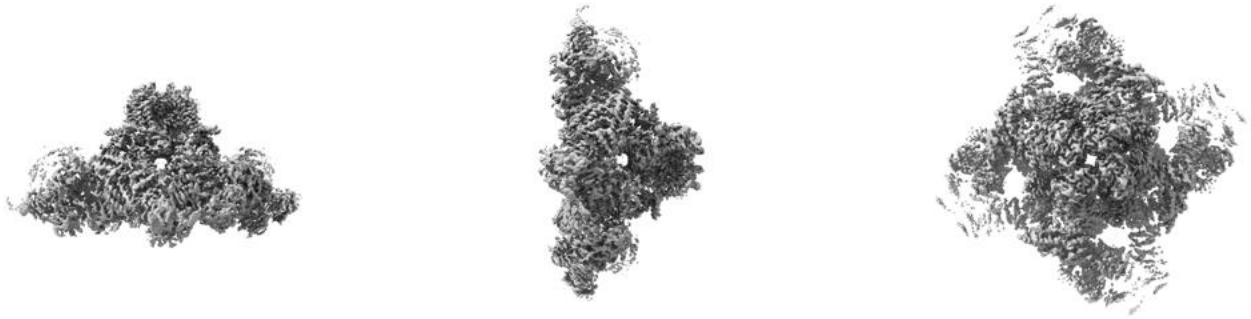


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

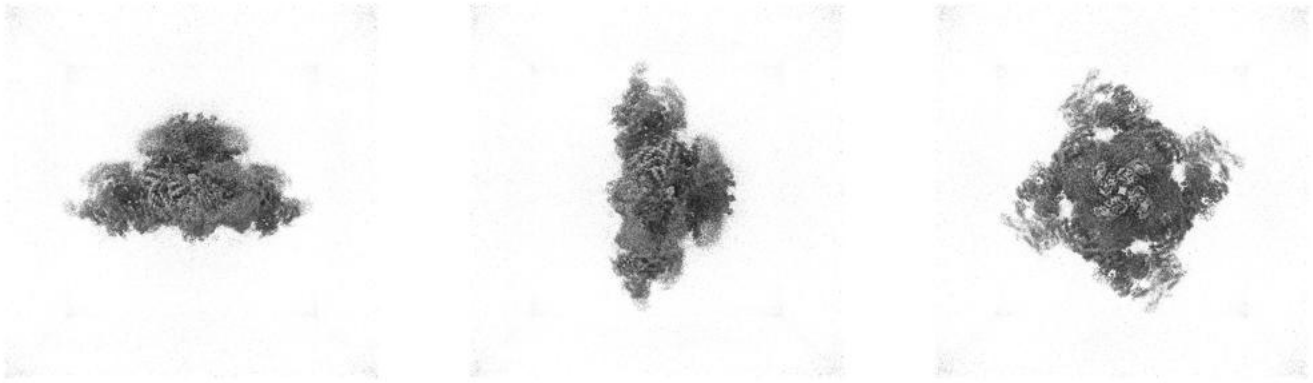
6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.1. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 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.

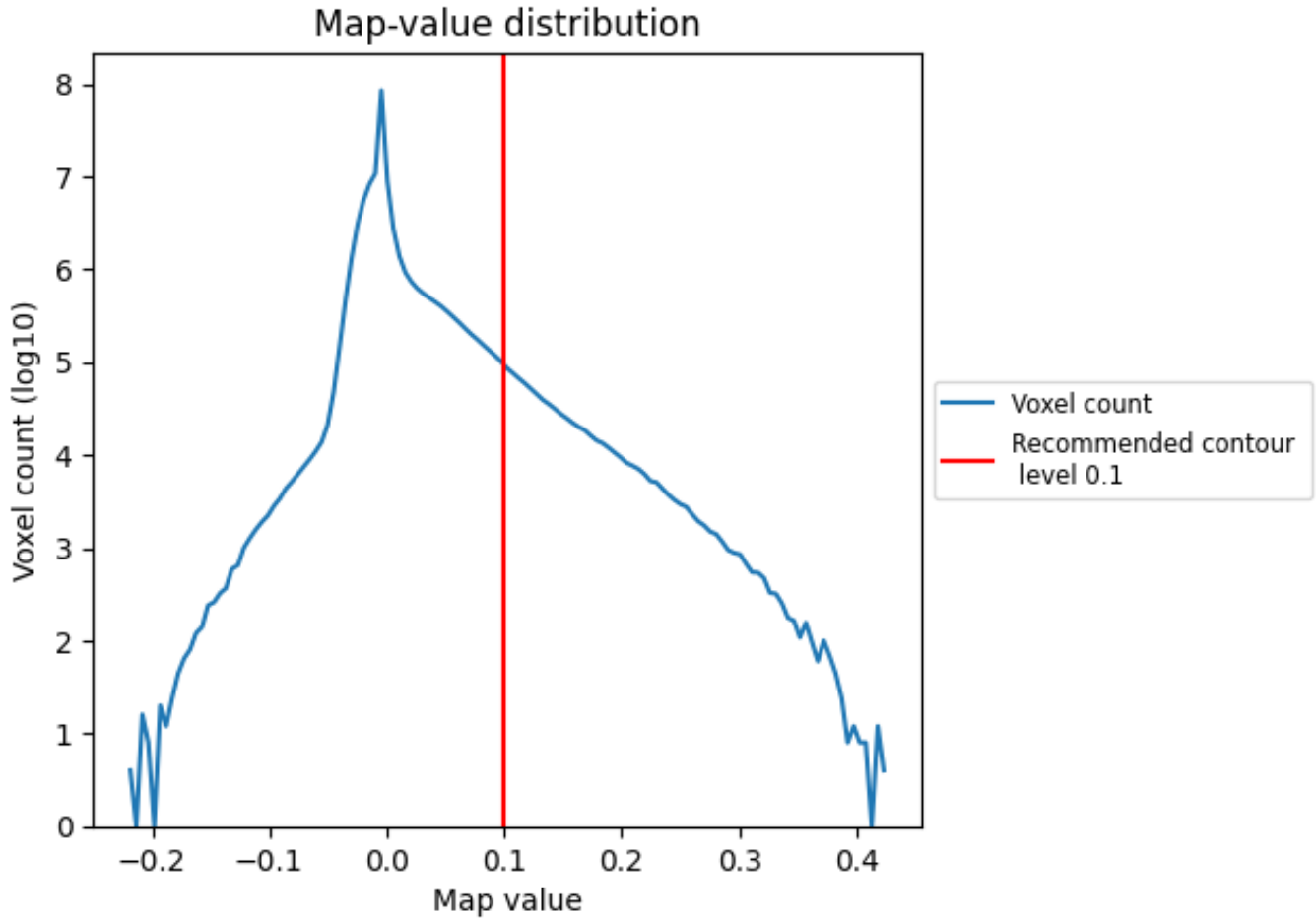
6.6 Mask visualisation (i)

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

7 Map analysis

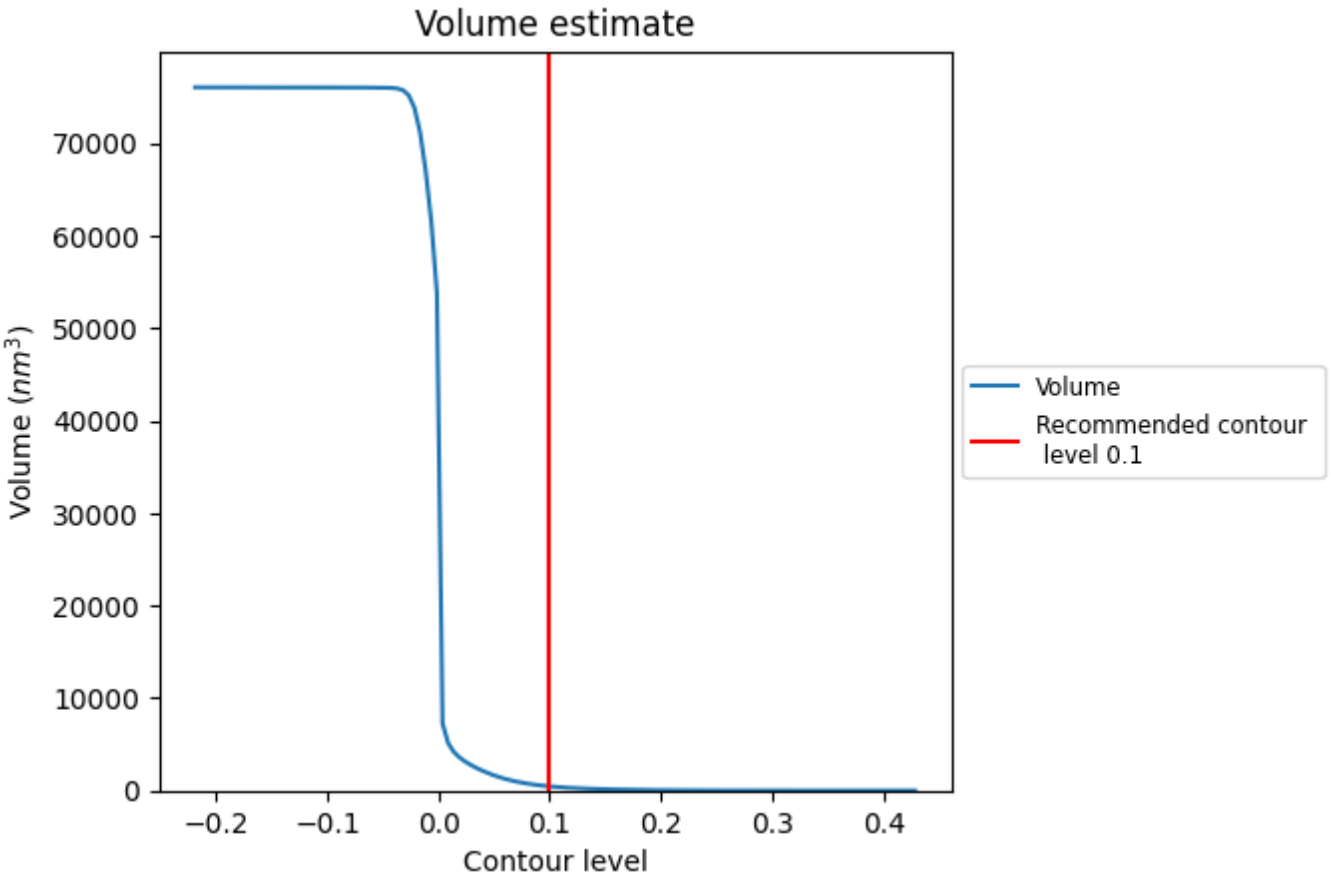
This section contains the results of statistical analysis of the map.

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.

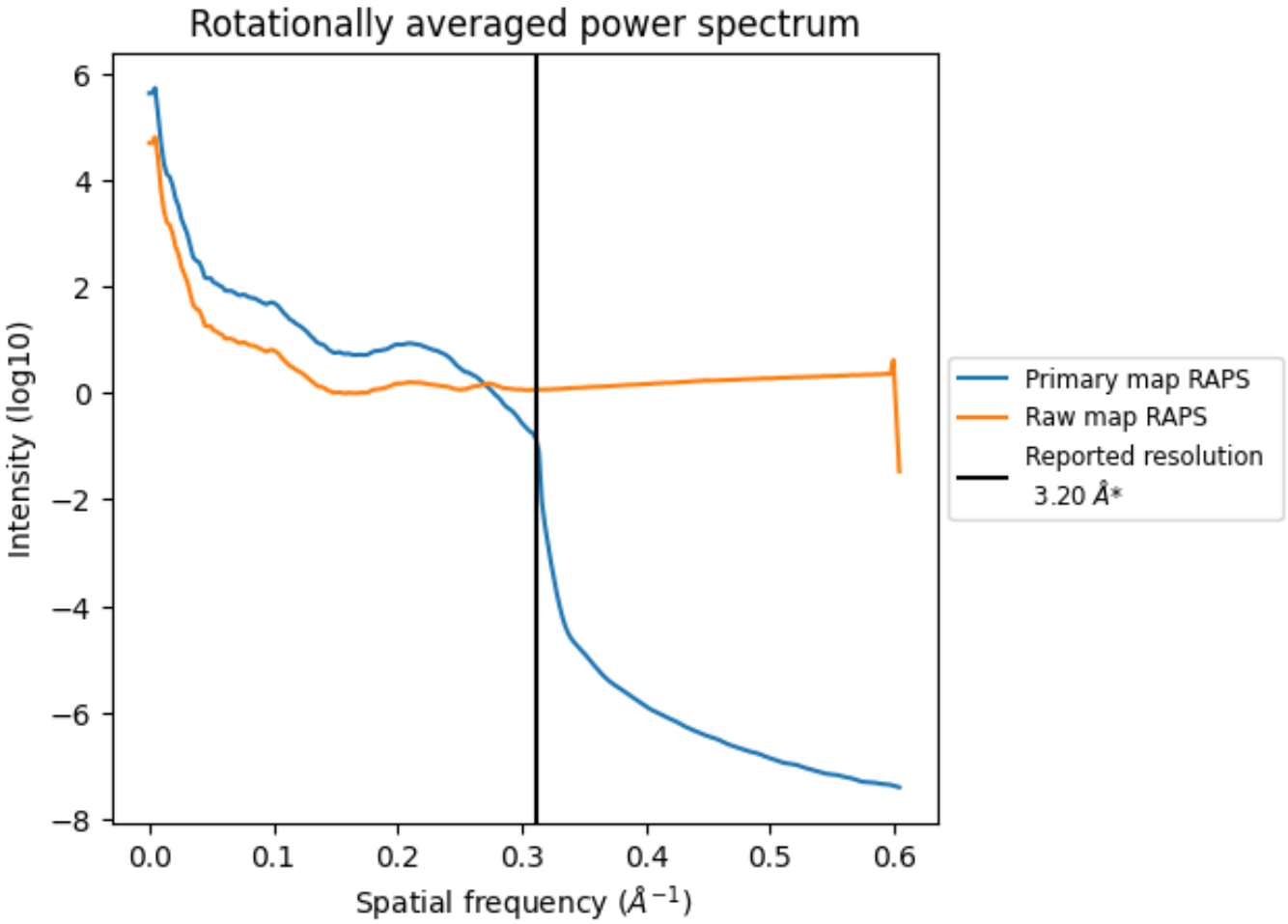
7.2 Volume estimate (i)



The volume at the recommended contour level is 452 nm^3; this corresponds to an approximate mass of 409 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)

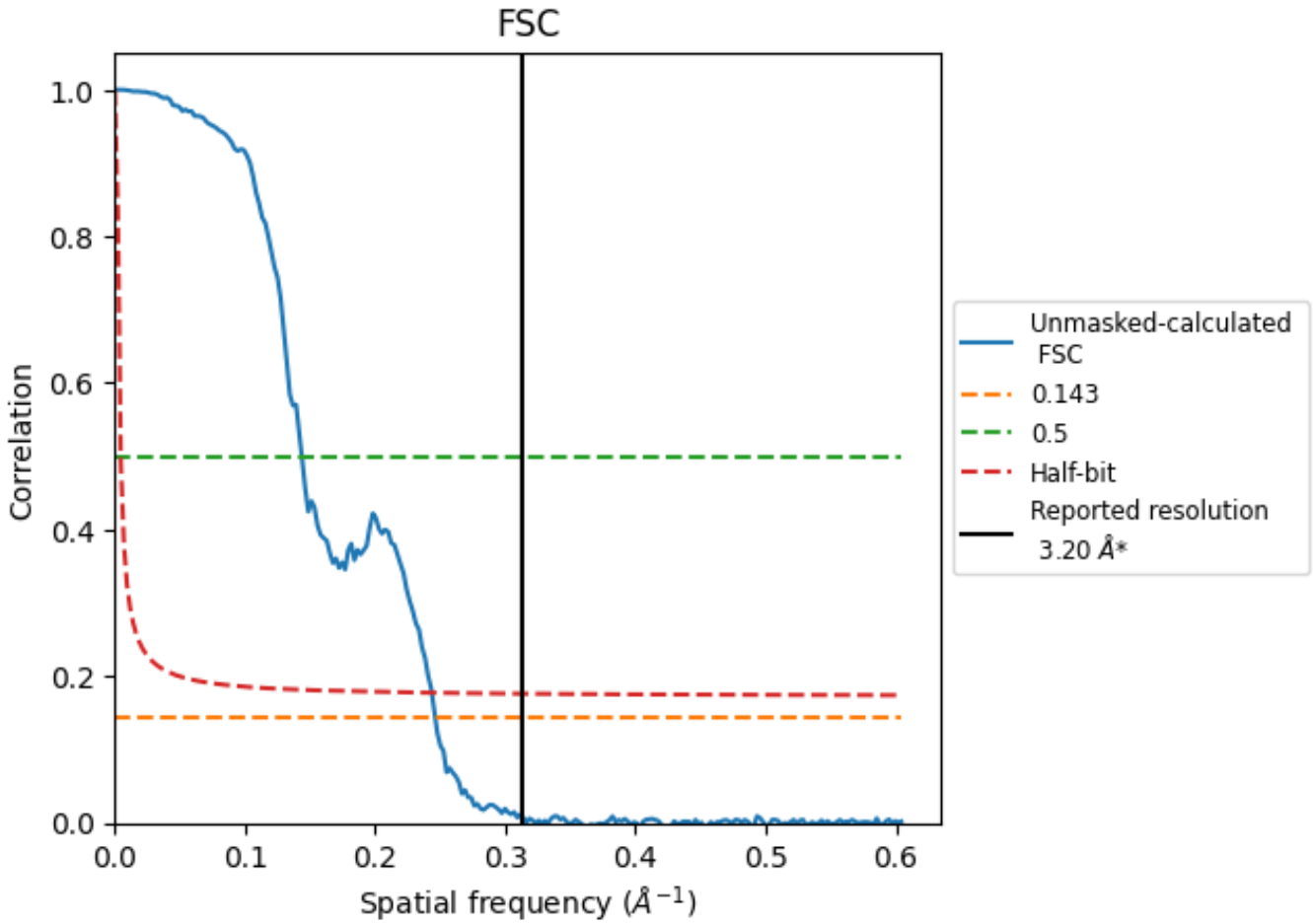


*Reported resolution corresponds to spatial frequency of 0.312 Å^{-1}

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 0.312 Å^{-1}

8.2 Resolution estimates (i)

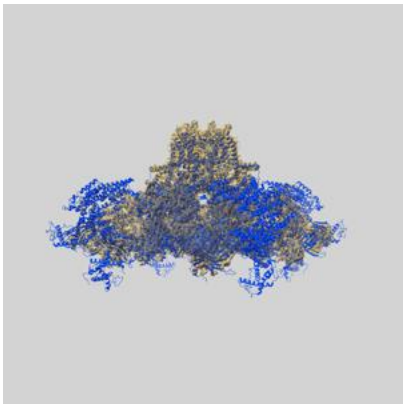
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.20	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.06	6.96	4.11

*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 4.06 differs from the reported value 3.2 by more than 10 %

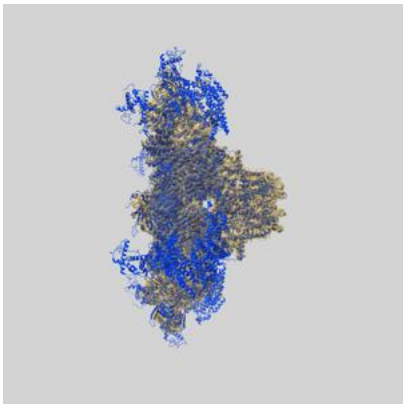
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-47395 and PDB model 9E1I. Per-residue inclusion information can be found in section 3 on page 7.

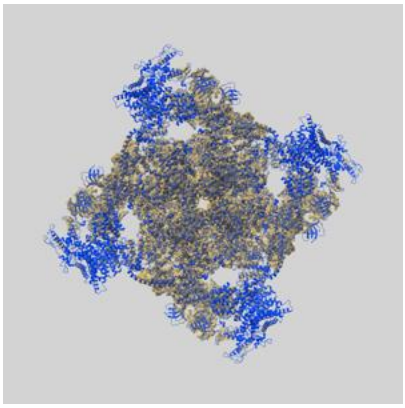
9.1 Map-model overlay



X



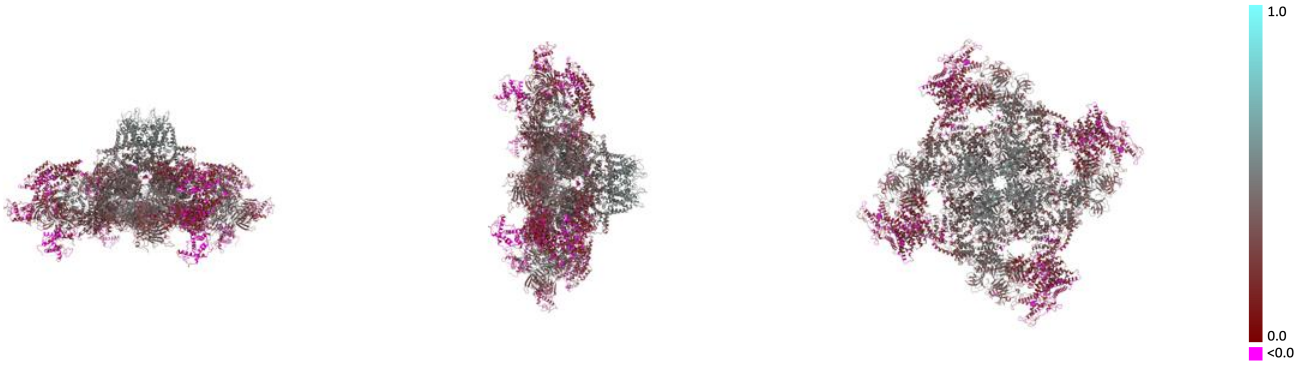
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.1 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.

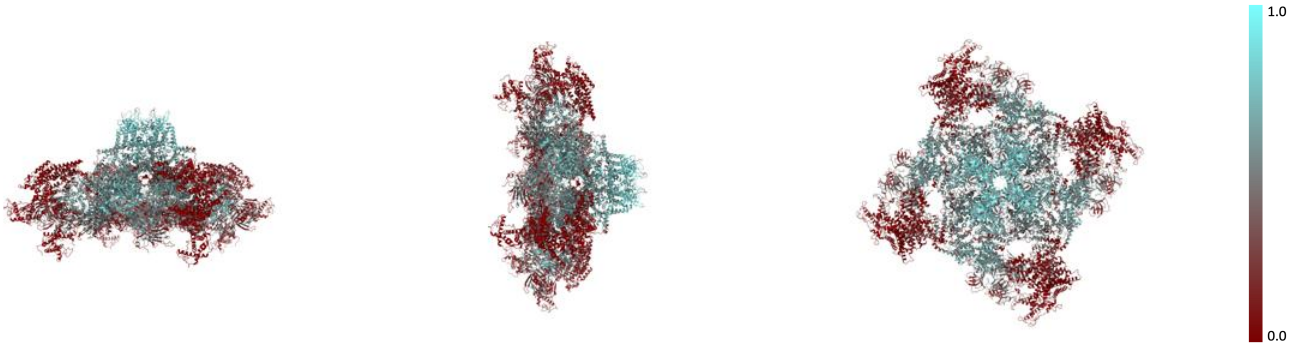
9.2 Q-score mapped to coordinate model



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.

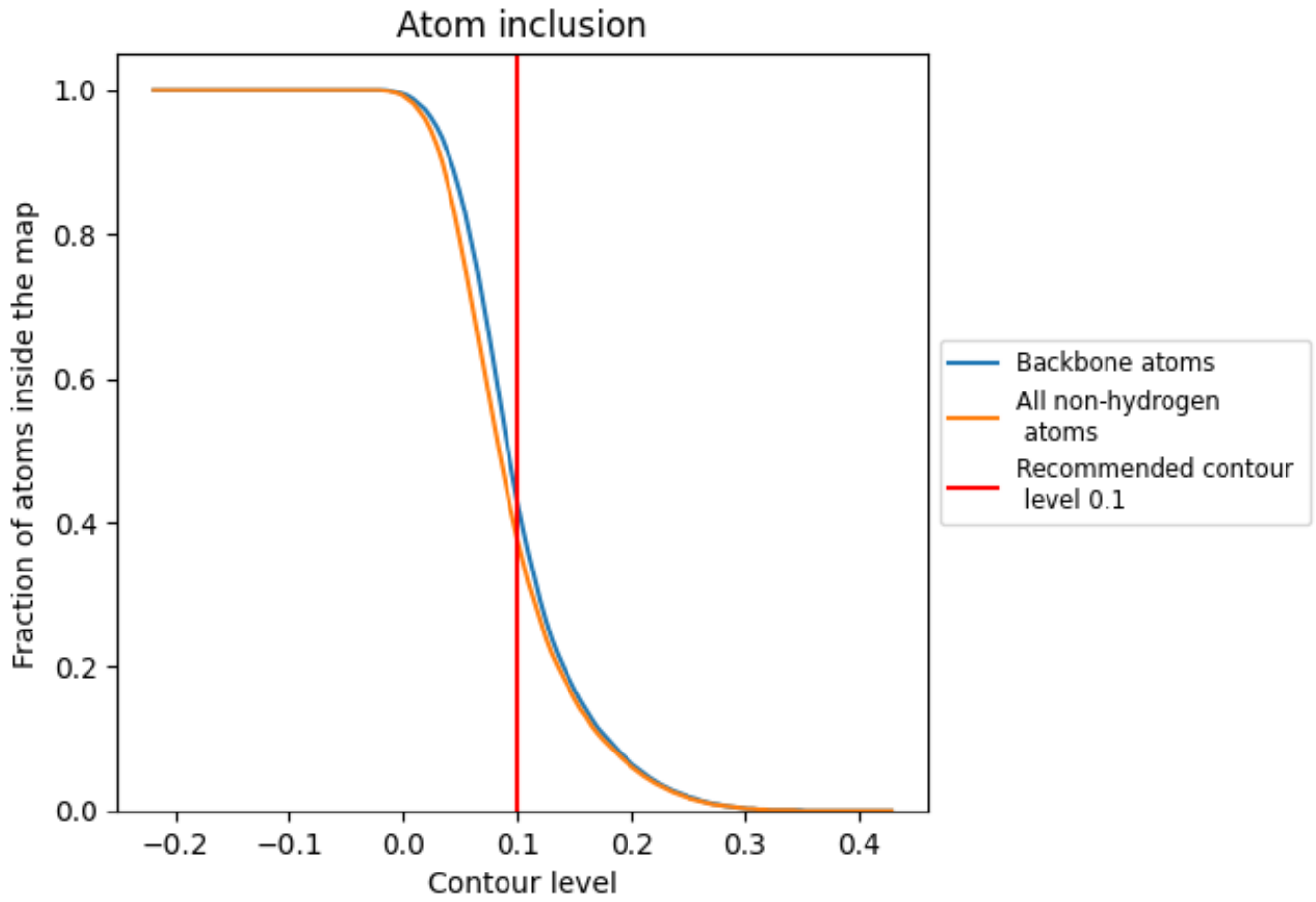
9.3 Atom inclusion mapped to coordinate model



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 (0.1).

9.4 Atom inclusion (i)



At the recommended contour level, 43% of all backbone atoms, 38% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.3780	0.3000
A	0.3910	0.2990
B	0.3900	0.2980
C	0.3890	0.2970
D	0.3890	0.2980
E	0.2210	0.3870
F	0.2250	0.3860
G	0.2250	0.3850
H	0.2250	0.3880