wwPDB EM Validation Summary Report

Jun 16, 2025 – 04:12 PM EDT

PDB ID	:	9E1G / pdb_00009e1g
EMDB ID	:	EMD-47393
Title	:	Structure of RyR1 in the primed state in the presence of oxypurinol
Authors	:	Miotto, M.C.; Marks, A.R.
Deposited on	:	2024-10-21
Resolution	:	3.17 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:

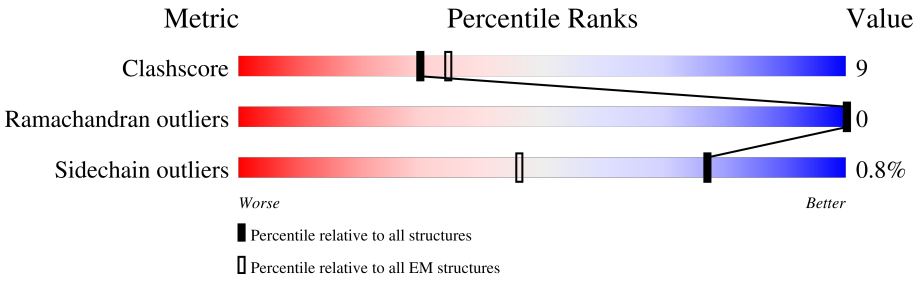
EMDB validation analysis	:	0.0.1.dev118
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.44

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 3.17 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	40% 70% 17% 13%
1	B	5037	40% 70% 17% 13%
1	C	5037	40% 69% 18% 13%
1	D	5037	40% 69% 18% 13%
2	E	108	66% 69% 29%
2	F	108	66% 77% 21%
2	G	108	65% 71% 27%
2	H	108	65% 74% 22%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 144104 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.

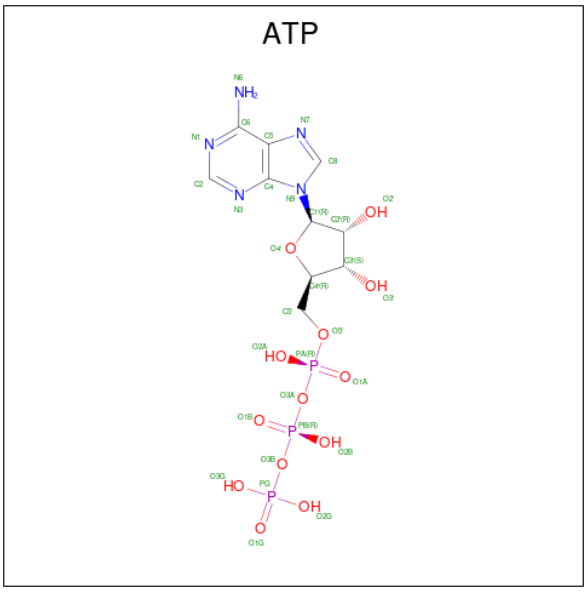
- Molecule 1 is a protein called Ryanodine receptor 1.

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 (CCD ID: 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 (CCD ID: 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 (CCD ID: ZN) (formula: Zn).

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

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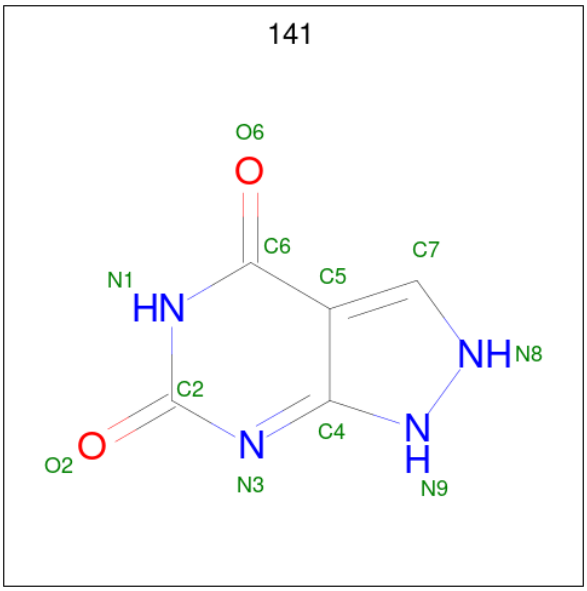
Mol	Chain	Residues	Atoms	AltConf
5	B	1	Total Zn 1 1	0
5	D	1	Total Zn 1 1	0
5	C	1	Total Zn 1 1	0

- Molecule 6 is Oxypurinol (CCD ID: 141) (formula: $C_5H_4N_4O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
6	A	1	Total C N O 11 5 4 2	0
6	B	1	Total C N O 11 5 4 2	0
6	D	1	Total C N O 11 5 4 2	0
6	C	1	Total C N O 11 5 4 2	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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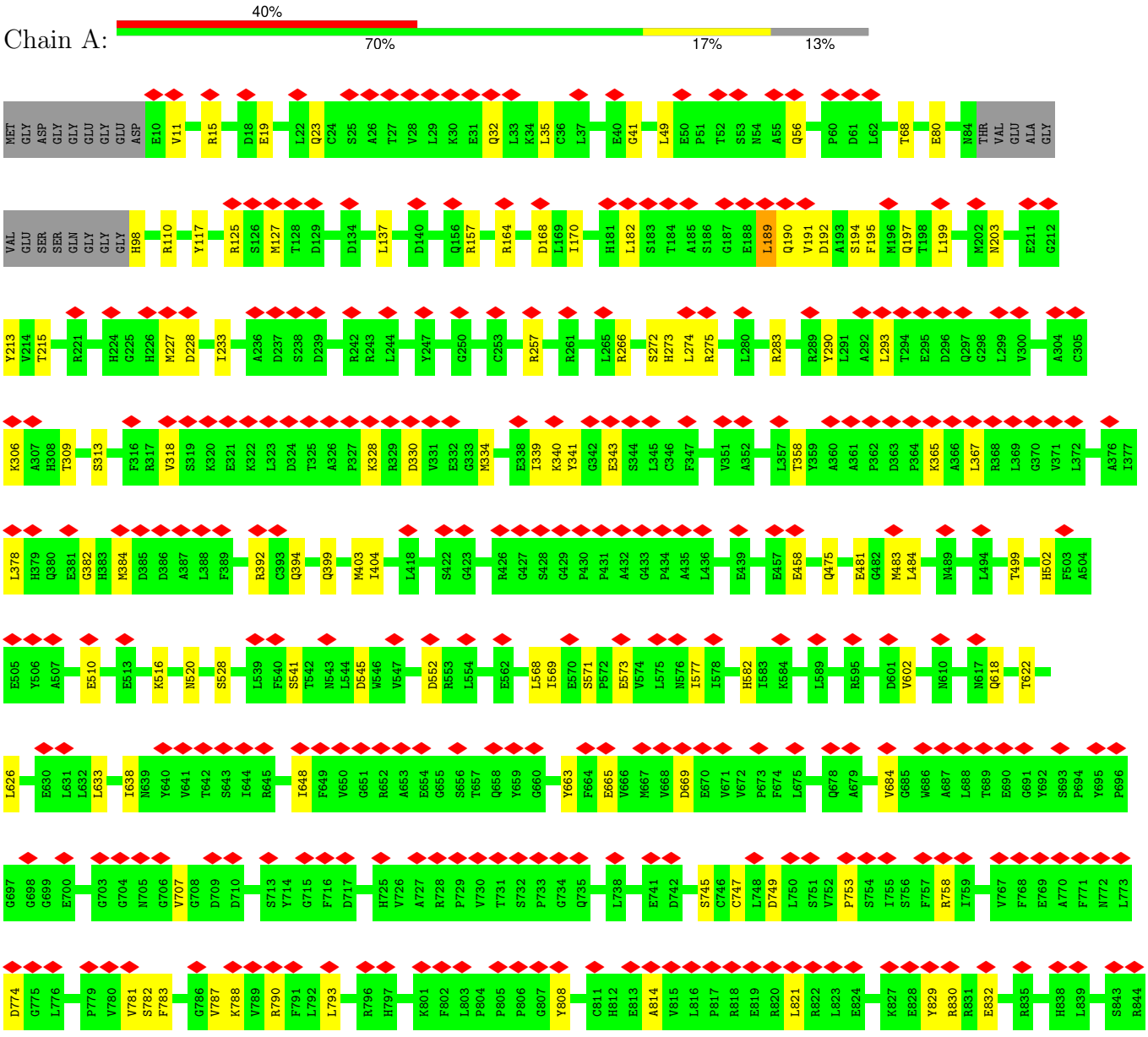
Mol	Chain	Residues	Atoms	AltConf
7	D	1	Total O 1 1	0
7	C	1	Total O 1 1	0

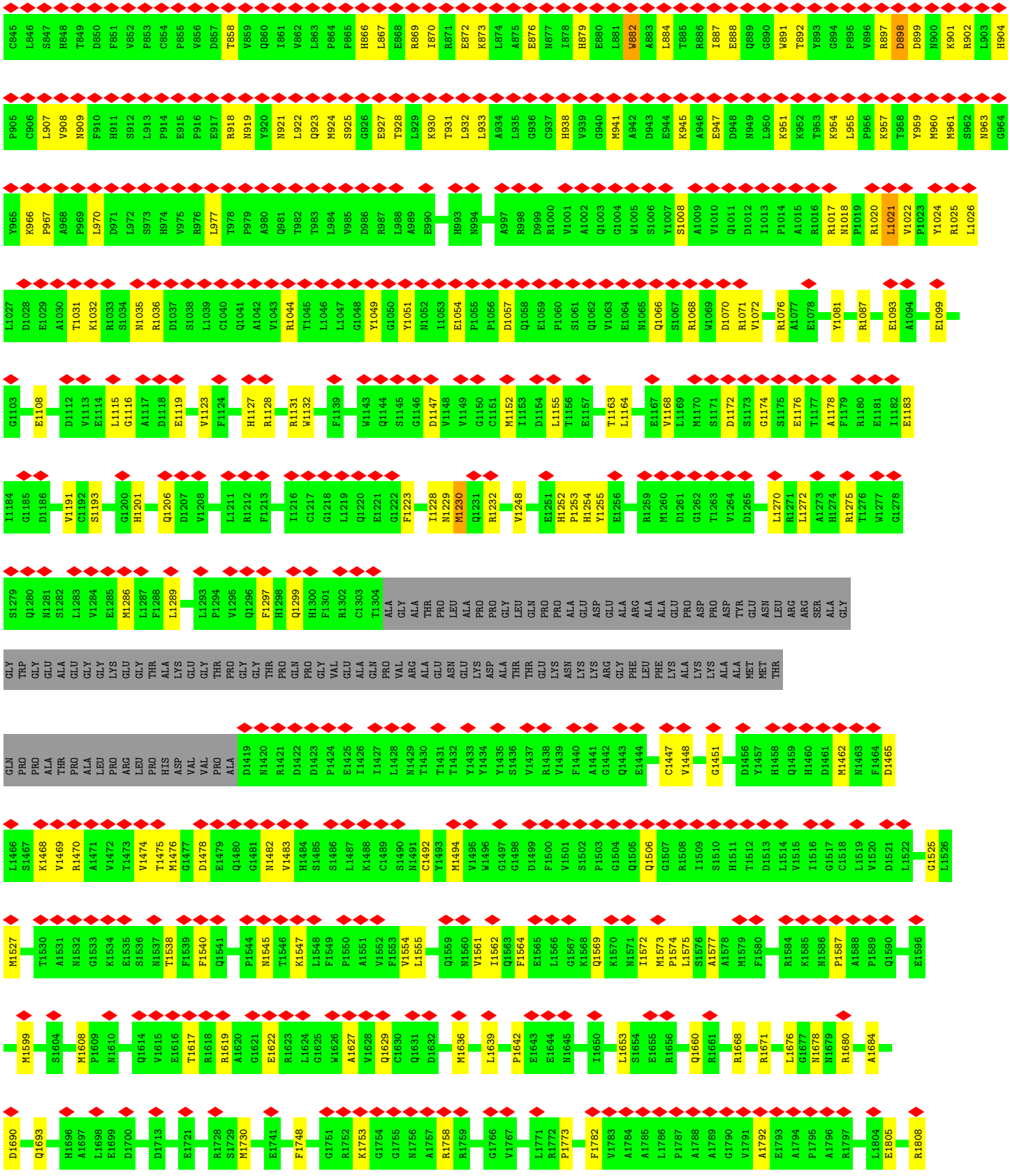
3 Residue-property plots (i)

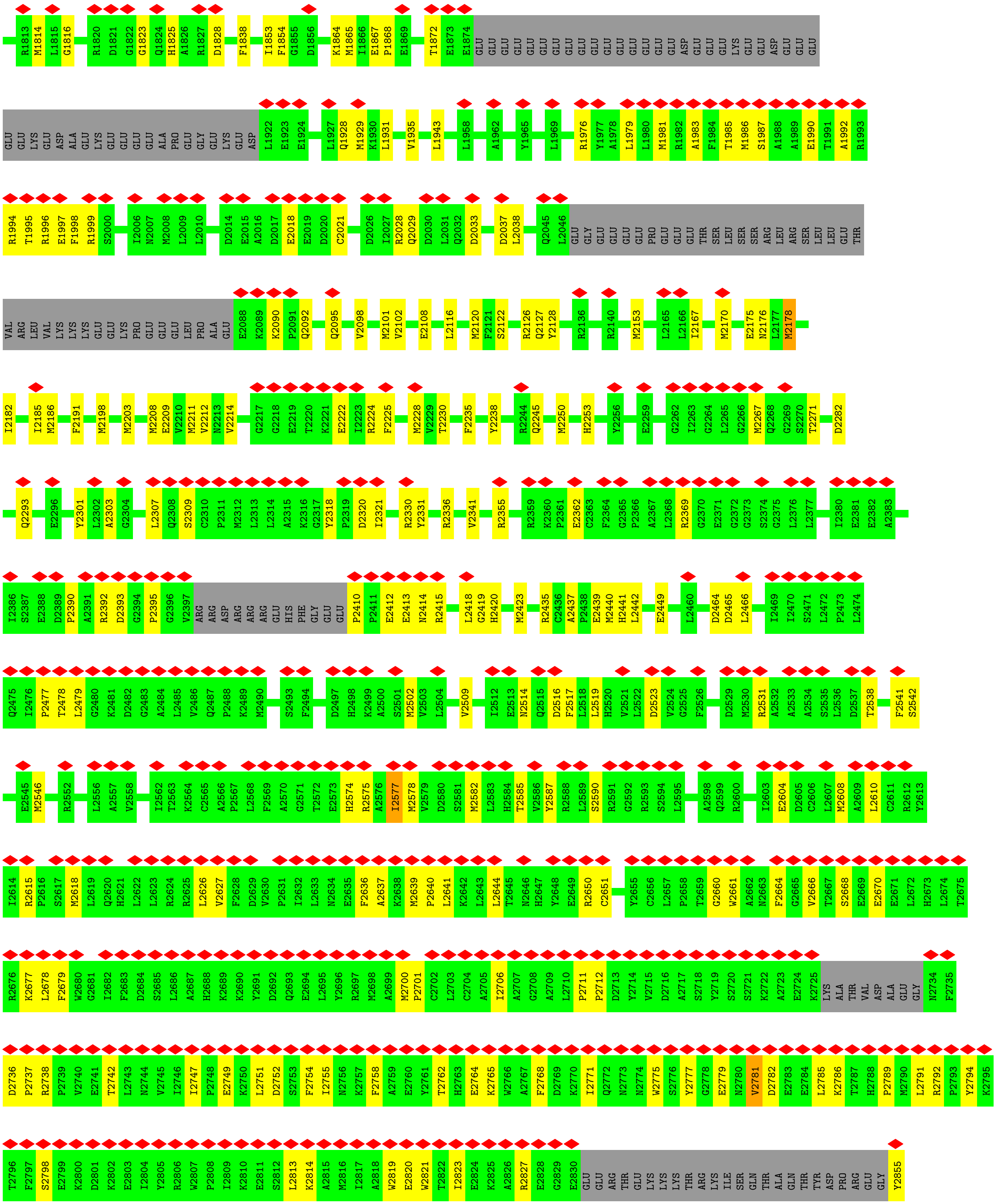
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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




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 W882 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 N994 A997 R998 D999 R1000 V1001 A1002 Q1003 G1004 W1005 S1006 Y1007 S1008 A1009 V1010 Q1011 D1012 I1013 P1014 A1015 R1016 R1017 N1018 P1019 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 Y1081 R1087 E1093 A1094 E1099
G1103 E1108 D1112 V1113 E1114 L1115 G1116 A1117 D1118 E1119 V1123 F1124 H1127 R1128 R1131 W1132 F1139 W1143 Q1144 S1145 G1146 D1147 V1148 V1149 G1150 C1151 M1152 I1153 D1154 L1155 T1156 E1157 T1163 L1164 E1167 V1168 L1169 M1170 S1171 D1172 S1173 G1174 S1175 E1176 T1177 A1178 F1179 R1180 E1181 I1182 E1183
I1184 G1185 D1186 V1191 C1192 S1193 G1200 H1201 Q1206 D1207 V1208 L1211 R1212 F1213 I1216 C1217 G1218 L1219 Q1220 E1221 G1222 F1223 I1228 N1229 M1230 Q1231 R1232 V1248 E1251 H1252 P1253 H1254 Y1255 E1256 R1259 M1260 D1261 G1262 T1263 V1264 D1265 L1270 R1271 L1272 A1273 H1274 R1275 T1276 W1277 G1278
S1279 Q1280 N1281 S1282 L1283 V1284 E1285 M1286 L1287 F1288 L1289 L1293 P1294 V1295 Q1296 F1297 H1298 Q1299 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 GLU PRO ALA 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 GLY 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 T1430 T1431 T1432 Y1433 Y1434 Y1435 S1436 V1437 R1438 V1439 F1440 A1441 G1442 Q1443 E1444 C1447 V1448 G1451 D1456 Y1457 H1458 Q1459 H1460 D1461 M1462 N1463 F1464 D1465
L1466 S1467 K1468 V1469 R1470 A1471 V1472 T1473 V1474 T1475 M1476 G1477 D1478 E1479 Q1480 G1481 N1482 V1483 H1484 S1485 S1486 L1487 K1488 C1489 S1490 N1491 C1492 Y1493 M1494 V1495 W1496 G1497 G1498 D1499 F1500 V1501 S1502 P1503 G1504 Q1505 Q1506 G1507 R1508 I1509 S1510 H1511 T1512 D1513 L1514 V1515 I1516 G1517 C1518 L1519 V1520 D1521 L1522 G1525 L1526
M1527 T1530 A1531 N1532 G1533 K1534 E1535 S1536 N1537 T1538 F1539 F1540 Q1541 P1544 N1545 T1546 K1547 L1548 F1549 P1550 A1551 V1552 F1553 V1554 L1555 Q1559 N1560 V1561 I1562 Q1563 F1564 E1565 L1566 G1567 K1568 Q1569 K1570 N1571 I1572 M1573 P1574 L1575 S1576 A1577 A1578 M1579 F1580 R1584 K1585 N1586 P1587 A1588 P1589 Q1590 E1596
M1599 S1604 M1608 P1609 N1610 Q1614 V1615 E1616 T1617 R1618 R1619 A1620 G1621 E1622 R1623 L1624 G1625 W1626 A1627 V1628 Q1629 C1630 Q1631 D1632 M1636 L1639 P1642 E1643 E1644 N1645 I1650 L1653 S1654 E1655 R1656 Q1660 R1661 R1668 R1671 L1676 G1677 N1678 N1679 R1680 A1684
D1690 Q1693 H1696 A1697 L1698 E1699 D1700 D1713 E1721 R1728 S1729 M1730 E1741 F1748 G1751 R1752 K1753 G1754 G1755 N1756 A1757 R1758 R1759 G1766 V1767 L1771 R1772 P1773 F1782 V1783 A1784 A1785 L1786 P1787 A1788 A1789 G1790 V1791 A1792 E1793 A1794 P1795 A1796 R1797 L1804 E1805 R1808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GLU GLU LYS GLU ASP ALA GLU LYS GLU GLU GLU GLU ALA PRO GLU GLY GLU LYS GLU ASP L1922 E1923 E1924 L1927 Q1928 M1929 K1930 L1931 V1935 L1943 L1958 A1962 Y1965 L1969 R1976 Y1977 A1978 L1979 L1980 M1981 R1982 A1983 F1984 T1985 M1986 S1987 A1988 A1989 E1990 T1991 A1992 R1993
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VAL ARG LEU VAL LYS LYS LYS GLU GLU LYS PRO GLU GLU GLU GLU LEU PRO ALA GLU E2088 K2089 K2090 P2091 Q2092 Q2095 V2098 M2101 V2102 E2108 L2116 M2120 F2121 S2122 R2126 Q2127 Y2128 R2136 R2140 M2153 L2165 L2166 I2167 M2170 E2175 N2176 L2177 M2178
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Q2293 E2296 Y2301 L2302 A2303 G2304 L2307 Q2308 S2309 C2310 P2311 M2312 L2313 L2314 A2315 K2316 G2317 Y2318 P2319 D2320 I2321 R2330 Y2331 R2336 V2341 R2355 R2359 K2360 P2361 E2362 C2363 F2364 G2365 P2366 A2367 L2368 R2369 G2370 E2371 G2372 G2373 S2374 G2375 L2376 L2377 I2380 E2381 E2382 A2383
I2386 S2387 E2388 D2389 P2390 A2391 R2392 D2393 G2394 P2395 G2396 V2397 ARG ARG ASP ARG ARG ARG GLU HIS PHE GLY GLU GLU P2410 P2411 E2412 E2413 N2414 R2415 L2418 G2419 H2420 M2423 R2435 C2436 A2437 P2438 E2439 M2440 H2441 L2442 E2449 L2460 D2464 D2465 L2466 I2469 I2470 S2471 L2472 P2473 L2474
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E2545 M2546 R2552 L2556 A2557 V2558 I2562 T2563 K2564 C2565 A2566 P2567 L2568 F2569 A2570 G2571 T2572 E2573 H2574 R2575 A2576 I2577 M2578 V2579 D2580 S2581 M2582 L2583 H2584 T2585 V2586 Y2587 R2588 L2589 S2590 R2591 G2592 R2593 S2594 L2595 A2598 Q2599 R2600 I2603 E2604 D2605 C2606 L2607 M2608 A2609 L2610 C2611 R2612 Y2613
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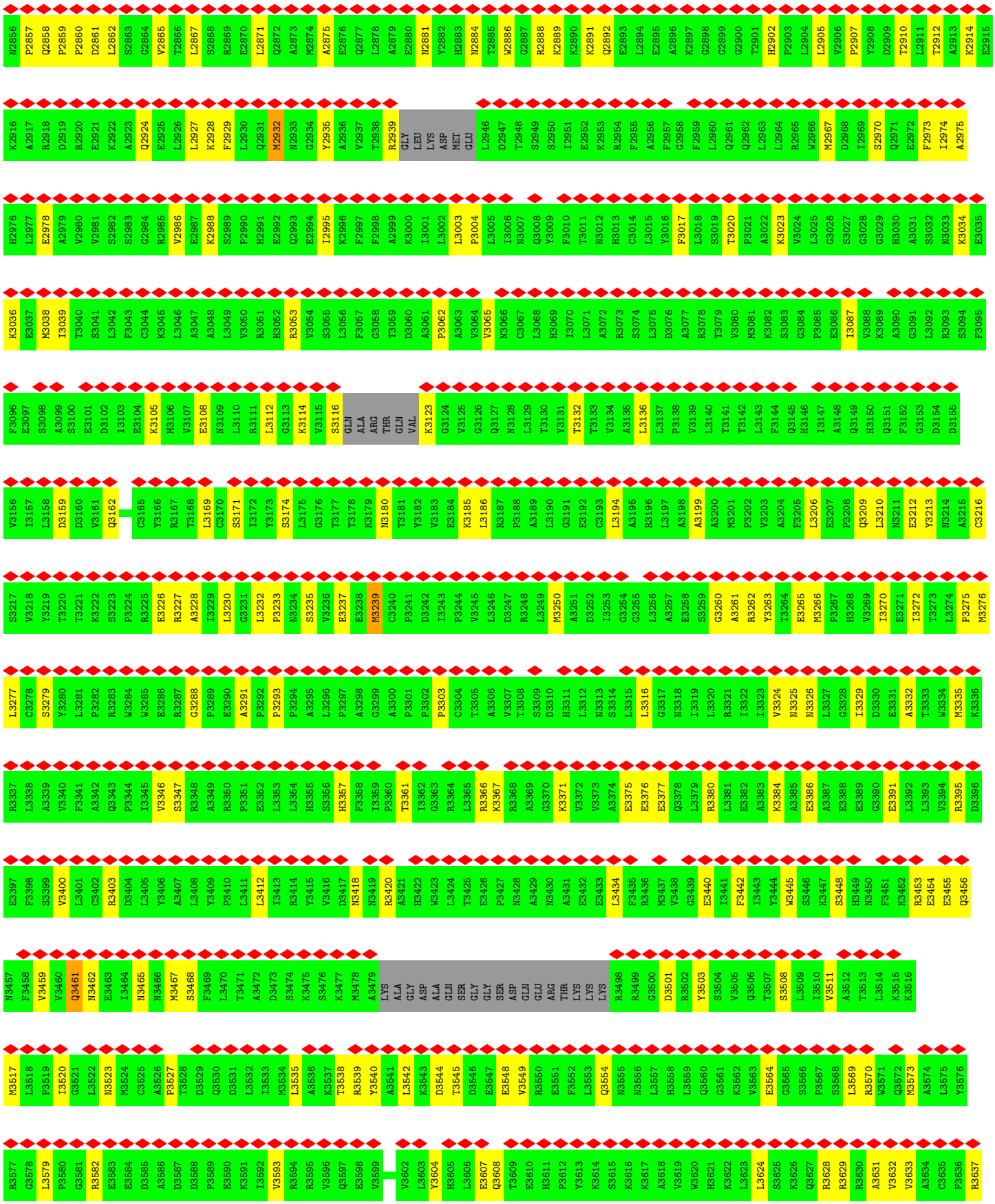
D2736 P2737 R2738 P2739 V2740 E2741 T2742 L2743 N2744 V2745 I2746 I2747 P2748 E2749 K2750 L2751 D2752 S2753 F2754 I2755 N2756 K2757 F2758 A2759 E2760 Y2761 T2762 H2763 E2764 K2765 W2766 A2767 F2768 D2769 K2770 I2771 Q2772 N2773 N2774 W2775 S2776 Y2777 G2778 E2779 N2780 V2781 D2782 E2783 E2784 L2785 K2786 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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F3096 E3097 S3098 A3099 S3100 E3101 D3102 I3103 E3104 K3105 M3106 V3107 E3108 N3109 L3110 R3111 L3112 G3113 K3114 V3115 S3116 GLN ALA ARG THR GLN VAL K3123 G3124 V3125 G3126 Q3127 N3128 L3129 T3130 Y3131 T3132 T3133 V3134 A3135 L3136 L3137 P3138 V3139 L3140 T3141 T3142 L3143 F3144 Q3145 H3146 I3147 A3148 Q3149 H3150 Q3151 F3152 G3153 D3154 D3155
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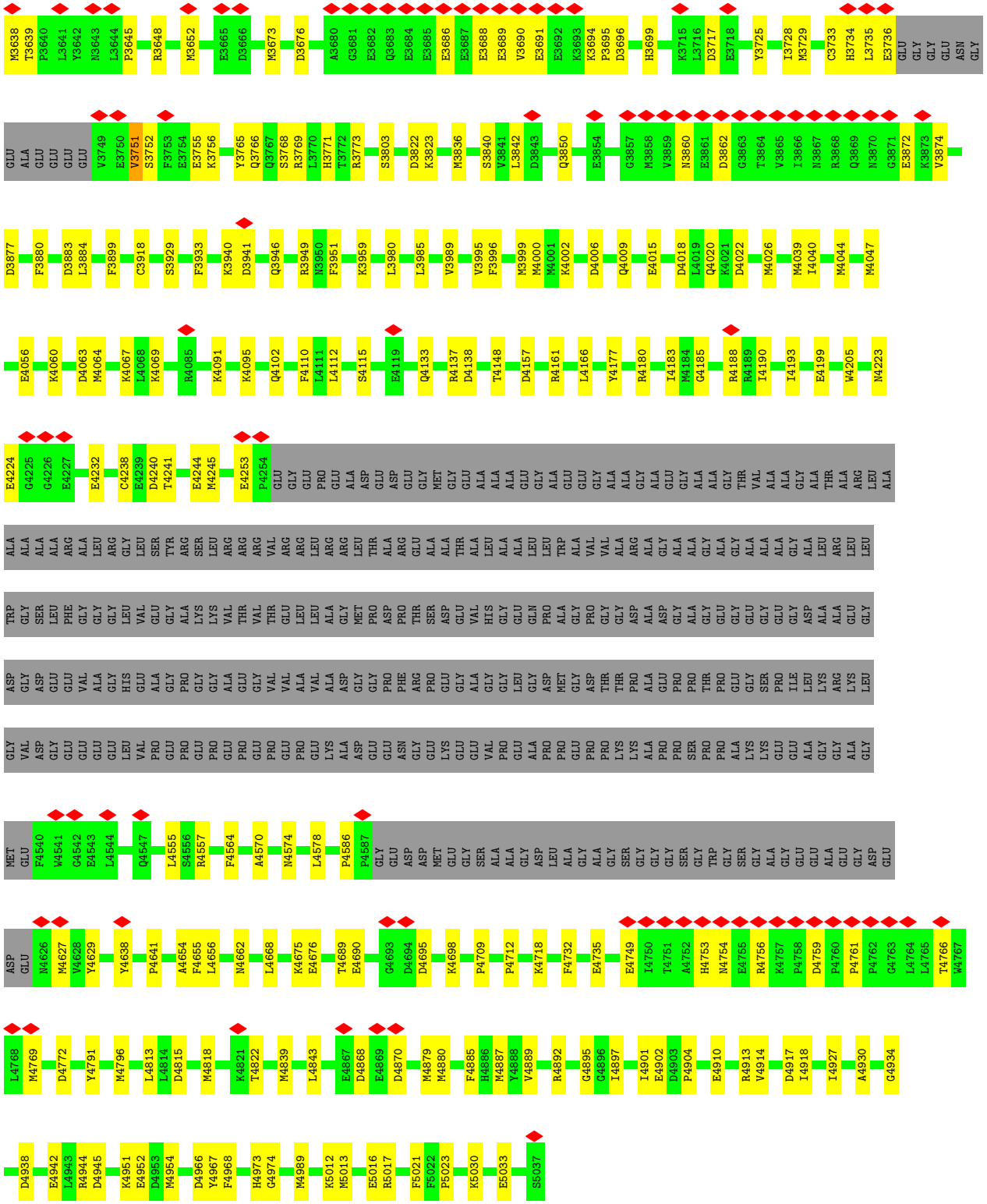
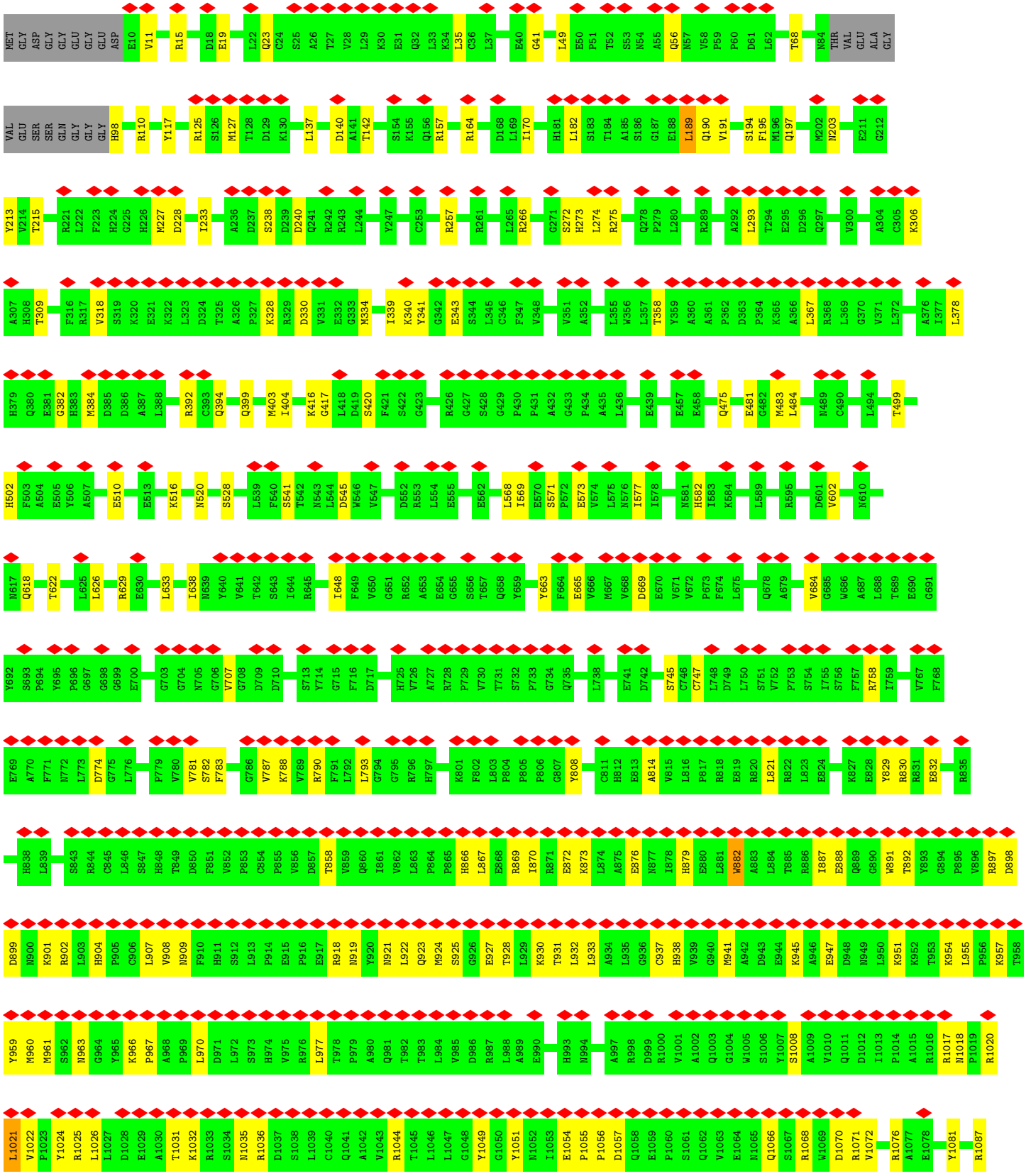


• Molecule 1: Ryanodine receptor 1

Chain B: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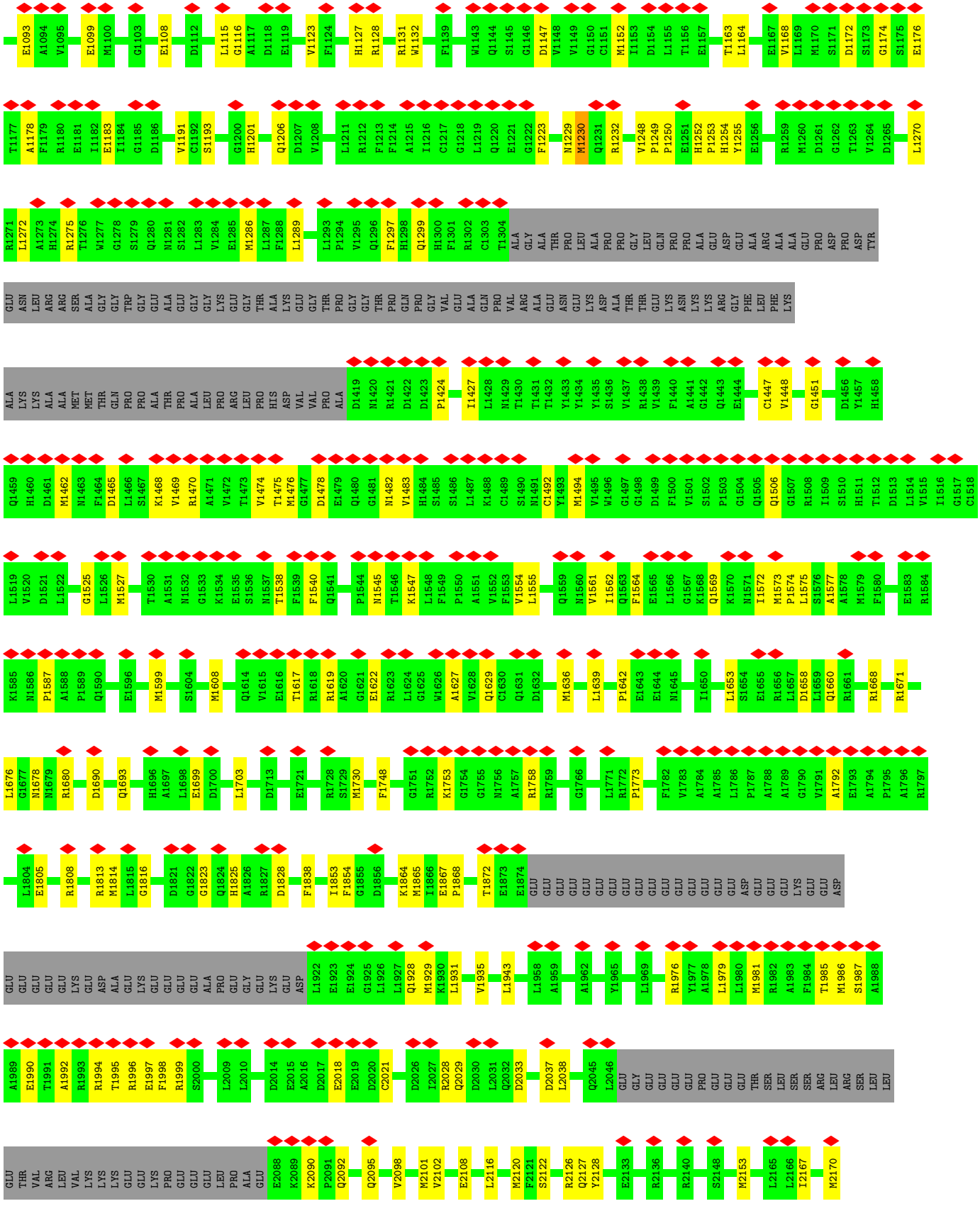
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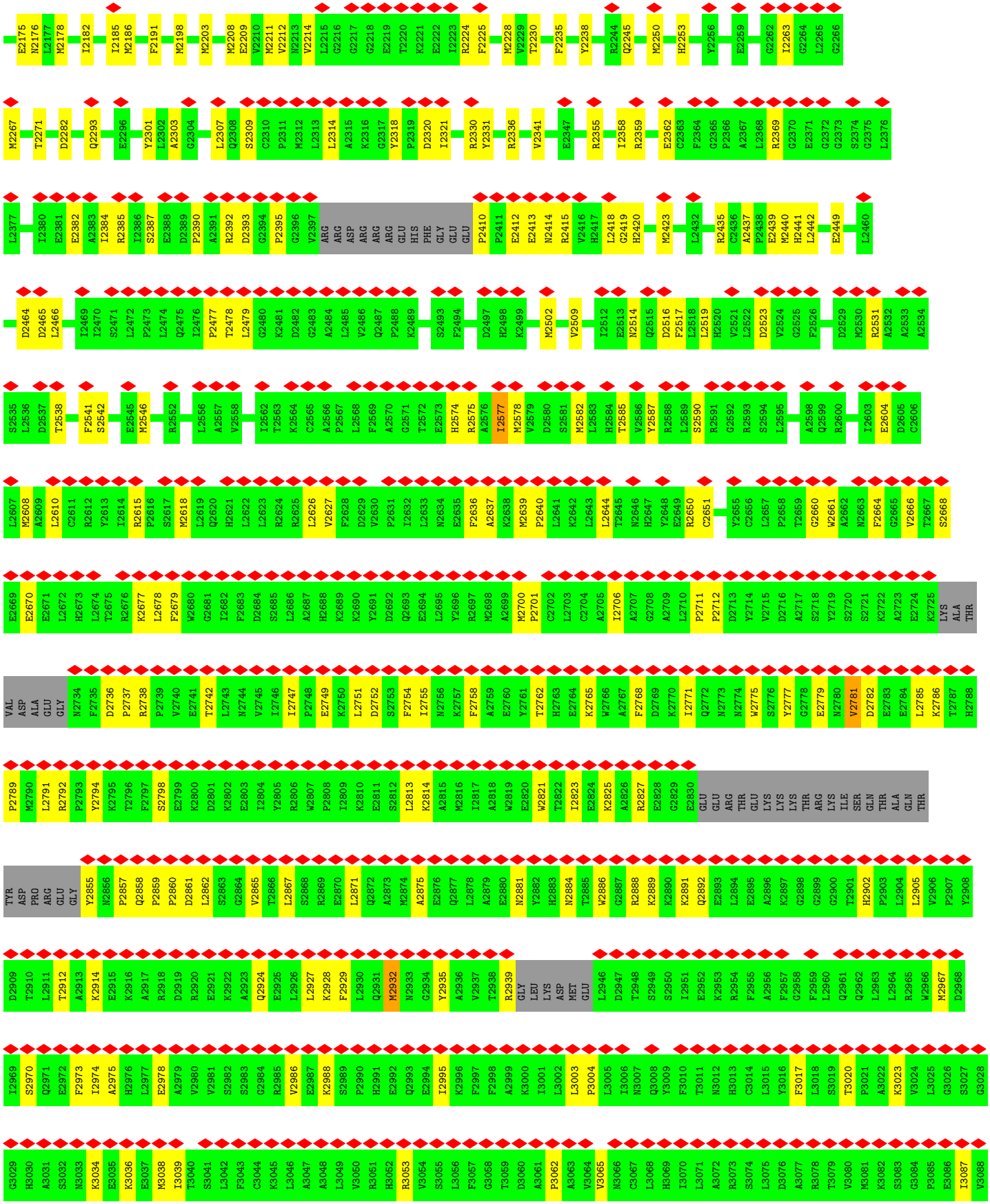
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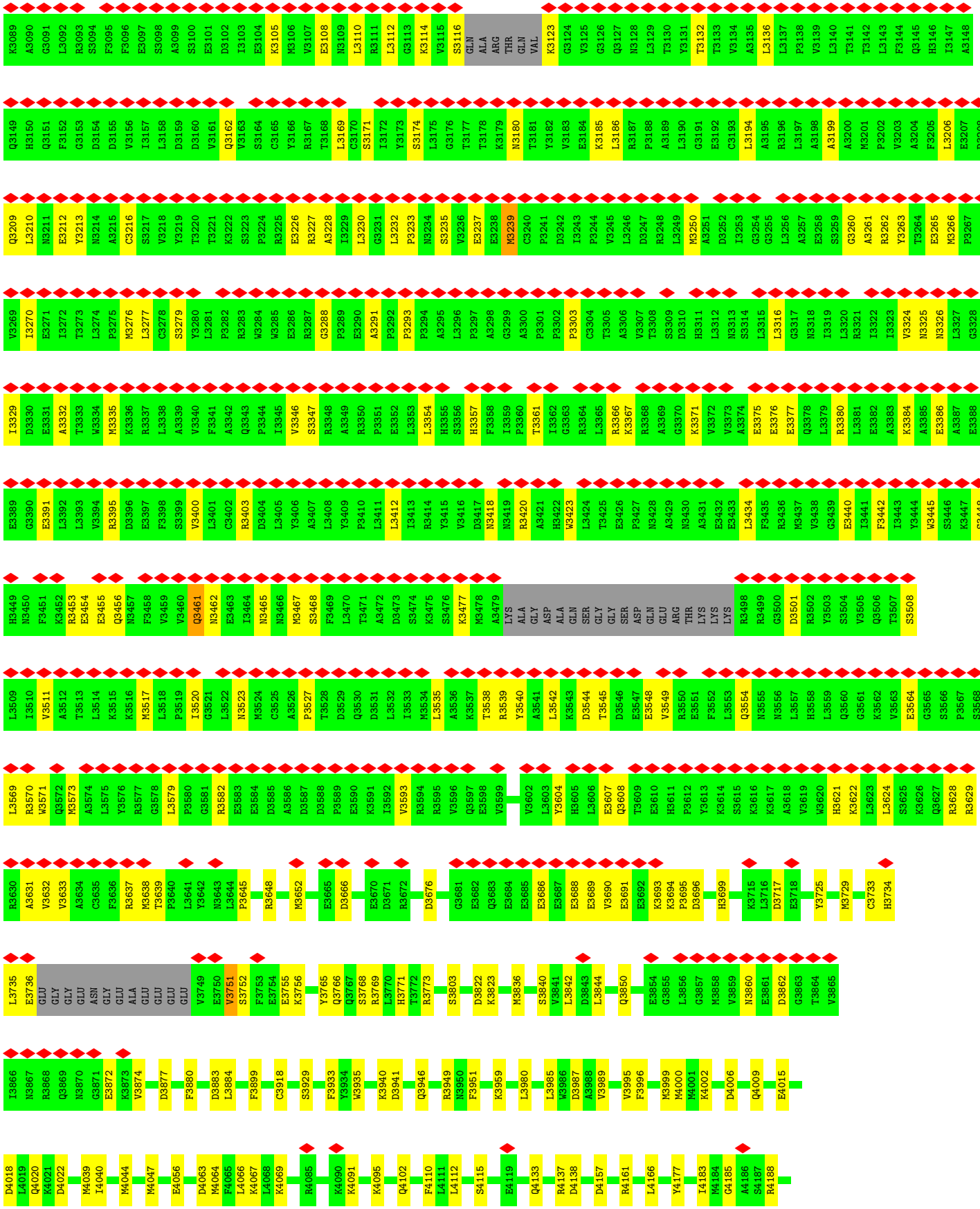
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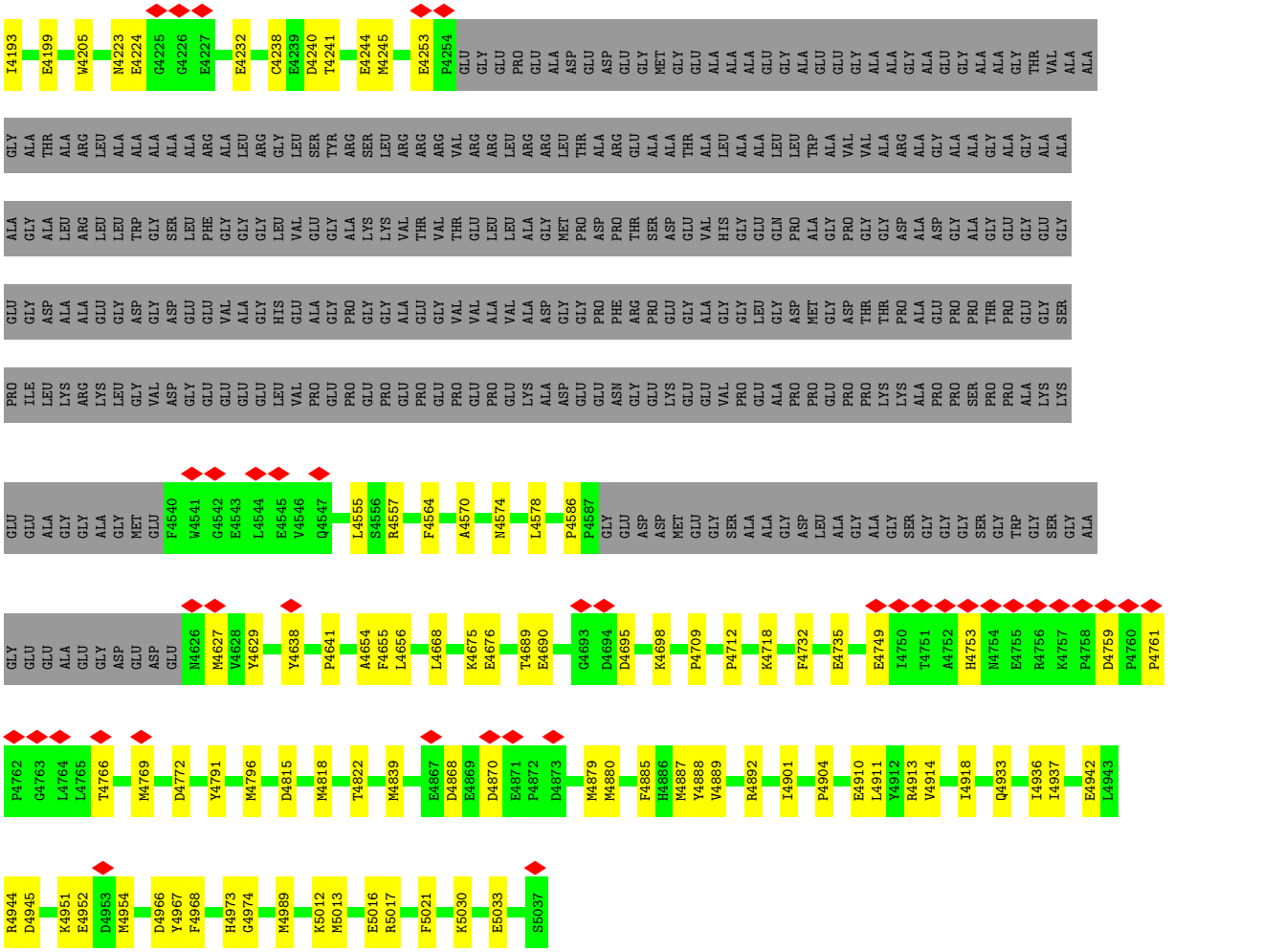
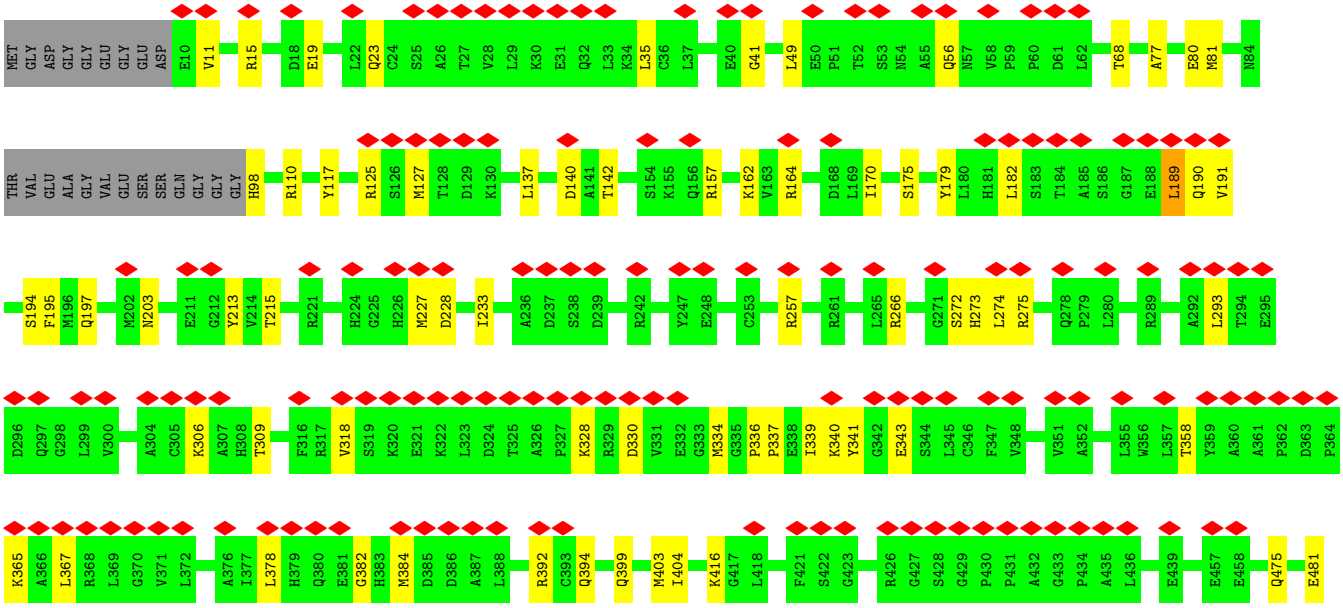
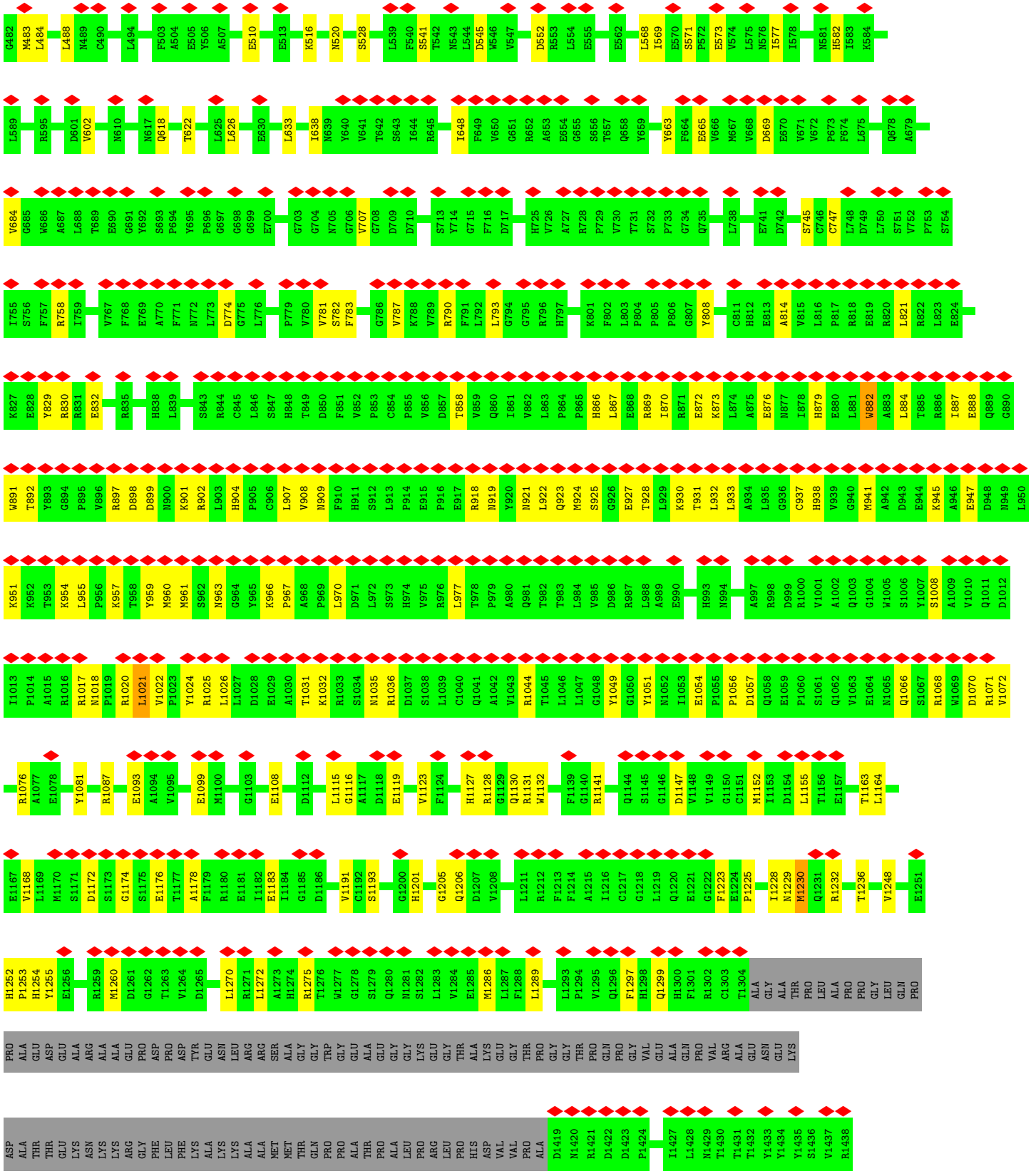


• Molecule 1: Ryanodine receptor 1

Chain D:

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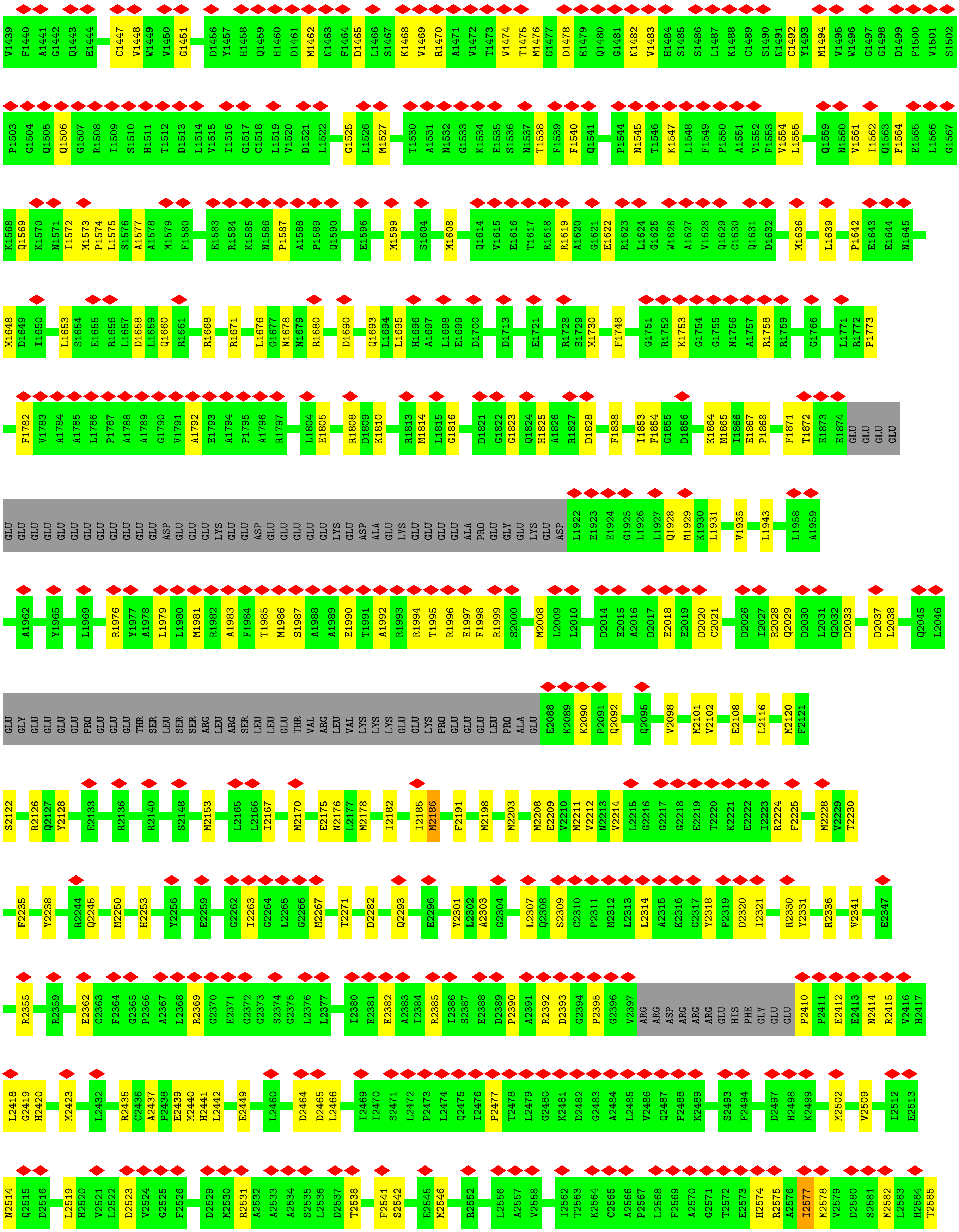
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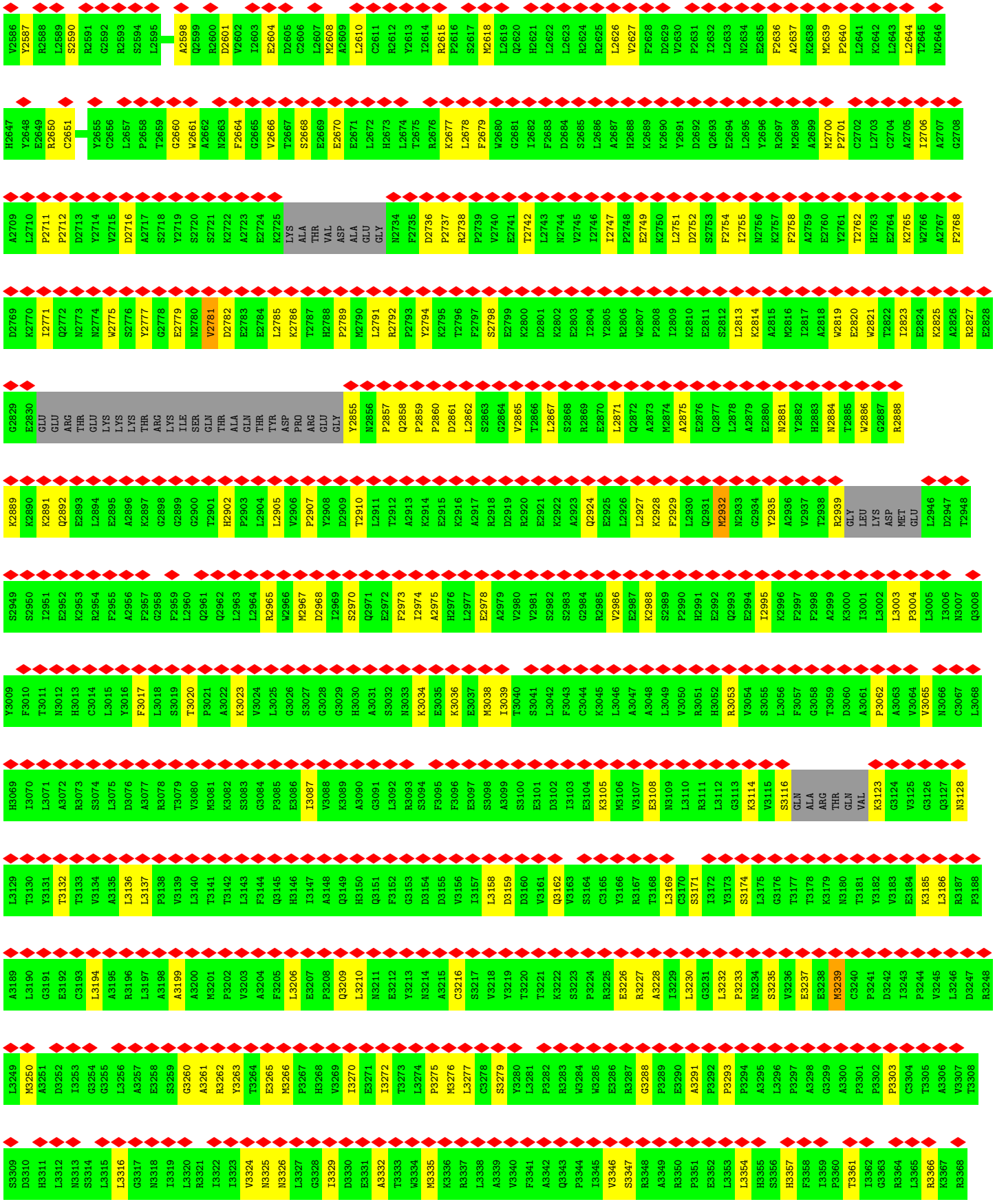
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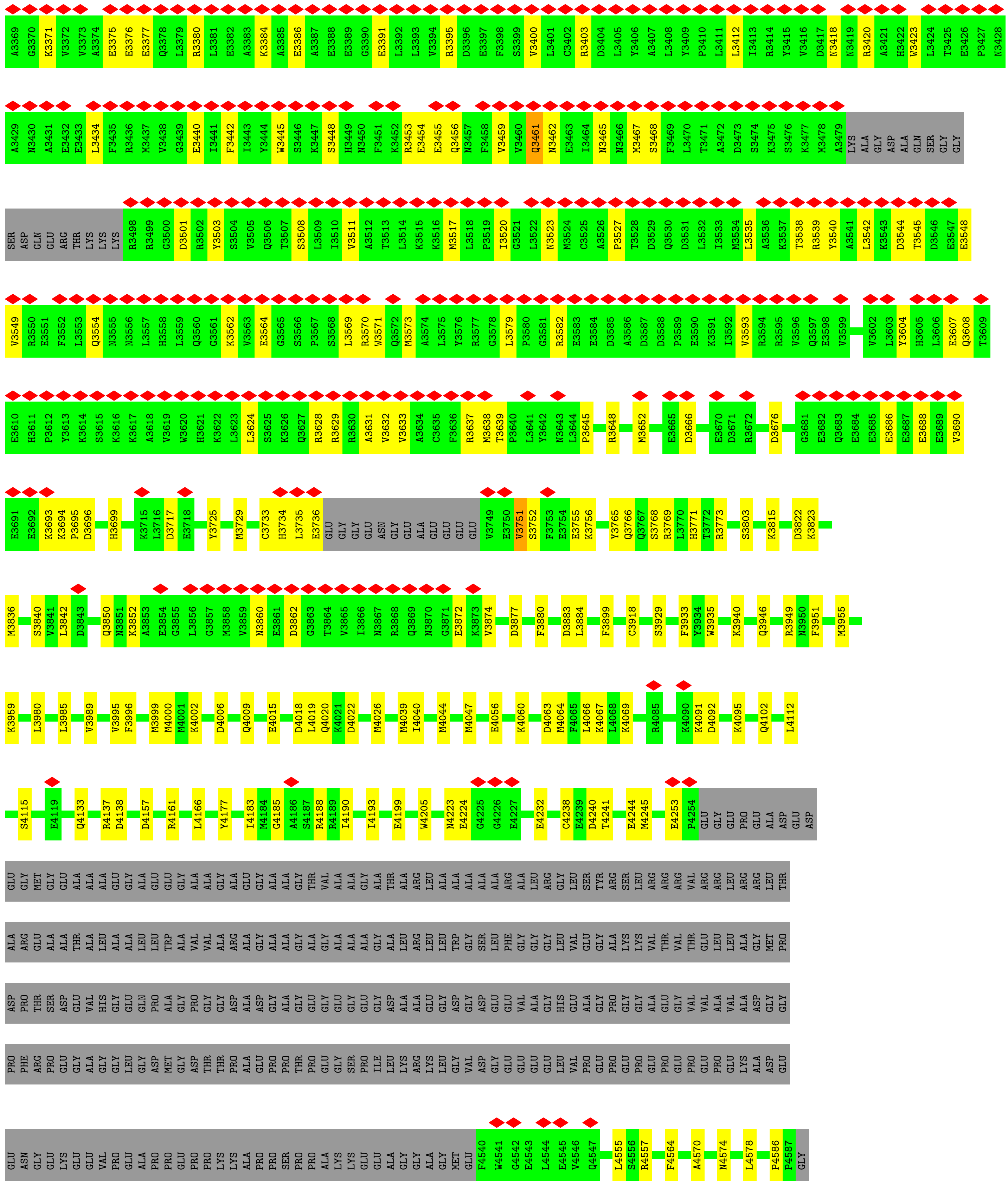
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ALA ARG GLU ALA ALA THR ALA LEU ALA ALA LEU LEU TRP ALA VAL VAL ALA ARG ALA GLY ALA ALA GLY ALA GLY ALA ALA ALA GLY ALA LEU ARG LEU LEU TRP GLY SER LEU PHE GLY GLY GLY LEU VAL GLU GLY ALA LYS LYS VAL THR VAL THR GLU LEU LEU ALA GLY MET PRO
ASP PRO THR SER ASP GLU VAL HIS GLY GLU GLN PRO ALA GLY PRO GLY GLY ASP ALA ASP GLY ALA ALA GLY GLU GLY GLU GLY GLU GLY ASP ALA ALA GLU GLY ASP GLY ASP GLU GLU VAL ALA GLY HIS 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 LEU VAL PRO GLU PRO GLU PRO GLU PRO GLU PRO GLU PRO GLU LYS ALA ASP GLU
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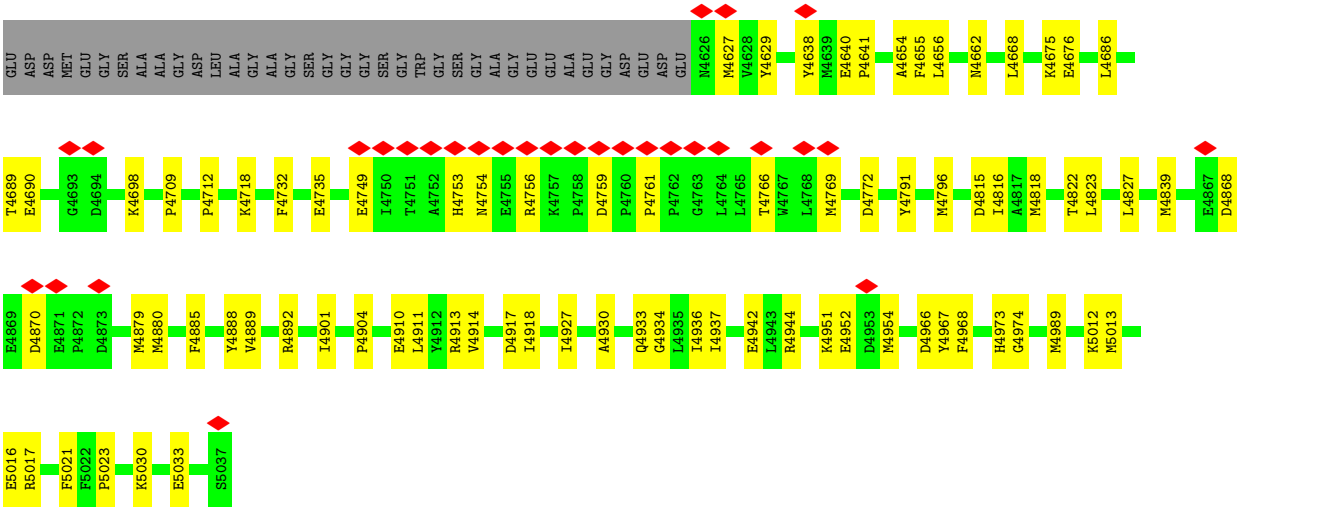
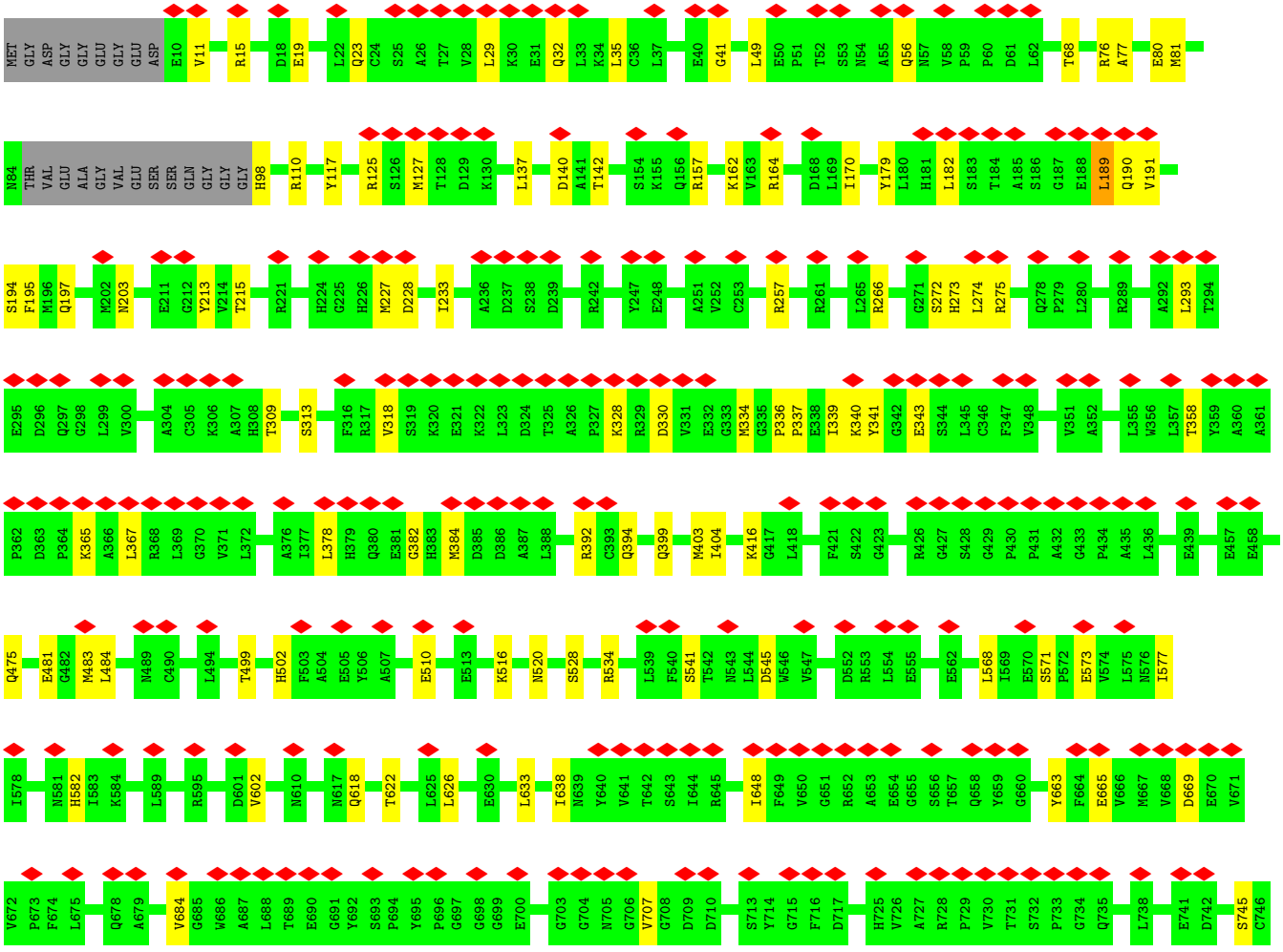
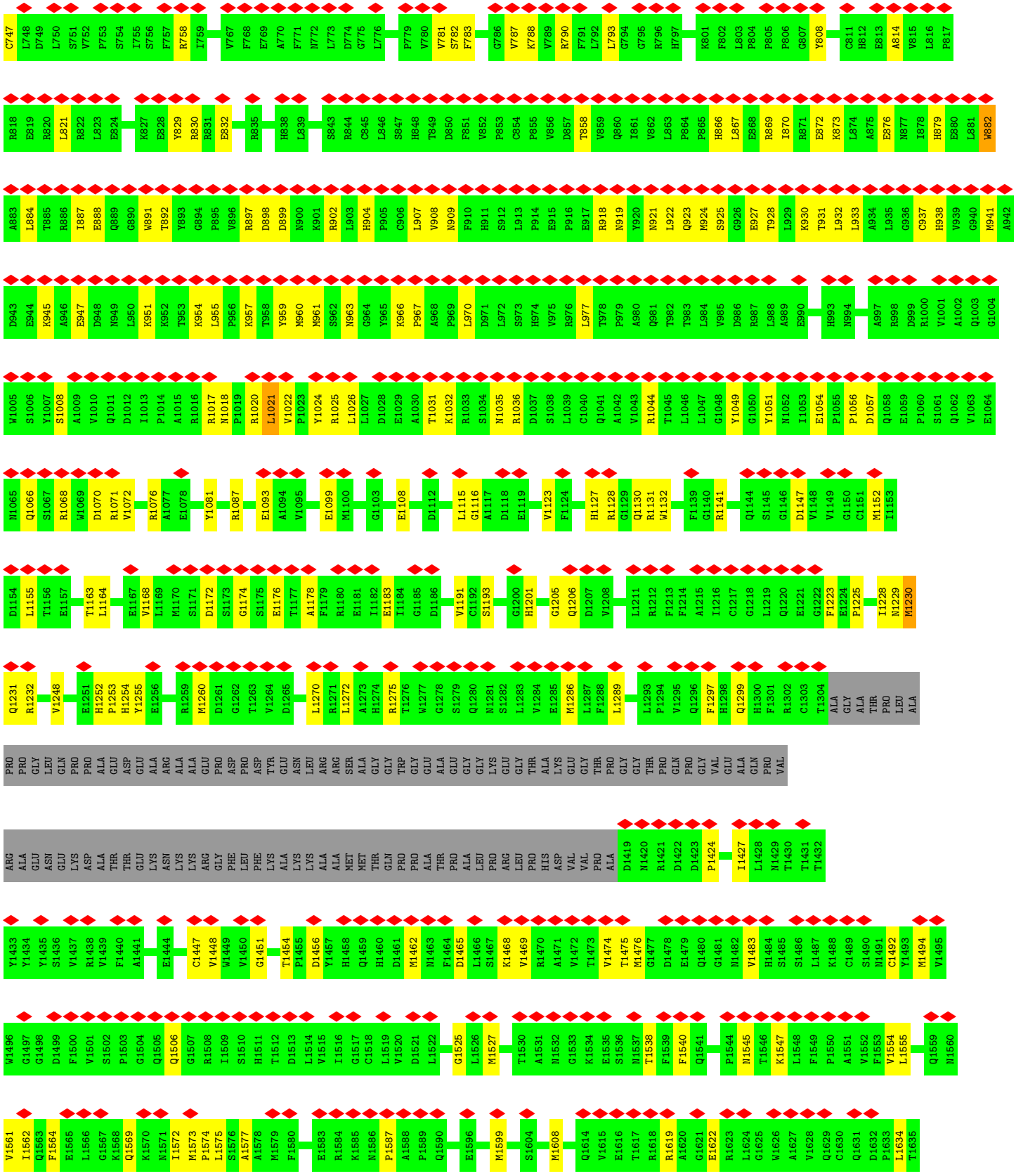


• Molecule 1: Ryanodine receptor 1

Chain C:

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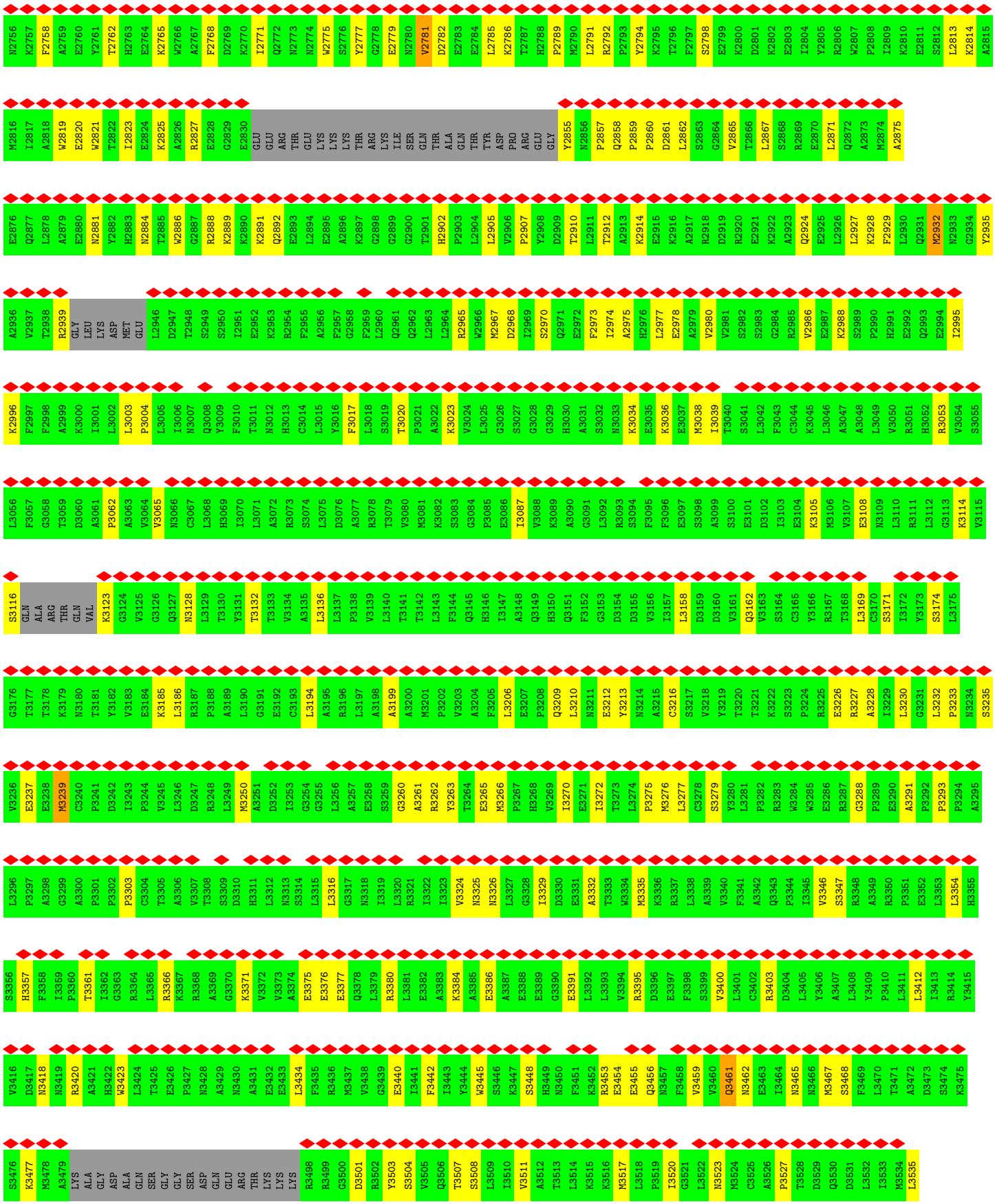
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S3116 GLN ALA ARG THR GLN VAL K3123 G3124 V3125 G3126 Q3127 N3128 L3129 T3130 Y3131 T3132 T3133 V3134 A3135 L3136 L3137 P3138 V3139 L3140 T3141 T3142 L3143 F3144 Q3145 H3146 I3147 A3148 Q3149 H3150 Q3151 F3152 G3153 D3154 D3155 V3156 I3157 L3158 D3159 D3160 V3161 Q3162 V3163 S3164 C3165 Y3166 R3167 T3168 L3169 C3170 S3171 I3172 Y3173 S3174 L3175
G3176 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 H3234 S3235
V3236 E3237 E3238 M3239 C3240 P3241 D3242 I3243 P3244 V3245 L3246 D3247 R3248 L3249 M3250 A3251 D3252 I3253 G3254 G3255 L3256 A3257 E3258 S3259 G3260 A3261 R3262 Y3263 T3264 E3265 M3266 P3267 H3268 V3269 I3270 E3271 I3272 T3273 L3274 P3275 M3276 L3277 C3278 S3279 Y3280 L3281 P3282 R3283 W3284 W3285 E3286 R3287 G3288 P3289 E3290 A3291 P3292 P3293 P3294 A3295
L3296 P3297 A3298 G3299 A3300 P3301 P3302 P3303 C3304 T3305 A3306 V3307 T3308 S3309 D3310 H3311 L3312 N3313 S3314 L3315 L3316 G3317 N3318 I3319 L3320 R3321 I3322 I3323 V3324 N3325 N3326 L3327 G3328 I3329 D3330 E3331 A3332 T3333 W3334 M3335 K3336 R3337 L3338 A3339 V3340 F3341 A3342 Q3343 P3344 I3345 V3346 S3347 R3348 A3349 R3350 P3351 E3352 L3353 L3354 H3355
S3356 H3357 F3358 I3359 P3360 T3361 I3362 G3363 R3364 L3365 R3366 K3367 R3368 A3369 G3370 K3371 V3372 V3373 A3374 E3375 E3376 E3377 Q3378 L3379 R3380 L3381 E3382 A3383 K3384 A3385 E3386 A3387 E3388 E3389 G3390 E3391 L3392 L3393 V3394 R3395 D3396 E3397 F3398 S3399 V3400 L3401 C3402 R3403 D3404 L3405 Y3406 A3407 L3408 Y3409 P3410 L3411 L3412 I3413 R3414 Y3415
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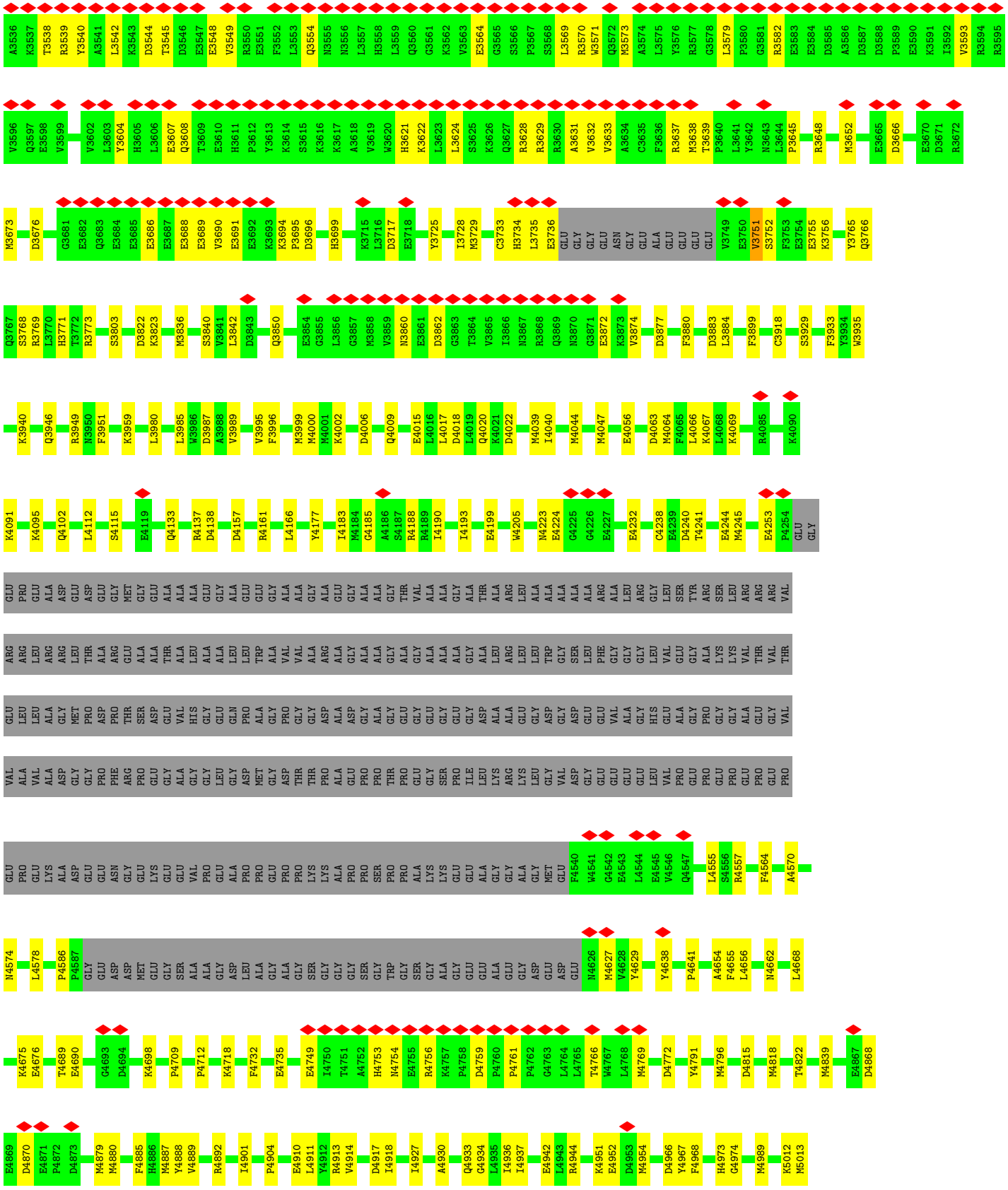
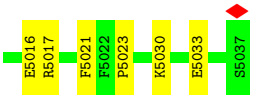
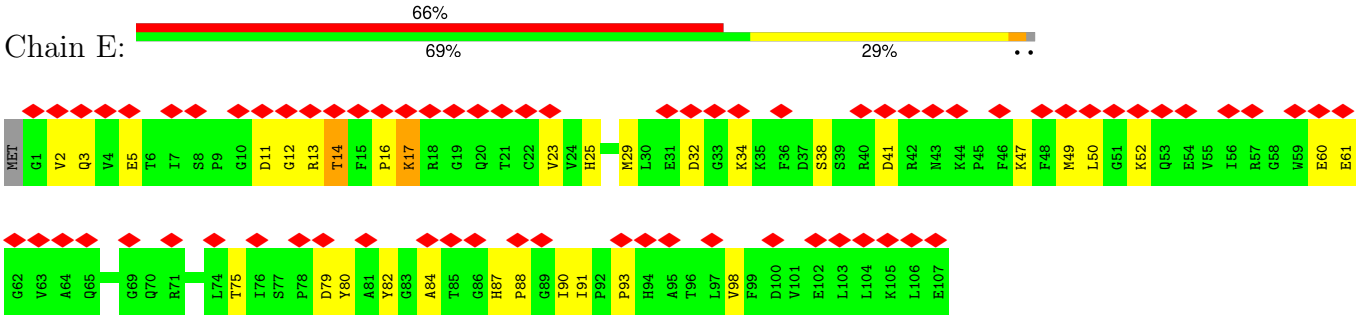
S3476 K3477 M3478 A3479 LYS ALA GLY ASP ALA GLN SER GLY GLY SER ASP GLN GLU ARG THR LYS LYS LYS R3498 R3499 G3500 D3501 R3502 Y3503 S3504 V3505 Q3506 T3507 S3508 L3509 I3510 V3511 A3512 T3513 L3514 K3515 K3516 M3517 L3518 P3519 I3520 G3521 L3522 N3523 M3524 C3525 A3526 P3527 T3528 D3529 Q3530 D3531 L3532 I3533 M3534 L3535





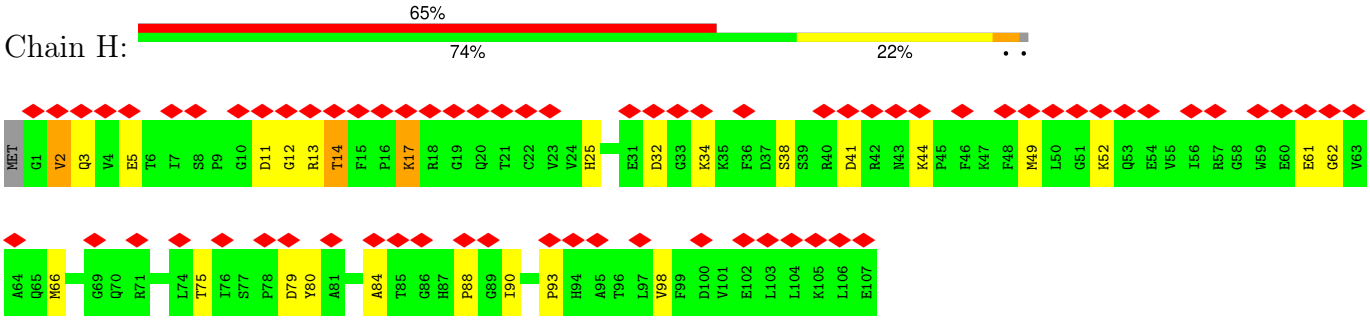
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain E:



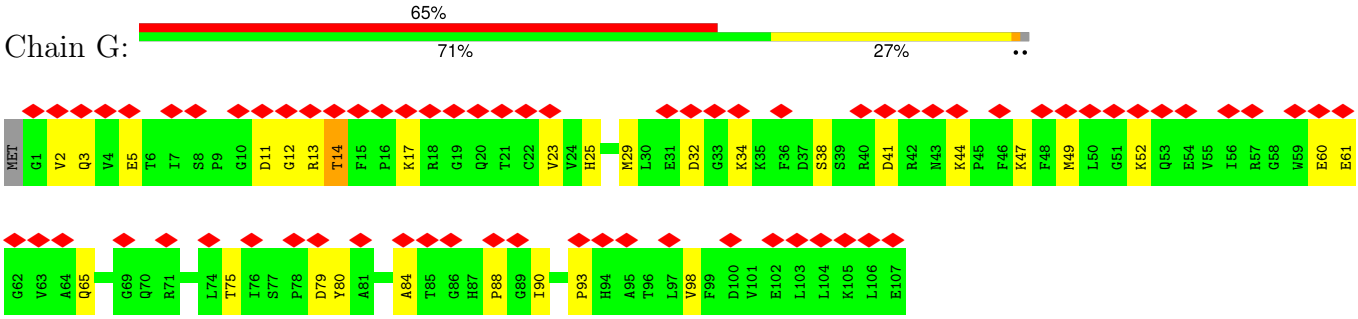
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain H:



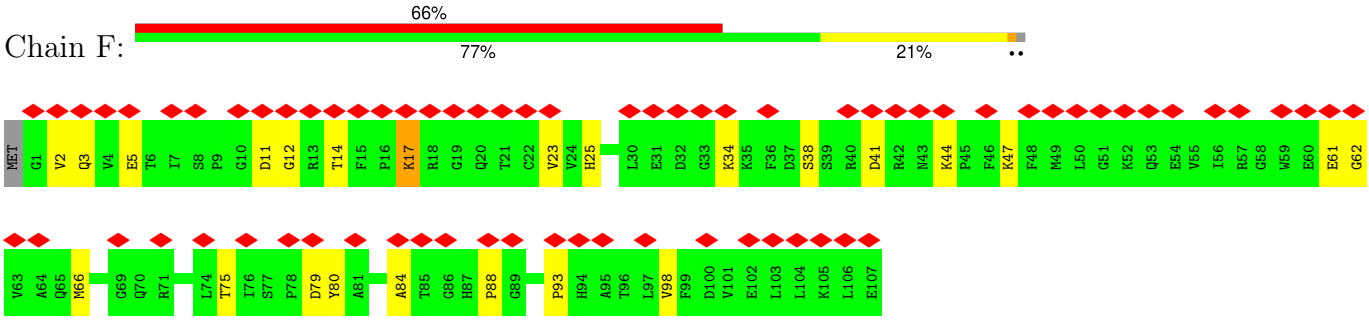
• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain G:



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

Chain F:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	17393	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	0.436	Depositor
Minimum map value	-0.223	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.018	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	428.288, 428.288, 428.288	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.8365, 0.8365, 0.8365	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, ZN, 141, 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	0.29	0/35977	0.38	1/48726 (0.0%)
1	B	0.29	0/35977	0.38	1/48726 (0.0%)
1	C	0.29	0/35977	0.38	1/48726 (0.0%)
1	D	0.29	0/35977	0.38	1/48726 (0.0%)
2	E	0.30	0/850	0.43	0/1146
2	F	0.27	0/850	0.40	0/1146
2	G	0.28	0/850	0.40	0/1146
2	H	0.29	0/850	0.41	0/1146
All	All	0.29	0/147308	0.38	4/199488 (0.0%)

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	3239	MET	CB-CG-SD	7.01	133.72	112.70
1	A	3239	MET	CB-CG-SD	7.00	133.71	112.70
1	C	3239	MET	CB-CG-SD	7.00	133.69	112.70
1	B	3239	MET	CB-CG-SD	6.99	133.67	112.70

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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	34797	630	0
1	B	35150	0	34797	622	0
1	C	35150	0	34797	648	0
1	D	35150	0	34797	650	0
2	E	831	0	831	25	0
2	F	831	0	831	18	0
2	G	831	0	831	23	0
2	H	831	0	831	21	0
3	A	31	0	12	0	0
3	B	31	0	12	0	0
3	C	31	0	12	0	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
5	D	1	0	0	0	0
6	A	11	0	4	0	0
6	B	11	0	4	0	0
6	C	11	0	4	0	0
6	D	11	0	4	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	144104	0	142576	2538	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 9.

The worst 5 of 2538 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:C:1573:MET:HE3	1:C:1574:PRO:HD2	1.37	1.05
1:A:1573:MET:HE3	1:A:1574:PRO:HD2	1.37	1.03
1:D:1573:MET:HE3	1:D:1574:PRO:HD2	1.37	1.02
1:B:1573:MET:HE3	1:B:1574:PRO:HD2	1.37	1.02
1:B:3467:MET:HE1	1:C:1174:GLY:CA	1.99	0.93

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%)	4246 (97%)	139 (3%)	0	100	100
1	B	4385/5037 (87%)	4245 (97%)	140 (3%)	0	100	100
1	C	4385/5037 (87%)	4247 (97%)	138 (3%)	0	100	100
1	D	4385/5037 (87%)	4246 (97%)	139 (3%)	0	100	100
2	E	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
2	F	105/108 (97%)	103 (98%)	2 (2%)	0	100	100
2	G	105/108 (97%)	102 (97%)	3 (3%)	0	100	100
2	H	105/108 (97%)	101 (96%)	4 (4%)	0	100	100
All	All	17960/20580 (87%)	17392 (97%)	568 (3%)	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%)	3808 (99%)	28 (1%)	81	91
1	B	3836/4276 (90%)	3808 (99%)	28 (1%)	81	91
1	C	3836/4276 (90%)	3808 (99%)	28 (1%)	81	91
1	D	3836/4276 (90%)	3807 (99%)	29 (1%)	79	89

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
2	E	89/90 (99%)	83 (93%)	6 (7%)	13 41
2	F	89/90 (99%)	86 (97%)	3 (3%)	32 61
2	G	89/90 (99%)	84 (94%)	5 (6%)	17 47
2	H	89/90 (99%)	85 (96%)	4 (4%)	23 53
All	All	15700/17464 (90%)	15569 (99%)	131 (1%)	77 89

5 of 131 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	1979	LEU
1	C	2577	ILE
1	C	4973	HIS
1	B	318	VAL
1	B	191	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 107 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	255	HIS
1	D	2342	ASN
1	C	3211	ASN
1	D	581	ASN
1	D	1640	HIS

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	$\#\|Z\| > 2$
3	ATP	A	5301	-	28,33,33	0.74	0	34,52,52	0.92	2 (5%)
6	141	D	5304	-	11,12,12	1.77	3 (27%)	11,17,17	0.97	0
3	ATP	B	5301	-	28,33,33	0.74	0	34,52,52	0.92	2 (5%)
6	141	B	5304	-	11,12,12	1.76	3 (27%)	11,17,17	0.97	0
6	141	C	5304	-	11,12,12	1.76	3 (27%)	11,17,17	0.98	0
3	ATP	D	5301	-	28,33,33	0.75	0	34,52,52	0.92	2 (5%)
3	ATP	C	5301	-	28,33,33	0.74	0	34,52,52	0.93	2 (5%)
6	141	A	5304	-	11,12,12	1.76	3 (27%)	11,17,17	0.97	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
3	ATP	A	5301	-	-	6/18/38/38	0/3/3/3
6	141	D	5304	-	-	-	0/2/2/2
3	ATP	B	5301	-	-	6/18/38/38	0/3/3/3
6	141	B	5304	-	-	-	0/2/2/2
6	141	C	5304	-	-	-	0/2/2/2
3	ATP	D	5301	-	-	6/18/38/38	0/3/3/3
3	ATP	C	5301	-	-	6/18/38/38	0/3/3/3
6	141	A	5304	-	-	-	0/2/2/2

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	C	5304	141	C5-C4	-4.04	1.38	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	5304	141	C5-C4	-4.01	1.38	1.45
6	B	5304	141	C5-C4	-3.99	1.38	1.45
6	D	5304	141	C5-C4	-3.99	1.38	1.45
6	B	5304	141	C7-N8	2.49	1.35	1.33

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

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	5301	ATP	C4'-O4'-C1'	-4.10	106.17	109.92
3	A	5301	ATP	C4'-O4'-C1'	-4.09	106.18	109.92
3	B	5301	ATP	C4'-O4'-C1'	-4.08	106.19	109.92
3	C	5301	ATP	C4'-O4'-C1'	-4.08	106.19	109.92
3	C	5301	ATP	C5-C6-N6	2.35	123.89	120.31

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

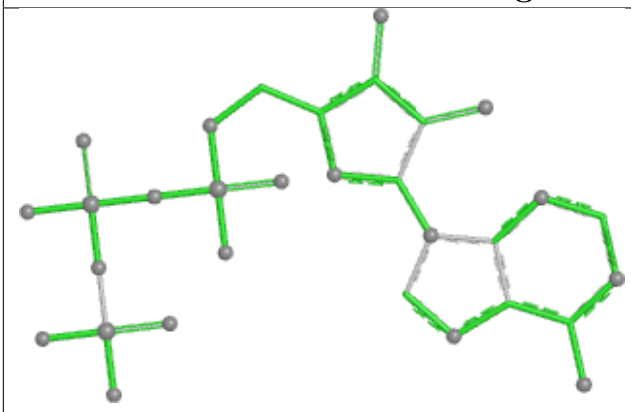
Mol	Chain	Res	Type	Atoms
3	A	5301	ATP	PB-O3B-PG-O2G
3	B	5301	ATP	PB-O3B-PG-O2G
3	D	5301	ATP	PB-O3B-PG-O2G
3	C	5301	ATP	PB-O3B-PG-O2G
3	A	5301	ATP	O4'-C4'-C5'-O5'

There are no ring outliers.

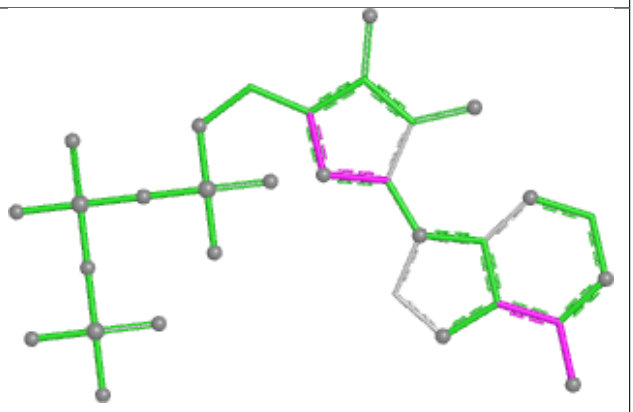
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

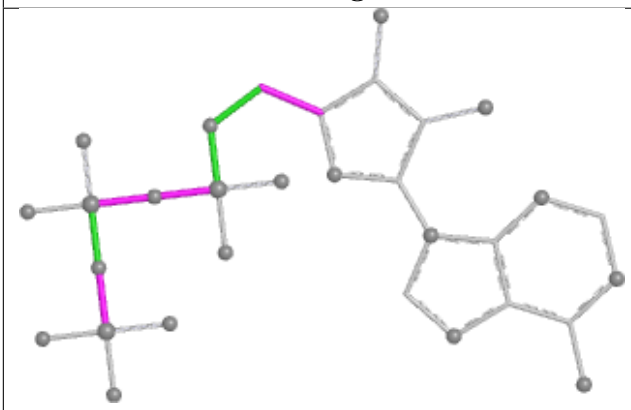
Ligand ATP A 5301



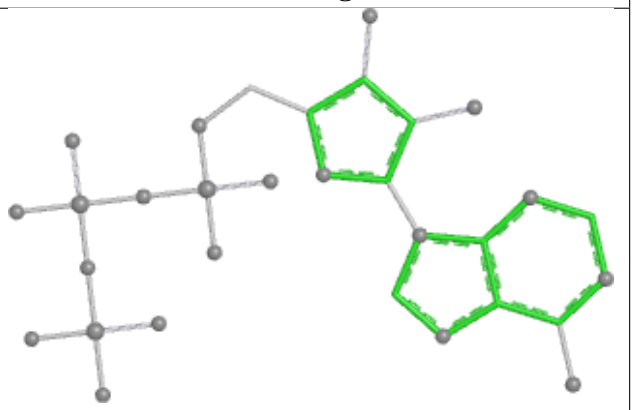
Bond lengths



Bond angles

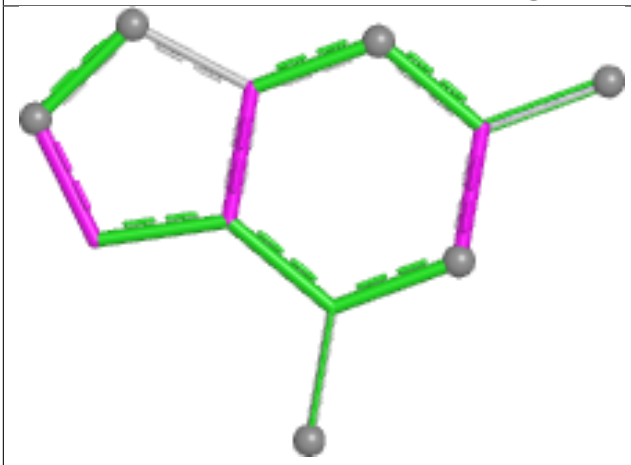


Torsions

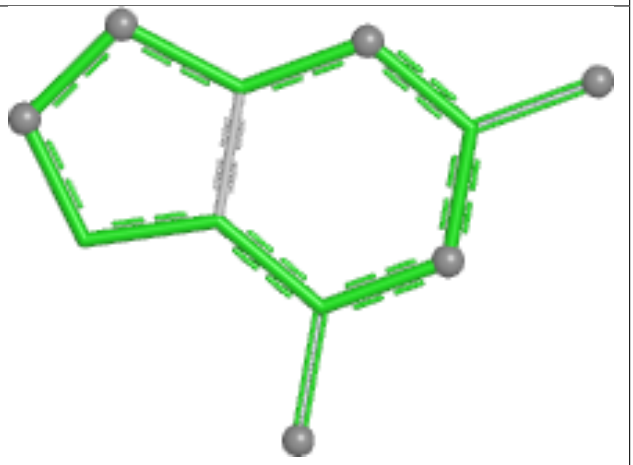


Rings

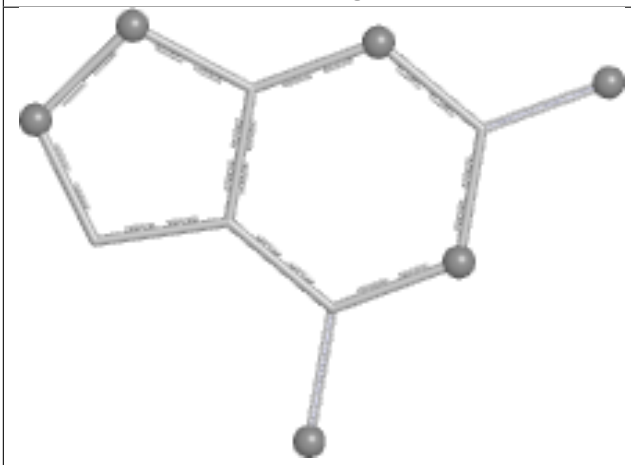
Ligand 141 D 5304



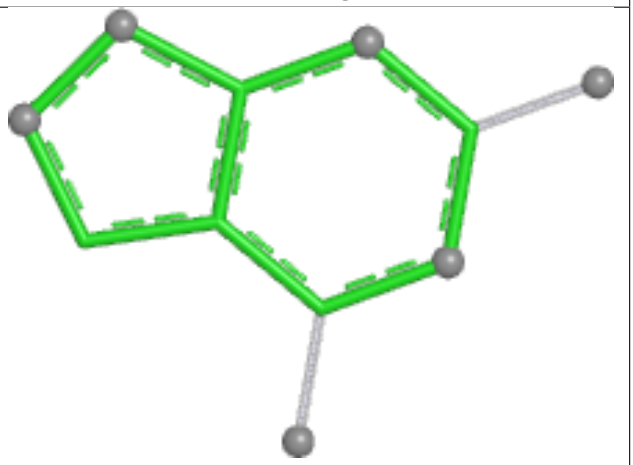
Bond lengths



Bond angles

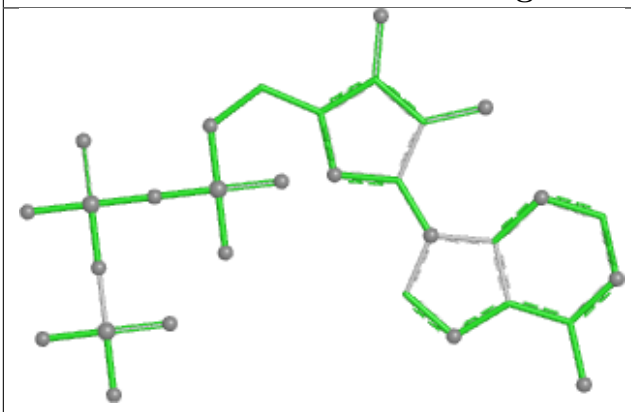


Torsions

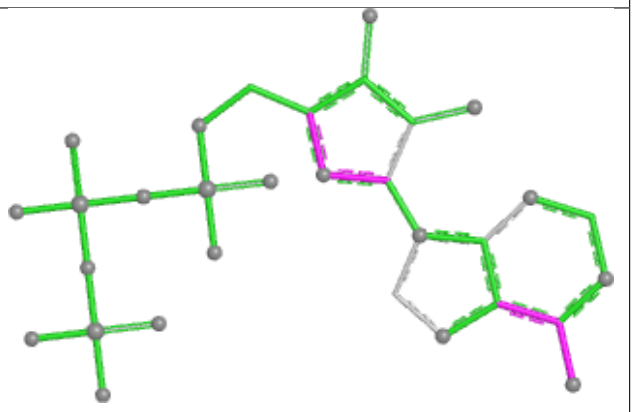


Rings

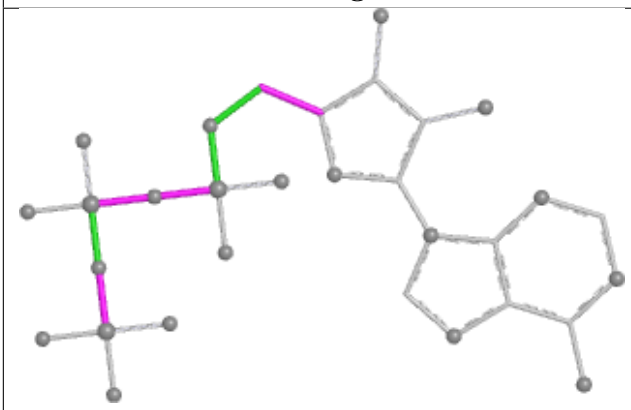
Ligand ATP B 5301



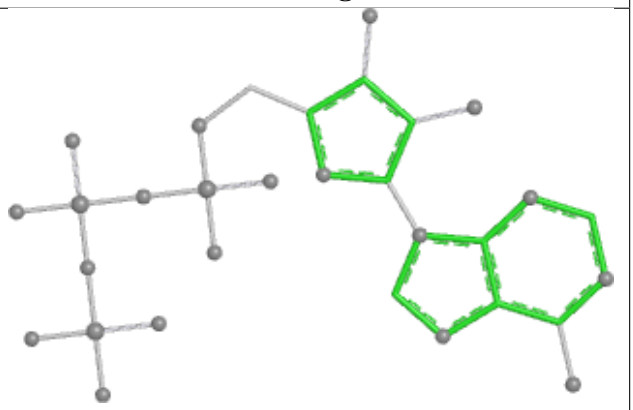
Bond lengths



Bond angles

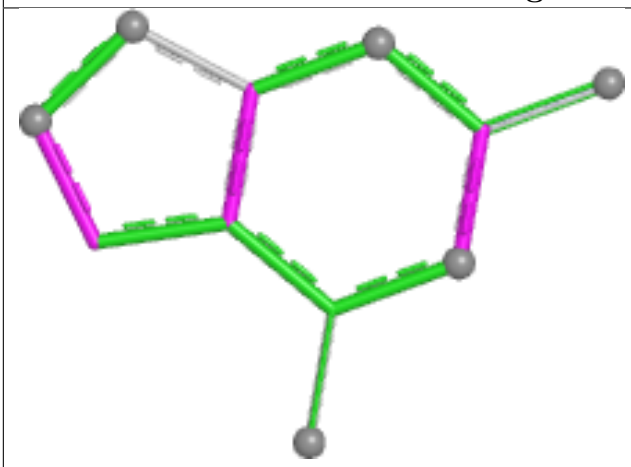


Torsions

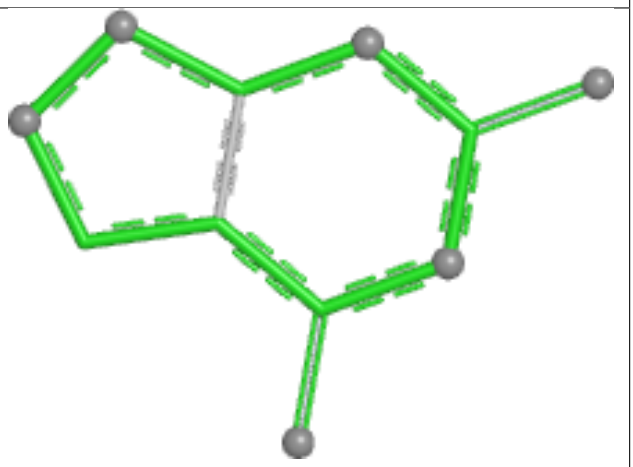


Rings

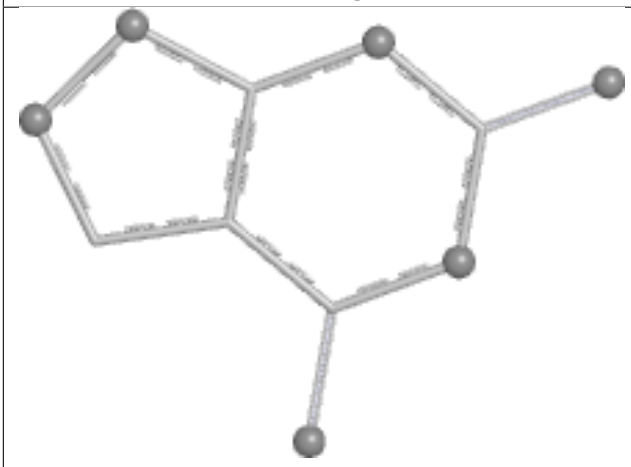
Ligand 141 B 5304



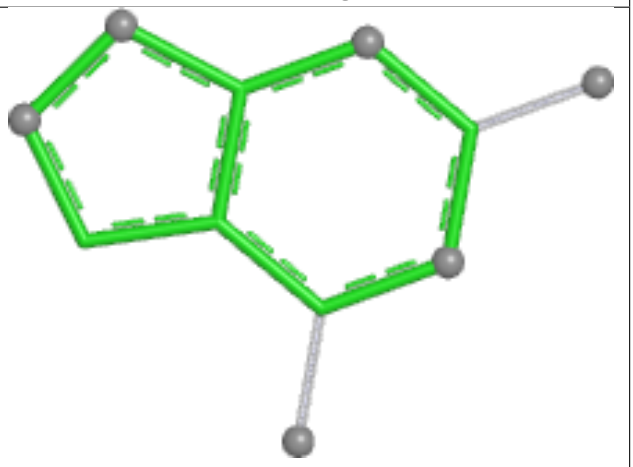
Bond lengths



Bond angles

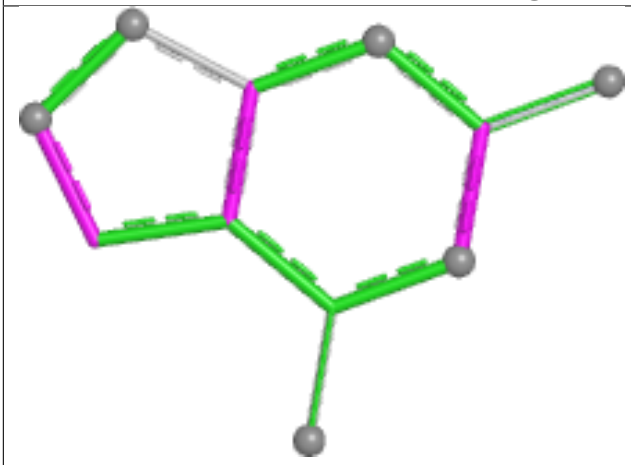


Torsions

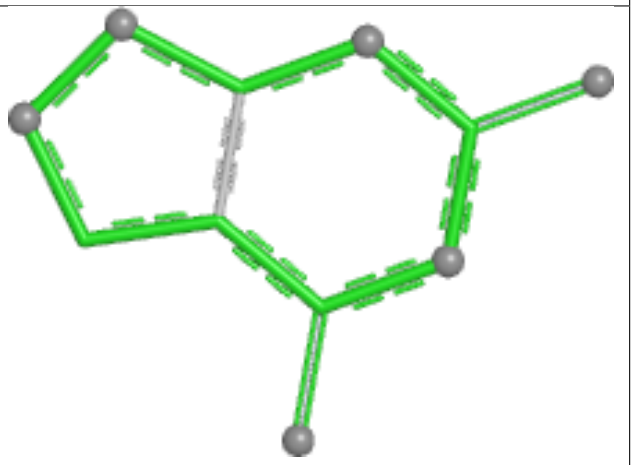


Rings

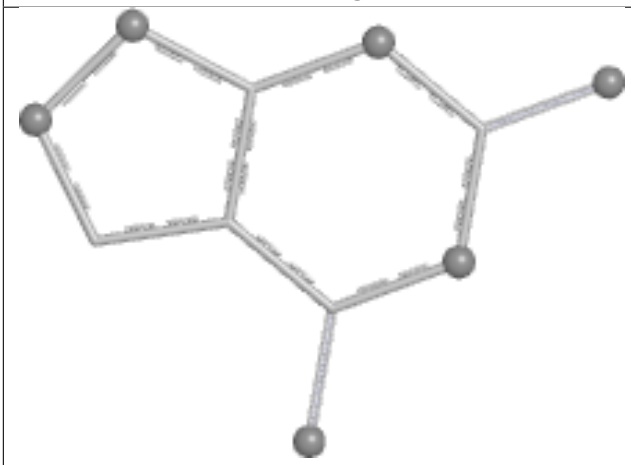
Ligand 141 C 5304



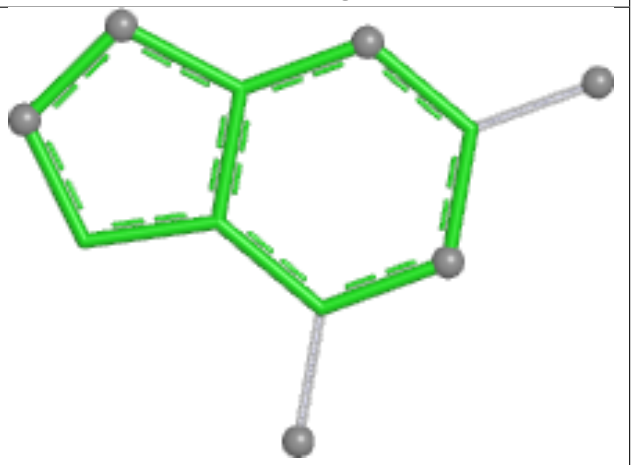
Bond lengths



Bond angles

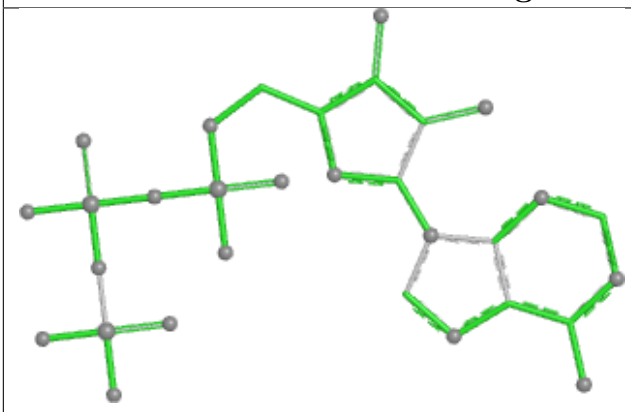


Torsions

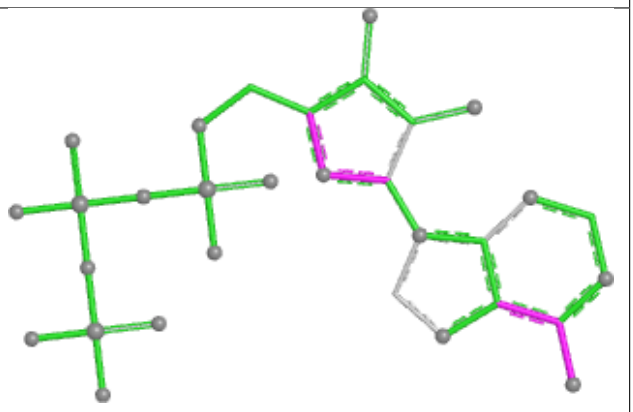


Rings

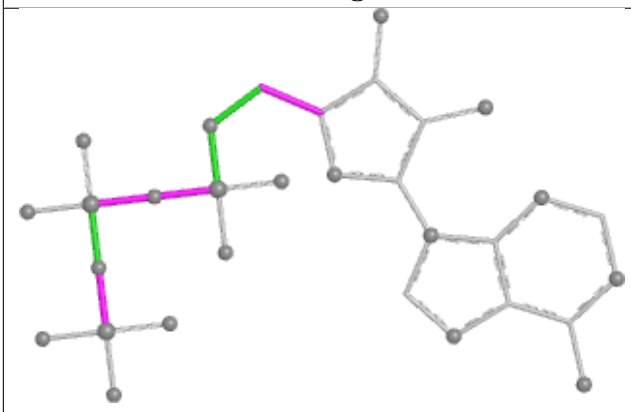
Ligand ATP D 5301



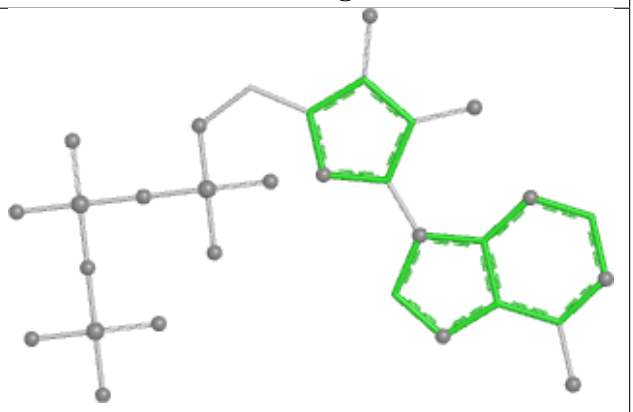
Bond lengths



Bond angles

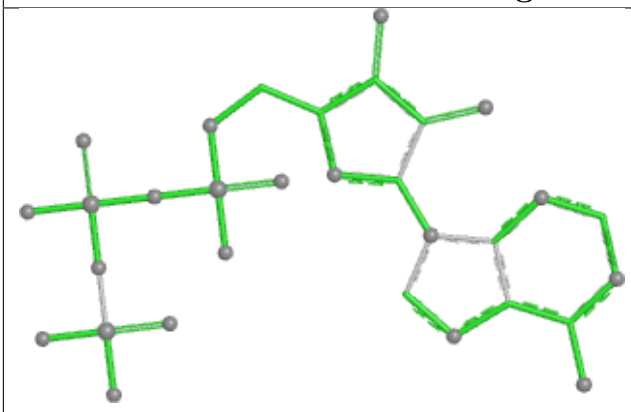


Torsions

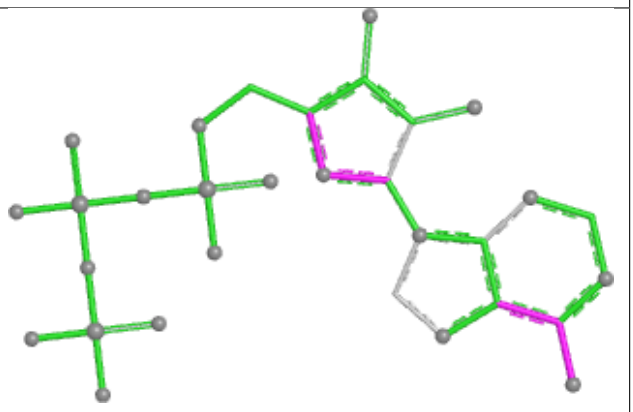


Rings

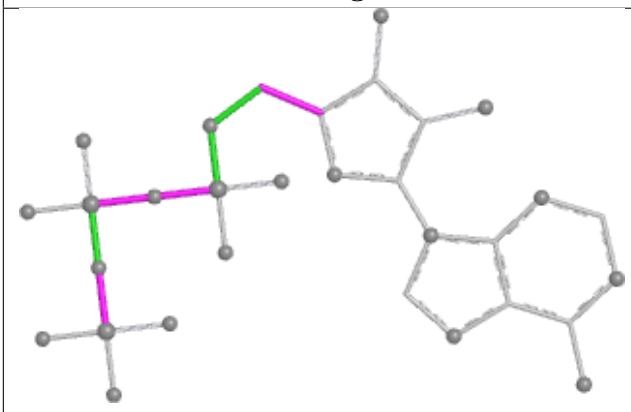
Ligand ATP C 5301



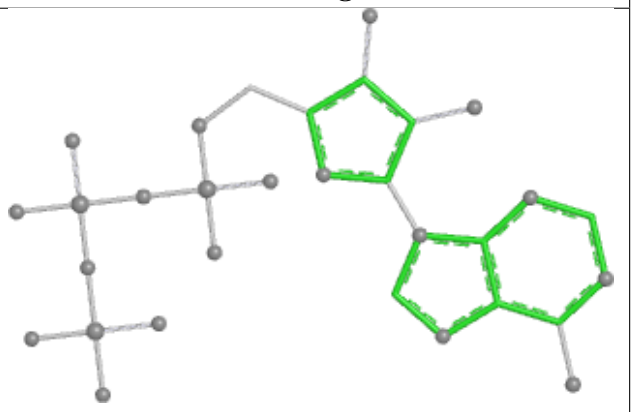
Bond lengths



Bond angles

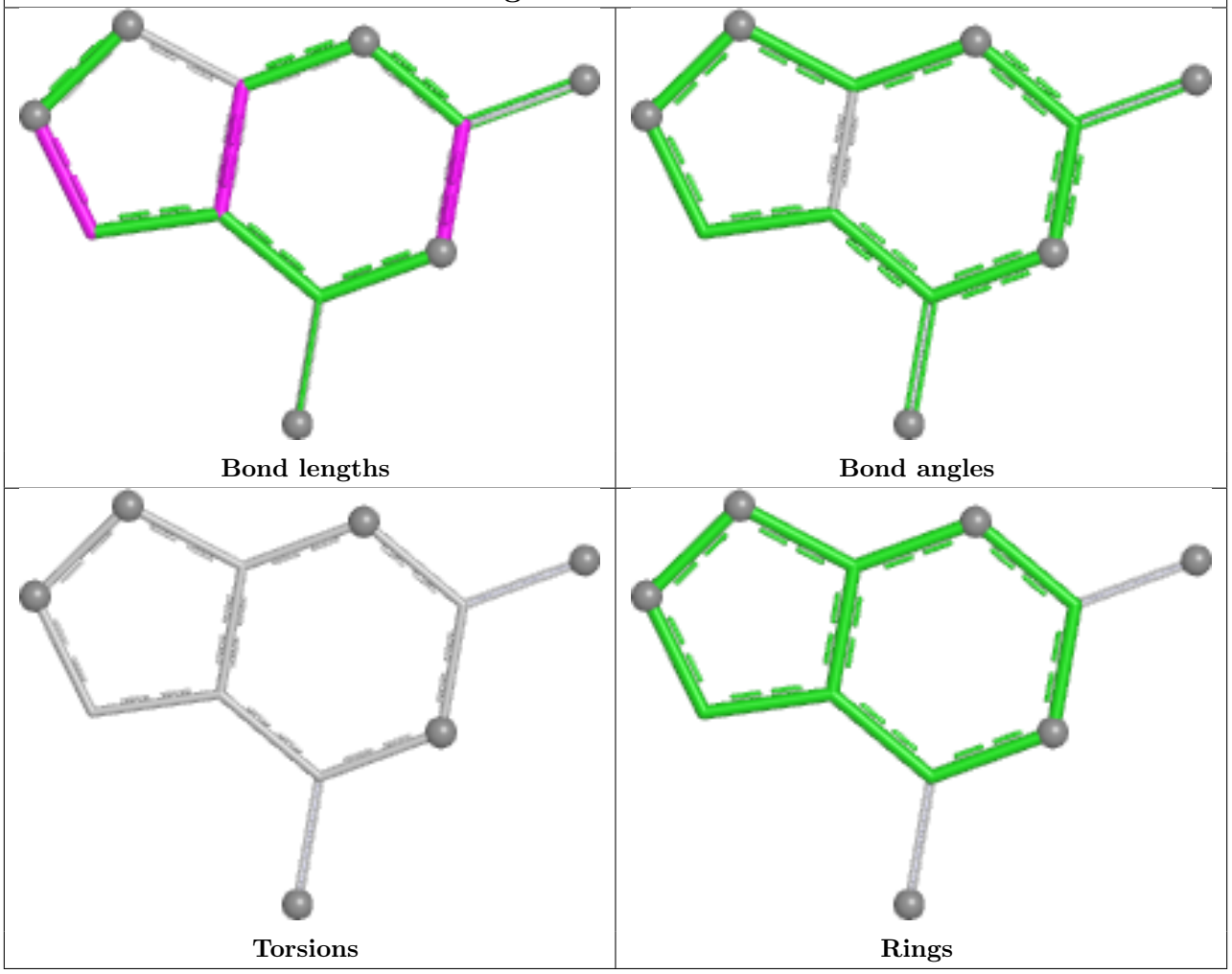


Torsions



Rings

Ligand 141 A 5304



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.

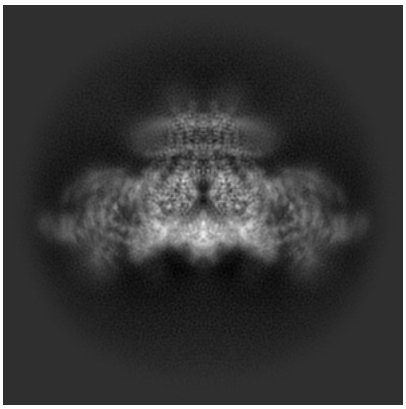
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-47393. These allow visual inspection of the internal detail of the map and identification of artifacts.

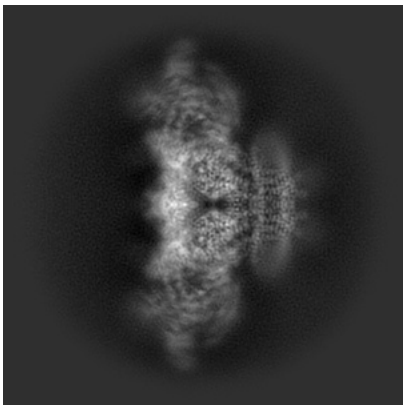
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

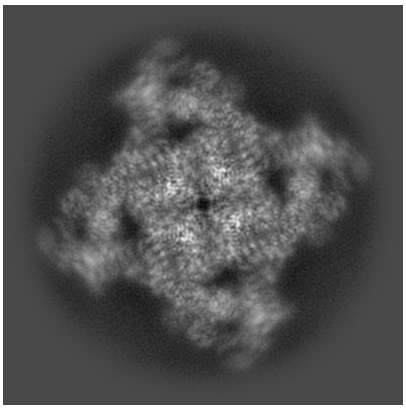
6.1.1 Primary map



X

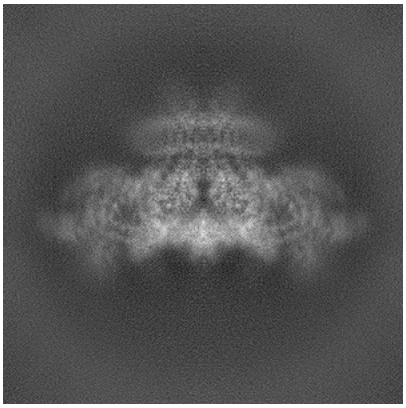


Y

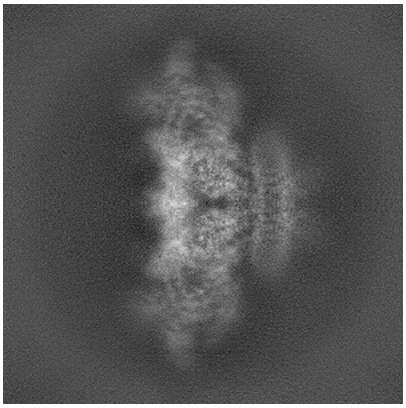


Z

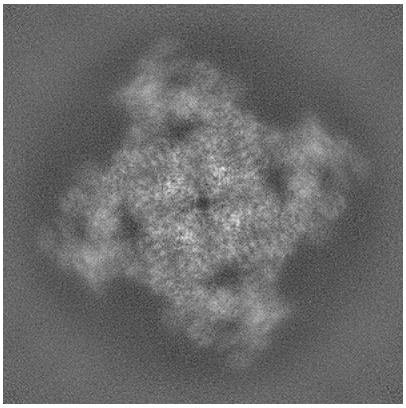
6.1.2 Raw map



X



Y

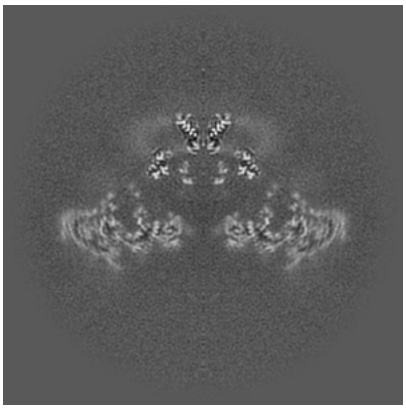


Z

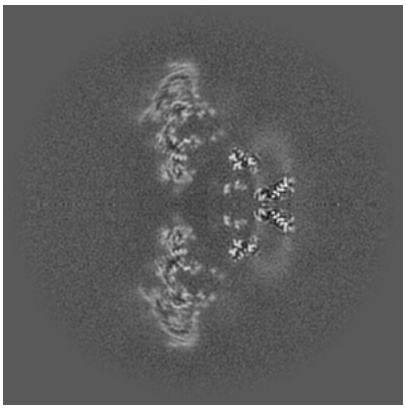
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

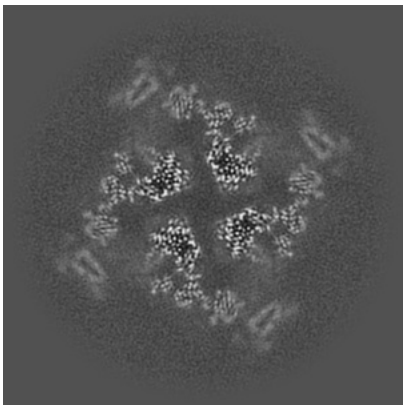
6.2.1 Primary map



X Index: 256

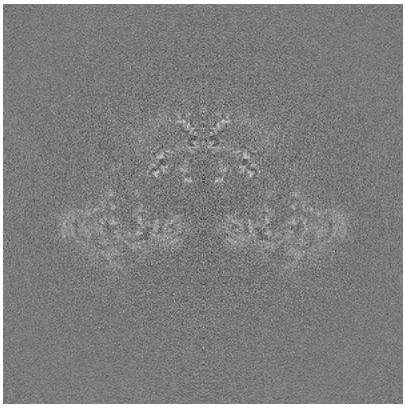


Y Index: 256

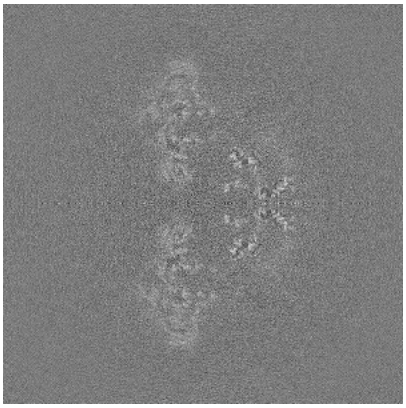


Z Index: 256

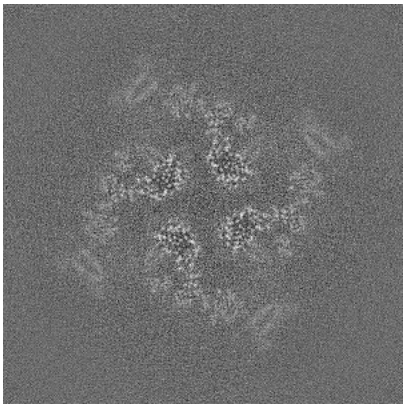
6.2.2 Raw map



X Index: 256



Y Index: 256

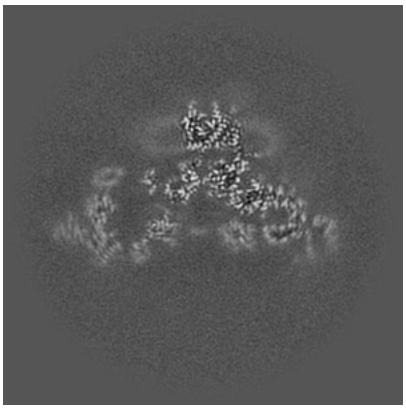


Z Index: 256

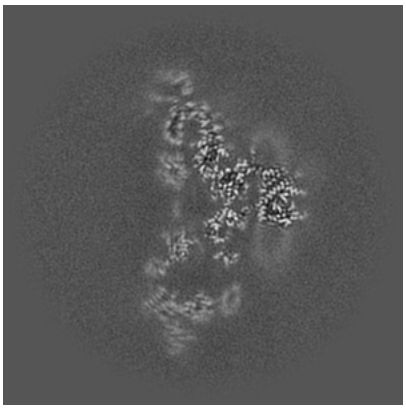
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

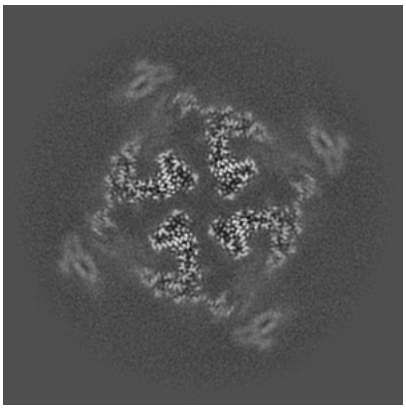
6.3.1 Primary map



X Index: 273

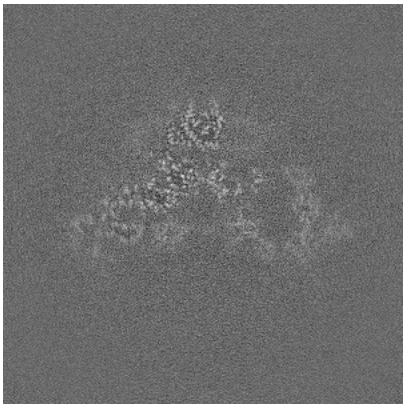


Y Index: 239

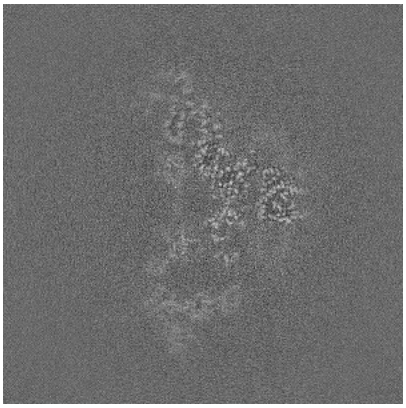


Z Index: 265

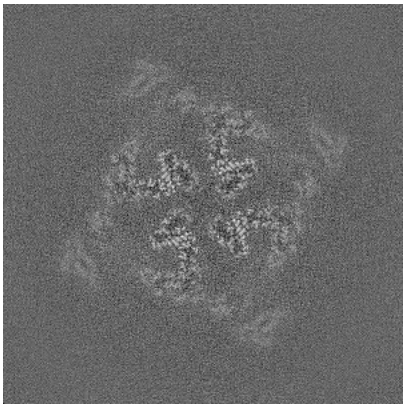
6.3.2 Raw map



X Index: 239



Y Index: 239

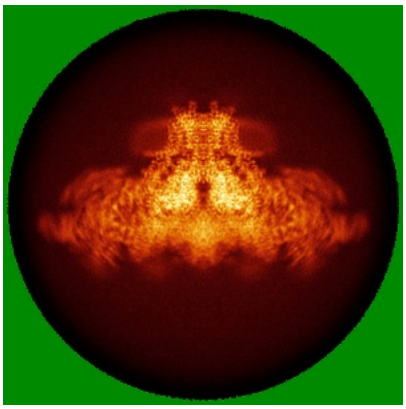


Z Index: 266

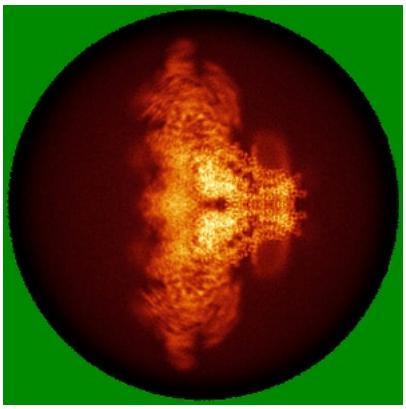
The images above show the largest variance slices of the map in three orthogonal directions.

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

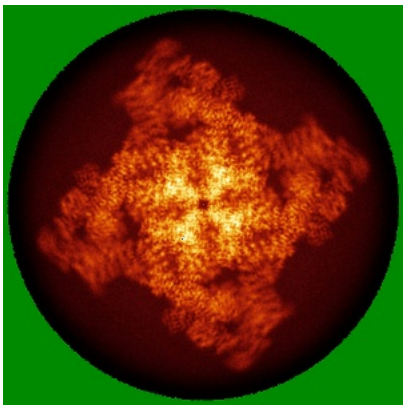
6.4.1 Primary map



X

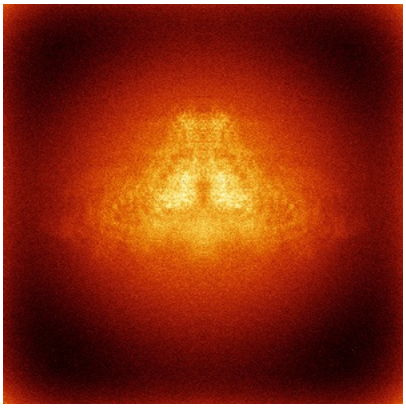


Y

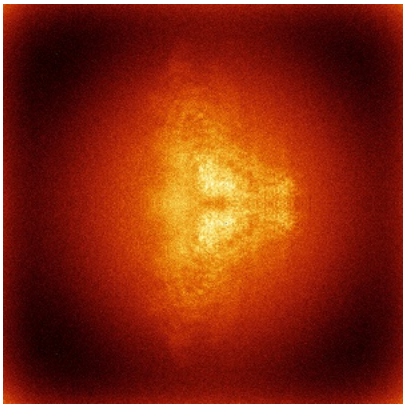


Z

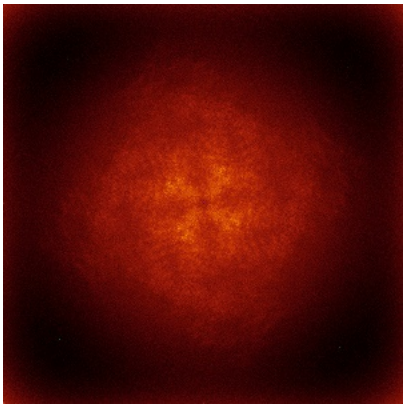
6.4.2 Raw map



X



Y

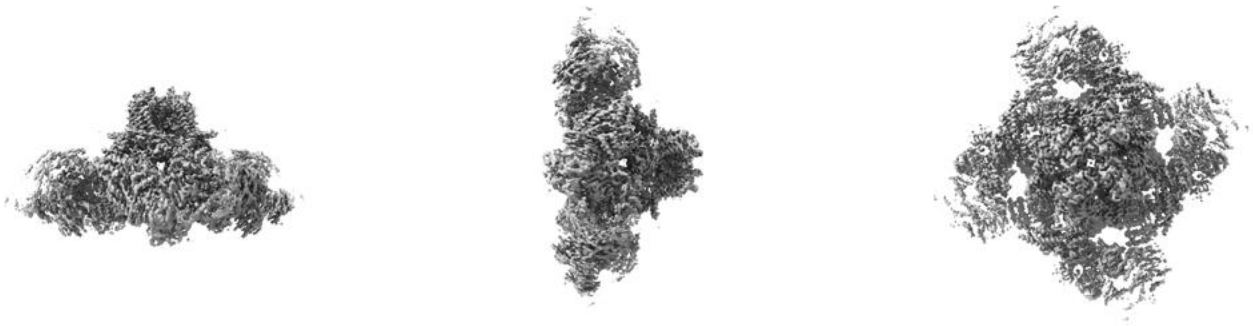


Z

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)

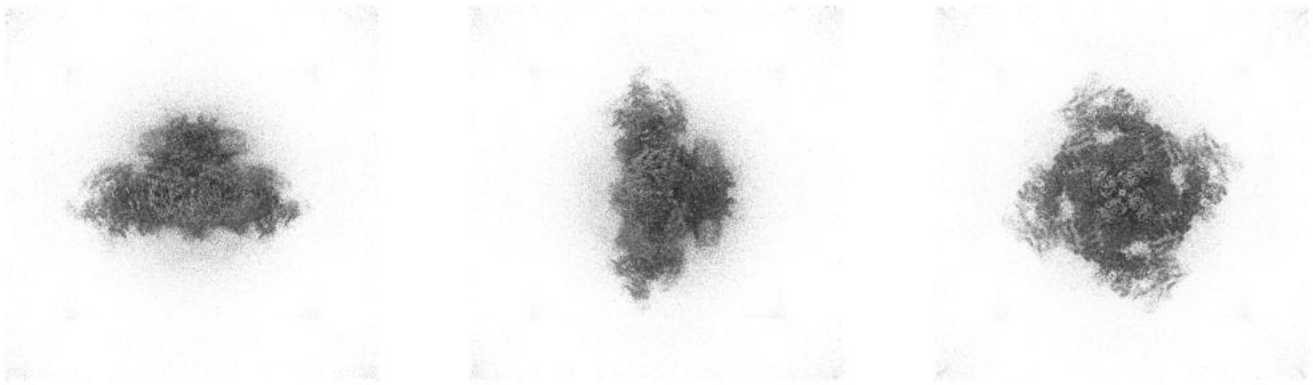
6.5.1 Primary map



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.

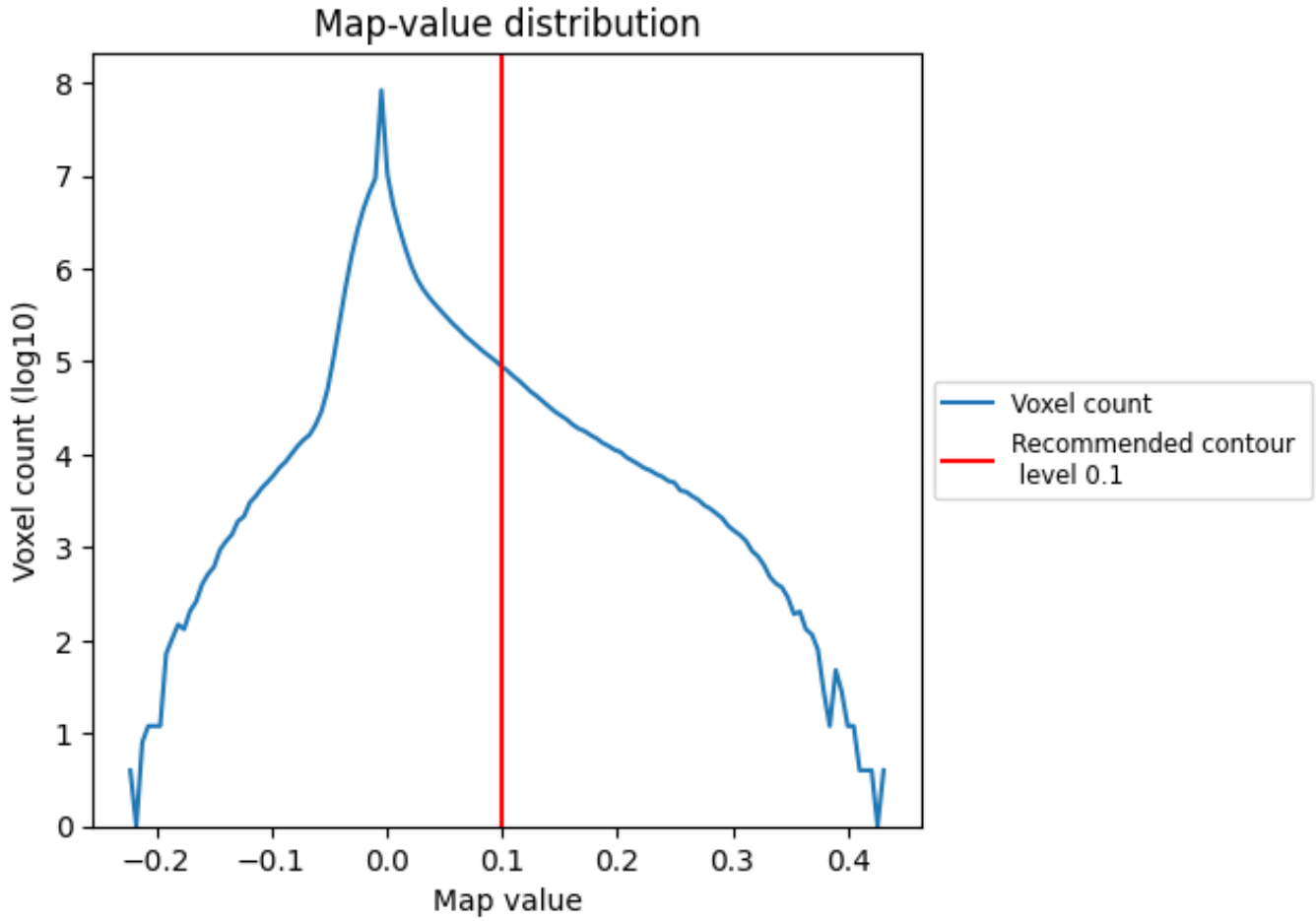
6.6 Mask visualisation (i)

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

7 Map analysis

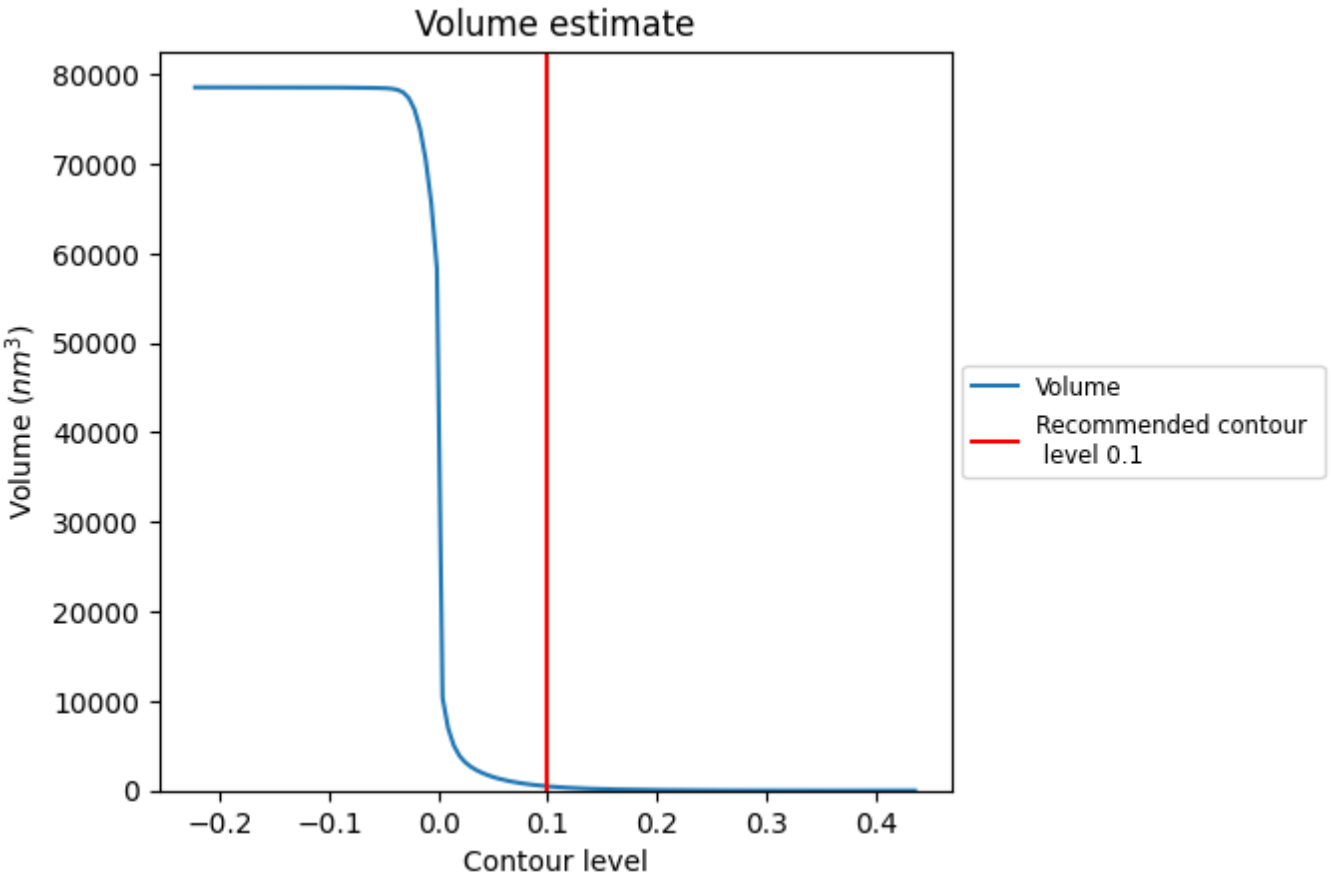
This section contains the results of statistical analysis of the map.

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.

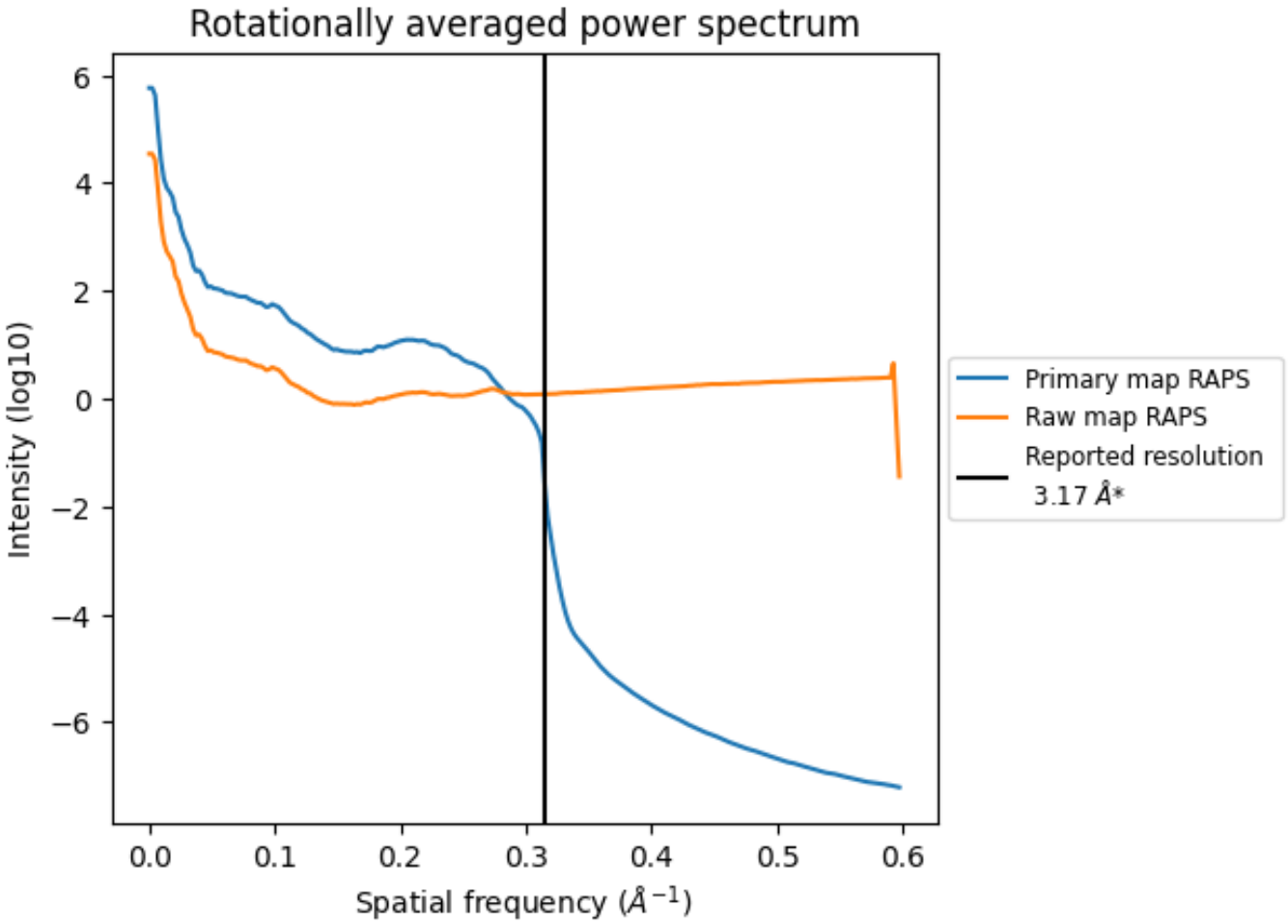
7.2 Volume estimate (i)



The volume at the recommended contour level is 477 nm^3; this corresponds to an approximate mass of 431 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)

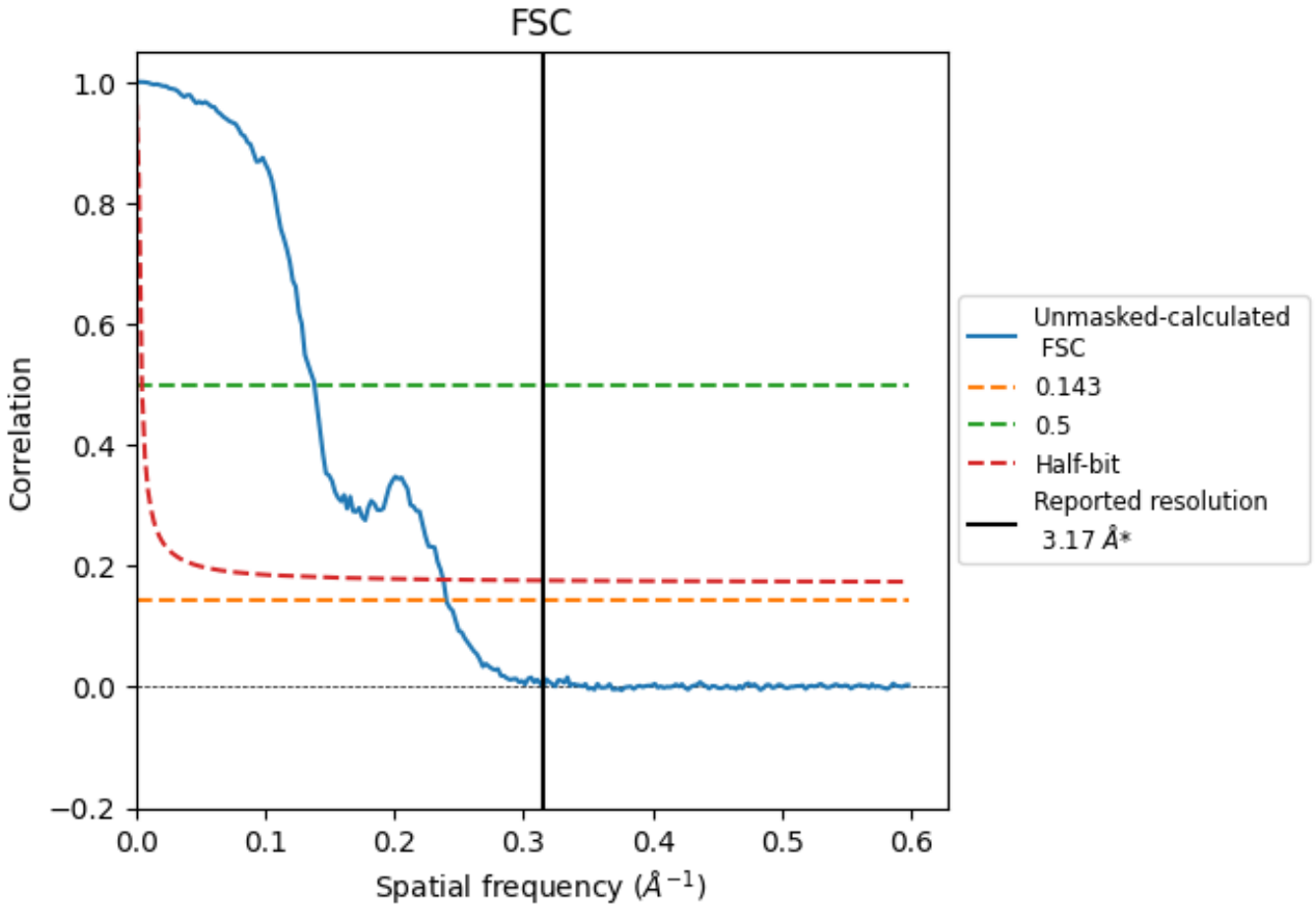


*Reported resolution corresponds to spatial frequency of 0.315 Å^{-1}

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 0.315 Å^{-1}

8.2 Resolution estimates (i)

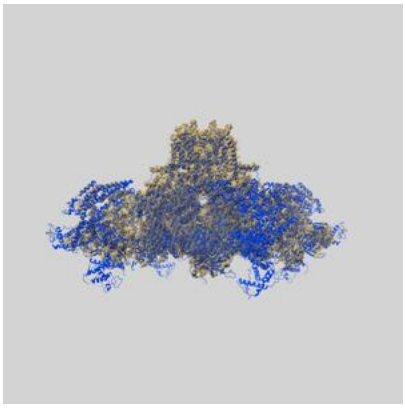
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.17	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.16	7.24	4.21

*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 4.16 differs from the reported value 3.17 by more than 10 %

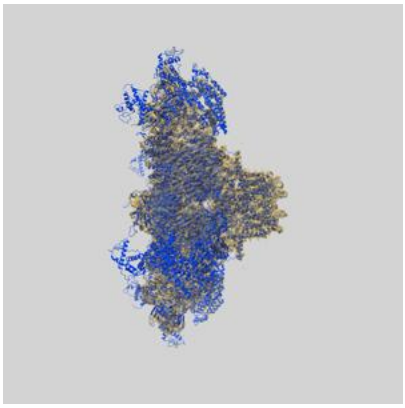
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-47393 and PDB model 9E1G. Per-residue inclusion information can be found in section 3 on page 7.

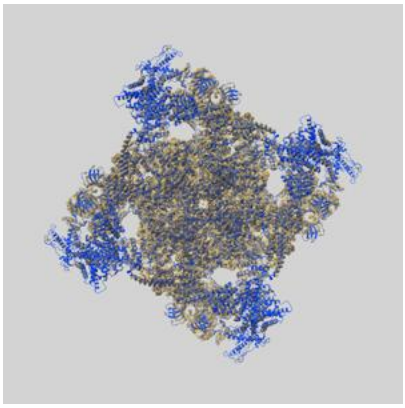
9.1 Map-model overlay



X



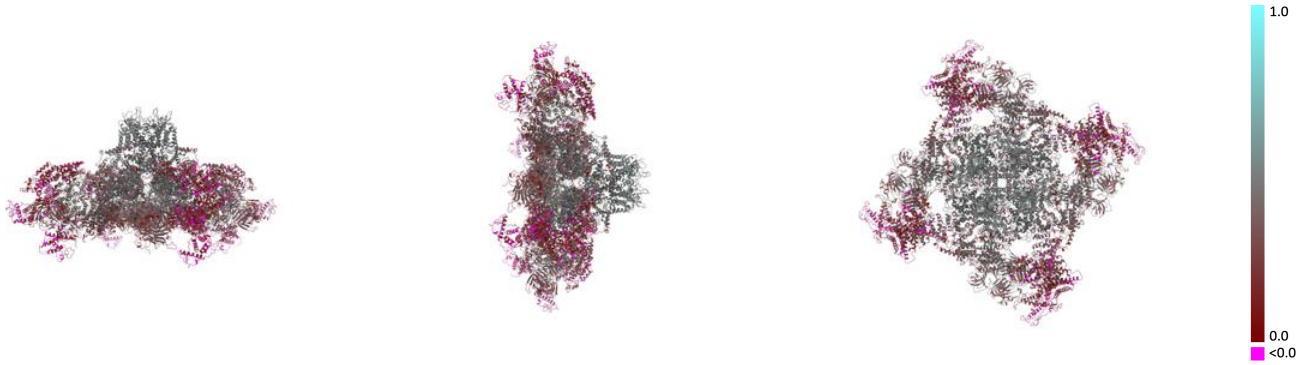
Y



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.

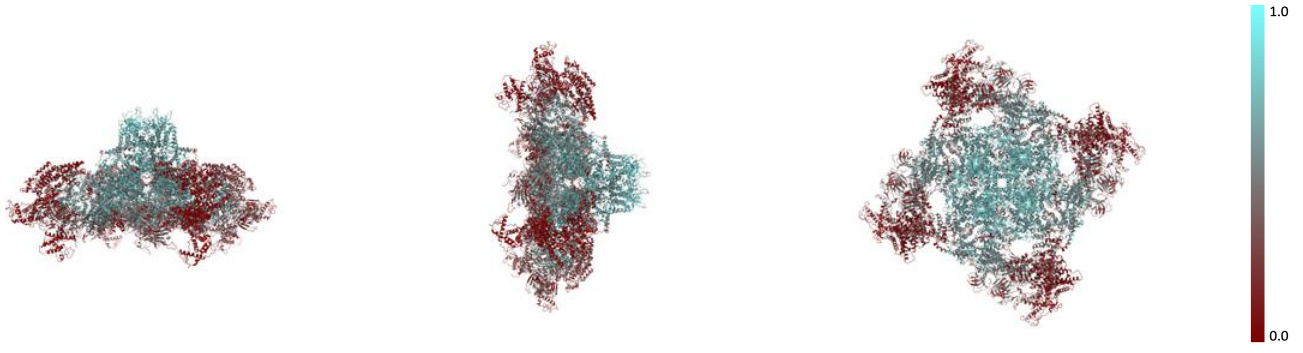
9.2 Q-score mapped to coordinate model



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.

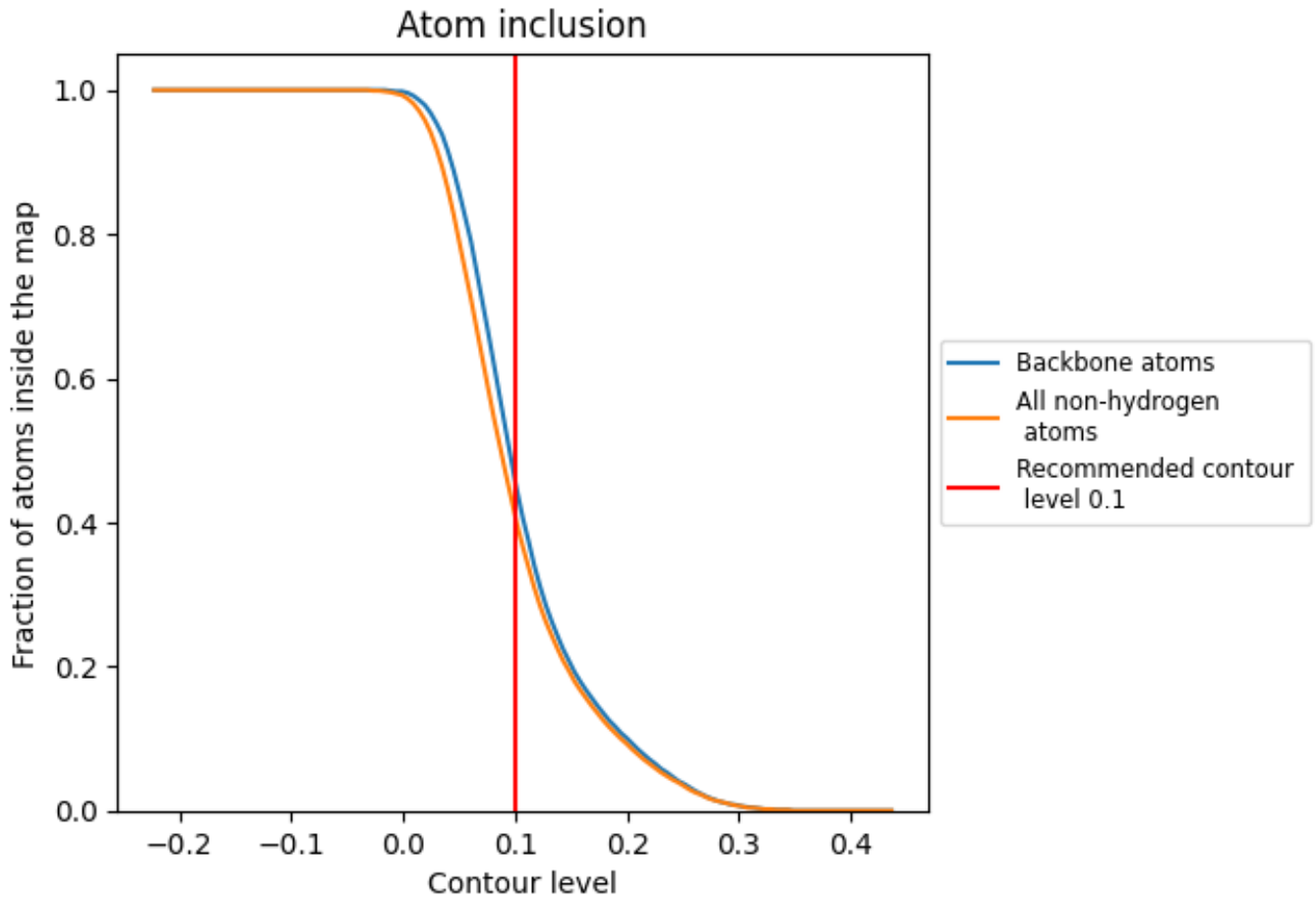
9.3 Atom inclusion mapped to coordinate model



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, 46% of all backbone atoms, 41% 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 (0.1) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4080	0.3230
A	0.4200	0.3260
B	0.4200	0.3210
C	0.4200	0.3210
D	0.4200	0.3210
E	0.2860	0.3640
F	0.2850	0.3620
G	0.2850	0.3570
H	0.2860	0.3640