wwPDB EM Validation Summary Report

Nov 5, 2024 – 10:45 AM EST

PDB ID	:	9E19
EMDB ID	:	EMD-47386
Title	:	Structure of RyR1 in the open state in the presence of pentoxifylline
Authors	:	Miotto, M.C.; Marks, A.R.
Deposited on	:	2024-10-21
Resolution	:	4.04 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:

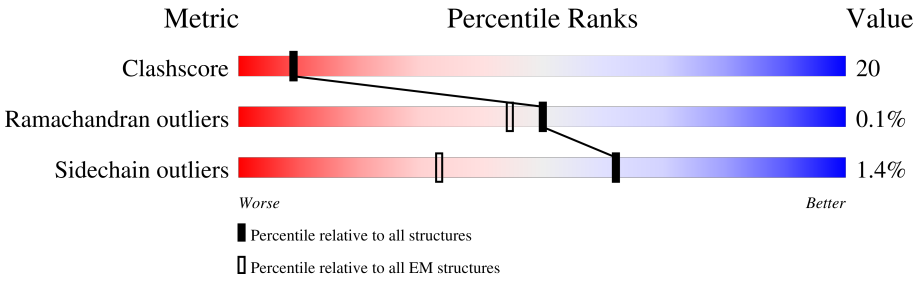
EMDB validation analysis	:	0.0.1.dev113
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA,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

1 Overall quality at a glance

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

The reported resolution of this entry is 4.04 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	41% 50% 37% • 13%
1	B	5037	42% 50% 37% • 13%
1	C	5037	41% 50% 36% • 13%
1	D	5037	41% 51% 36% • 13%
2	E	108	82% 62% 34% • •
2	F	108	86% 63% 33% • •
2	G	108	83% 61% 35% • •
2	H	108	82% 60% 36% • •

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 144136 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.

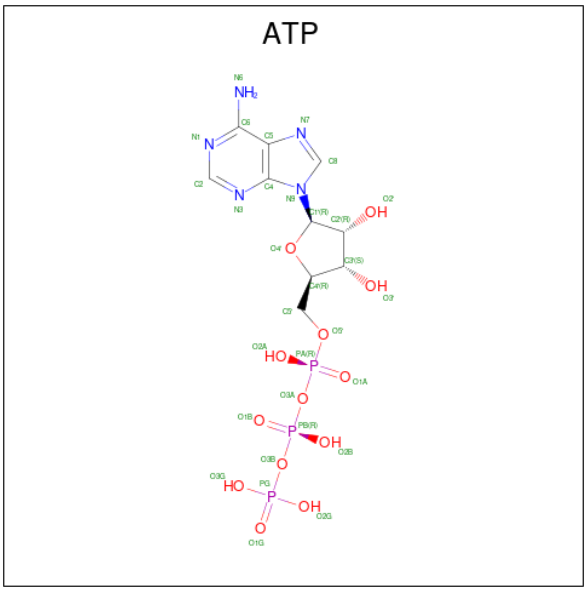
- Molecule 1 is a protein called Ryanodine receptor 1.

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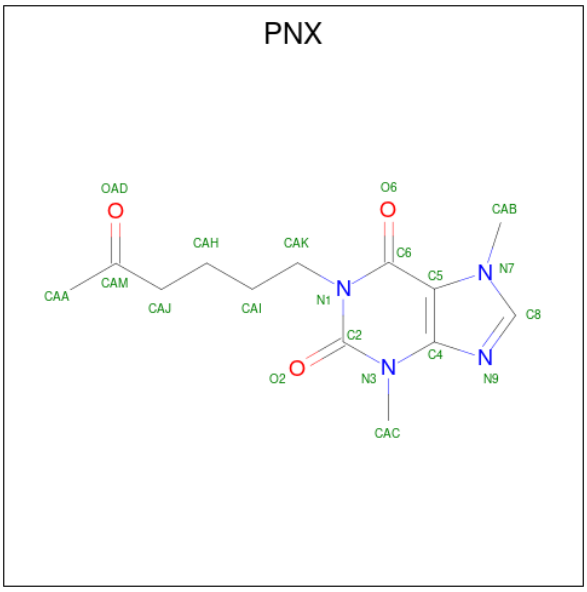
Mol	Chain	Residues	Atoms	AltConf
5	B	1	Total Zn 1 1	0
5	D	1	Total Zn 1 1	0
5	C	1	Total Zn 1 1	0

- Molecule 6 is 3,7-DIMETHYL-1-(5-OXOHEXYL)-3,7-DIHYDRO-1H-PURINE-2,6-DI ONE (three-letter code: PNX) (formula: $C_{13}H_{18}N_4O_3$) (labeled as "Ligand of Interest" by depositor).



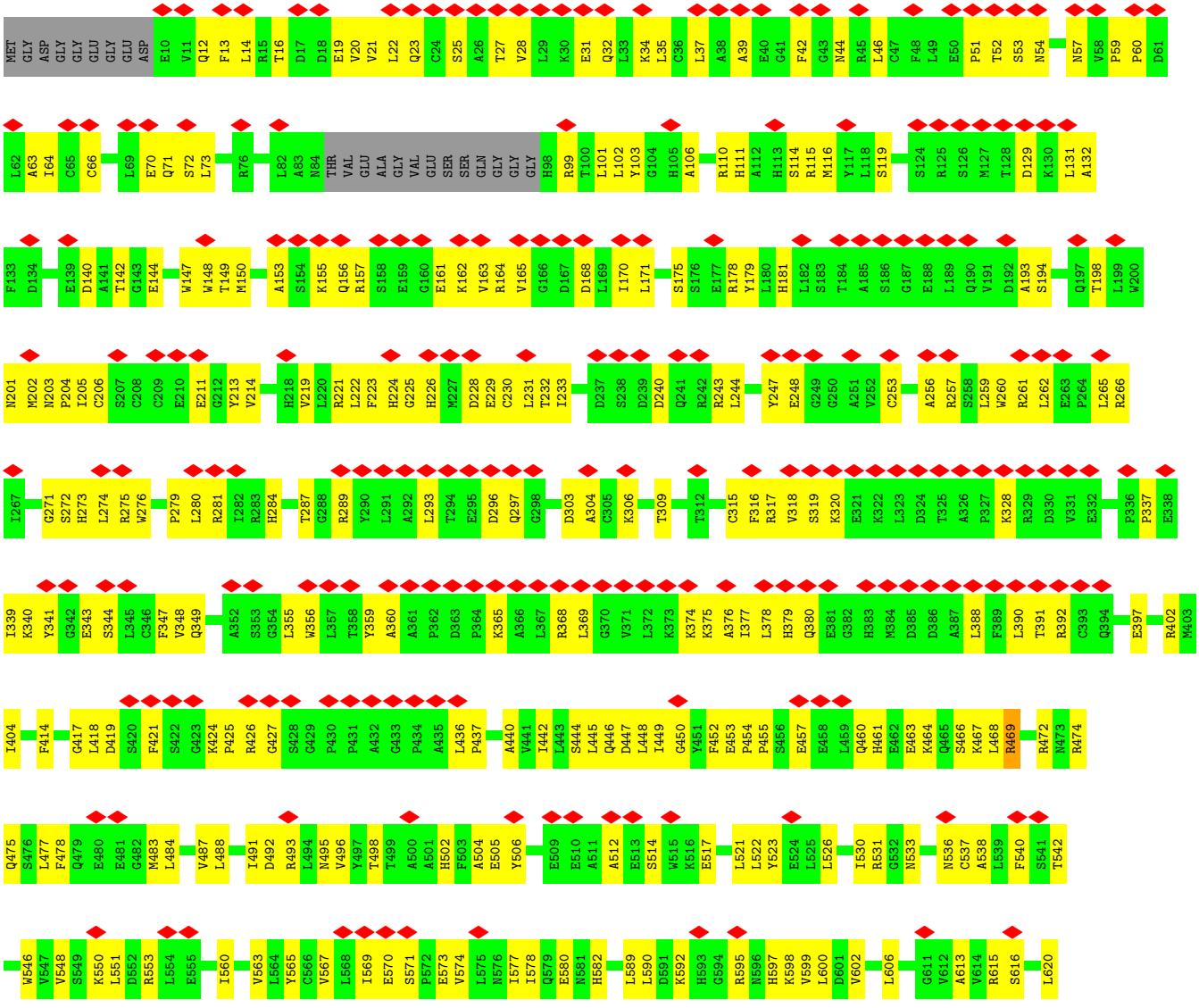
Mol	Chain	Residues	Atoms	AltConf
6	A	1	Total C N O 20 13 4 3	0
6	B	1	Total C N O 20 13 4 3	0
6	D	1	Total C N O 20 13 4 3	0
6	C	1	Total C N O 20 13 4 3	0

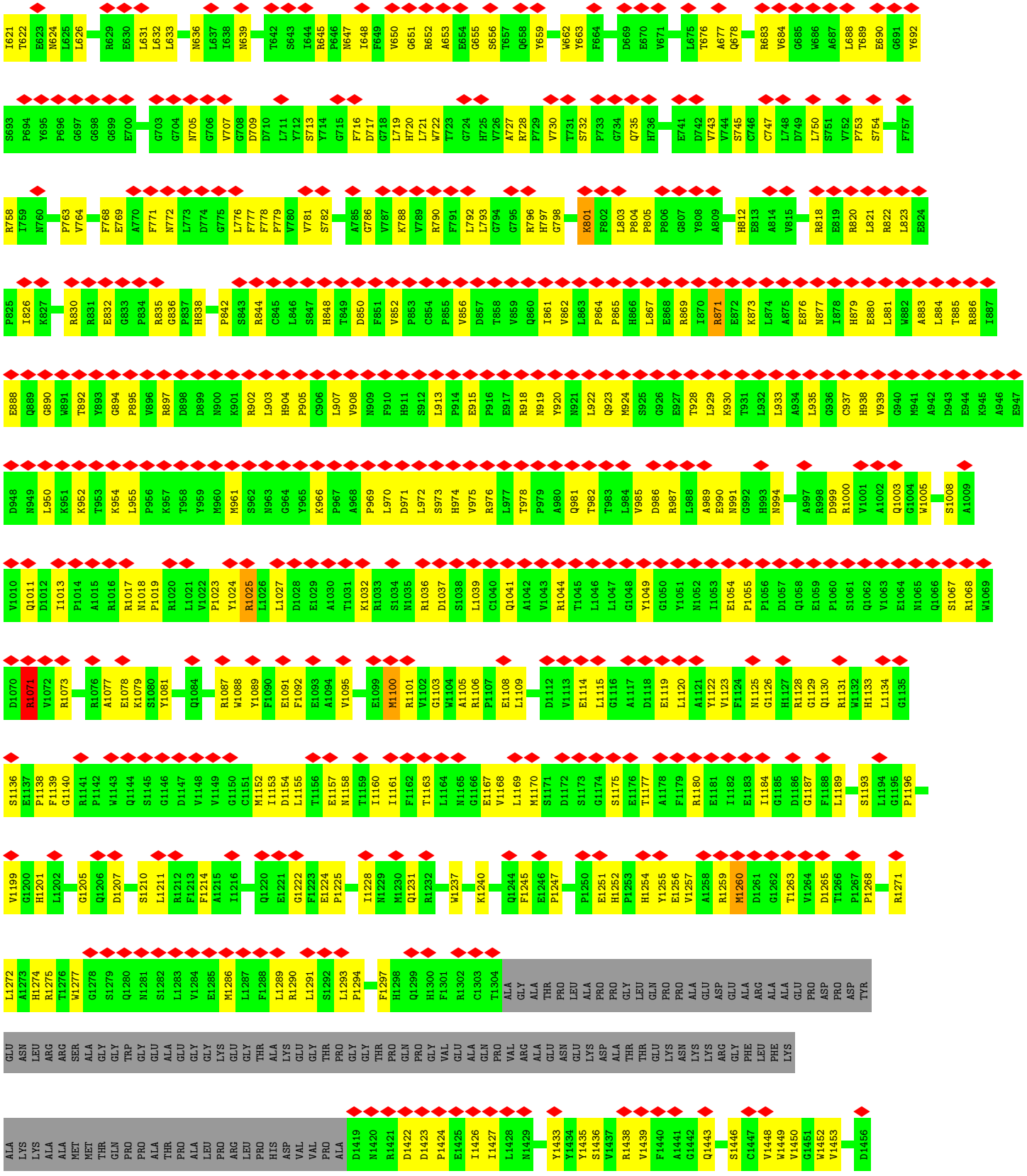
3 Residue-property plots (i)

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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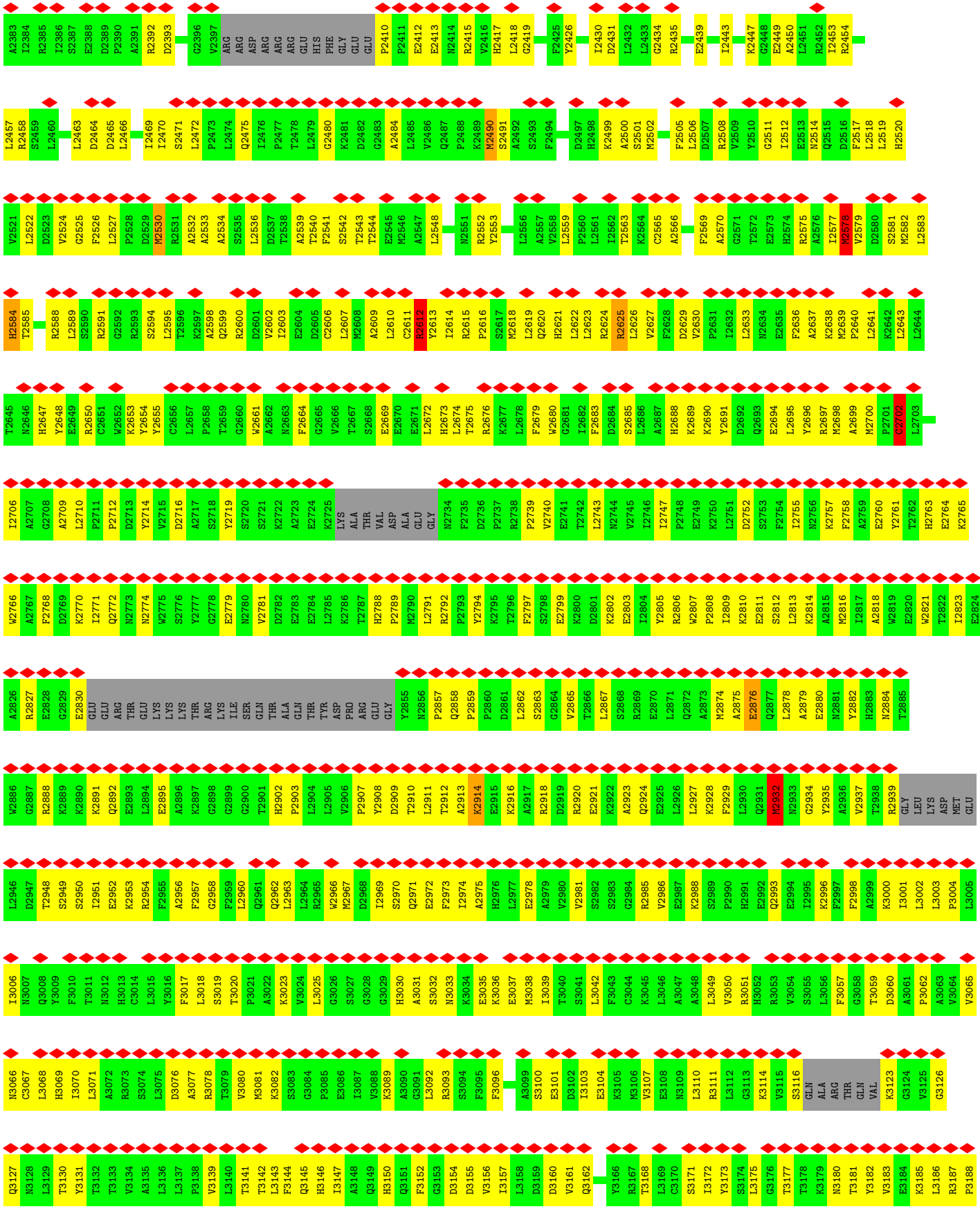
S693 P694 Y695 P696 G697 G698 G699 E700 G703 G704 N705 G706 V707 G708 D709 D710 L711 Y712 S713 Y714 G715 F716 D717 G718 L719 H720 L721 W722 T723 G724 H725 V726 A727 R728 P729 V730 T731 S732 P733 G734 Q735 H736 E741 D742 V743 V744 S745 C746 C747 L748 D749 L750 S751 V752 P753 S754 F757
R758 I759 N760 P763 V764 F768 E769 A770 F771 N772 L773 D774 G775 L776 F777 F778 P779 V780 V781 S782 A785 G786 V787 K788 V789 R790 F791 L792 L793 G794 G795 R796 H797 G798 K801 P802 L803 P804 P805 P806 G807 Y808 A809 H812 E813 A814 V815 R818 E819 R820 L821 R822 L823 E824
P825 I826 K827 R830 R831 E832 G833 P834 R835 G836 P837 H838 P842 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 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 N991 G992 H993 N994 A997 R998 D999 R1000 V1001 A1002 Q1003 G1004 W1005 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 R1073 R1076 A1077 E1078 K1079 S1080 Y1081 Q1084 R1087 W1088 Y1089 F1090 E1091 F1092 E1093 A1094 V1095 E1099 M1100 R1101 V1102 G1103 W1104 A1105 R1106 P1107 E1108 L1109 D1112 V1113 E1114 L1115 G1116 A1117 D1118 E1119 L1120 A1121 Y1122 V1123 F1124 N1125 G1126 H1127 R1128 G1129 Q1130 R1131 W1132 H1133 L1134 G1135
S1136 E1137 P1138 F1139 G1140 R1141 P1142 W1143 Q1144 S1145 G1146 D1147 V1148 V1149 G1150 C1151 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 S1193 L1194 G1195 P1196
V1199 G1200 H1201 L1202 G1205 Q1206 D1207 S1210 L1211 R1212 F1213 F1214 A1215 I1216 Q1220 E1221 G1222 F1223 E1224 P1225 I1228 N1229 M1230 Q1231 R1232 W1237 K1240 Q1244 F1245 E1246 P1247 P1250 E1251 H1252 P1253 H1254 Y1255 E1256 V1257 A1258 R1259 M1260 D1261 G1262 T1263 V1264 D1265 T1266 P1267 P1268 R1271
L1272 A1273 H1274 R1275 T1276 W1277 G1278 S1279 Q1280 N1281 S1282 L1283 V1284 E1285 M1286 L1287 F1288 L1289 R1290 L1291 S1292 L1293 P1294 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 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 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 Y1433 Y1434 Y1435 S1436 V1437 R1438 V1439 F1440 A1441 G1442 Q1443 S1446 C1447 V1448 W1449 V1450 G1451 W1452 V1453 D1456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L2457 R2458 S2459 L2460 L2463 D2464 D2465 L2466 I2469 I2470 S2471 L2472 P2473 L2474 Q2475 I2476 P2477 T2478 L2479 G2480 K2481 D2482 G2483 A2484 L2485 V2486 Q2487 P2488 K2489 M2490 S2491 A2492 S2493 F2494 D2497 H2498 K2499 A2500 S2501 M2502 F2505 L2506 D2507 R2508 V2509 Y2510 G2511 I2512 E2513 N2514 Q2515 D2516 F2517 L2518 L2519 H2520
V2521 L2522 D2523 V2524 G2525 F2526 L2527 P2528 D2529 M2530 R2531 A2532 A2533 A2534 S2535 L2536 D2537 T2538 A2539 T2540 F2541 S2542 T2543 T2544 E2545 M2546 A2547 L2548 N2551 R2552 Y2553 L2556 A2557 V2558 L2559 P2560 L2561 I2562 T2563 K2564 C2565 A2566 F2569 A2570 G2571 T2572 E2573 H2574 R2575 A2576 I2577 W2578 V2579 D2580 S2581 M2582 L2583
H2584 T2585 R2588 L2589 S2590 R2591 G2592 R2593 S2594 L2595 T2596 K2597 A2598 Q2599 R2600 D2601 V2602 I2603 E2604 D2605 C2606 L2607 M2608 A2609 L2610 C2611 R2612 Y2613 I2614 R2615 P2616 S2617 M2618 L2619 Q2620 H2621 L2622 L2623 R2624 R2625 L2626 V2627 F2628 D2629 V2630 P2631 I2632 L2633 N2634 E2635 F2636 A2637 K2638 M2639 P2640 L2641 K2642 L2643 L2644
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W2886 G2887 R2888 K2889 K2890 K2891 Q2892 E2893 L2894 E2895 A2896 K2897 G2898 G2899 G2900 T2901 H2902 P2903 L2904 L2905 V2906 P2907 Y2908 D2909 T2910 L2911 T2912 A2913 K2914 E2915 K2916 A2917 R2918 D2919 R2920 E2921 K2922 A2923 Q2924 E2925 L2926 L2927 K2928 F2929 L2930 Q2931 M2932 N2933 G2934 Y2935 A2936 V2937 T2938 R2939 GLY LEU LYS ASP MET GLU
L2946 D2947 T2948 S2949 S2950 I2951 E2952 K2953 R2954 F2955 A2956 F2957 G2958 F2959 L2960 Q2961 Q2962 L2963 L2964 R2965 W2966 M2967 D2968 I2969 S2970 Q2971 E2972 F2973 I2974 A2975 H2976 L2977 E2978 A2979 V2980 V2981 S2982 S2983 G2984 R2985 V2986 E2987 K2988 S2989 P2990 H2991 E2992 Q2993 E2994 I2995 K2996 F2997 F2998 A2999 K3000 I3001 L3002 L3003 P3004 L3005
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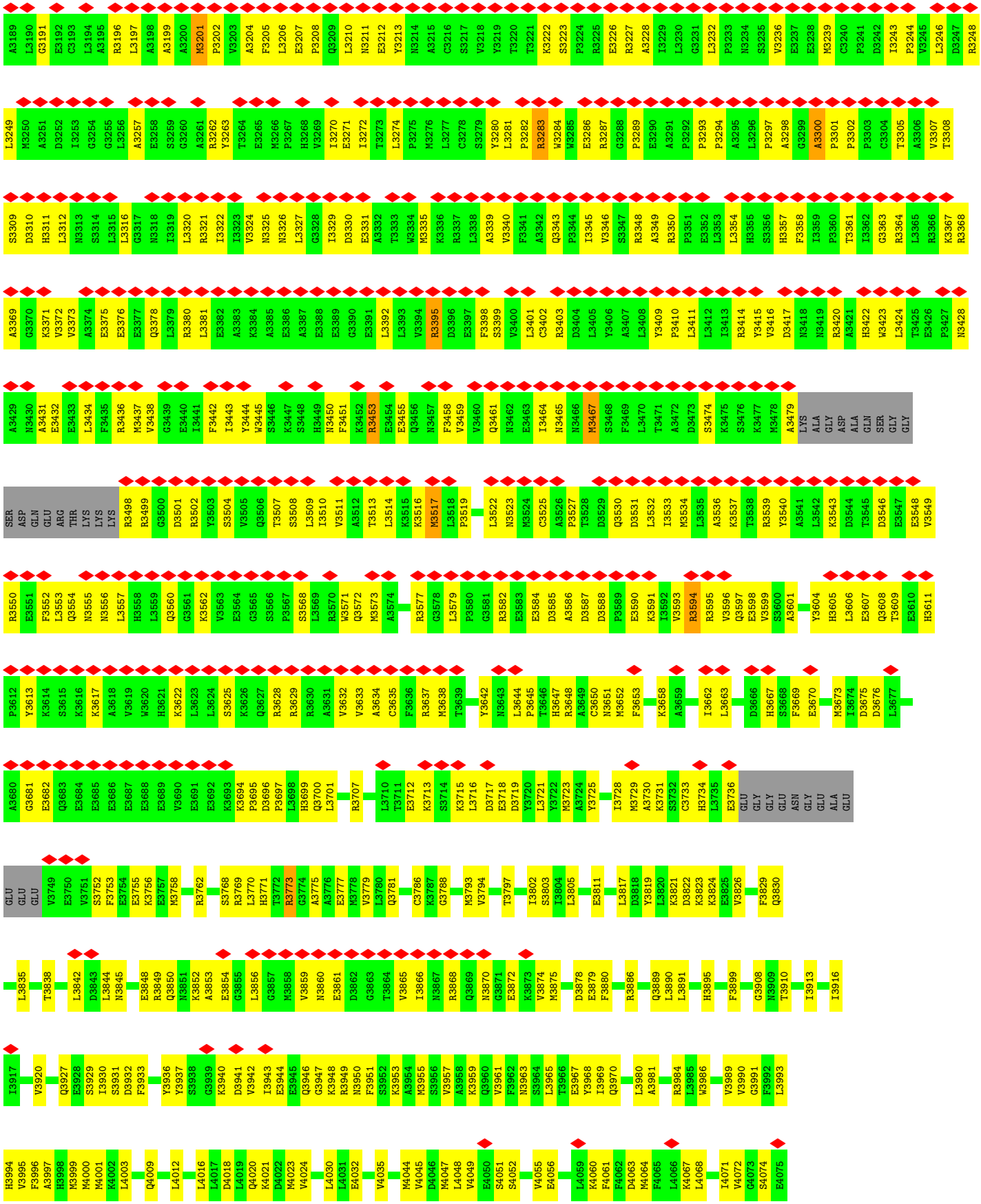
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L3249 M3250 A3251 D3252 I3253 G3254 G3255 L3256 A3257 E3258 S3259 G3260 A3261 R3262 Y3263 T3264 E3265 M3266 P3267 H3268 V3269 I3270 E3271 I3272 T3273 L3274 P3275 M3276 L3277 C3278 S3279 Y3280 L3281 P3282 R3283 W3284 W3285 E3286 R3287 G3288 P3289 E3290 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 V3416 D3417 N3418 N3419 R3420 A3421 H3422 W3423 L3424 T3425 E3426 P3427 N3428
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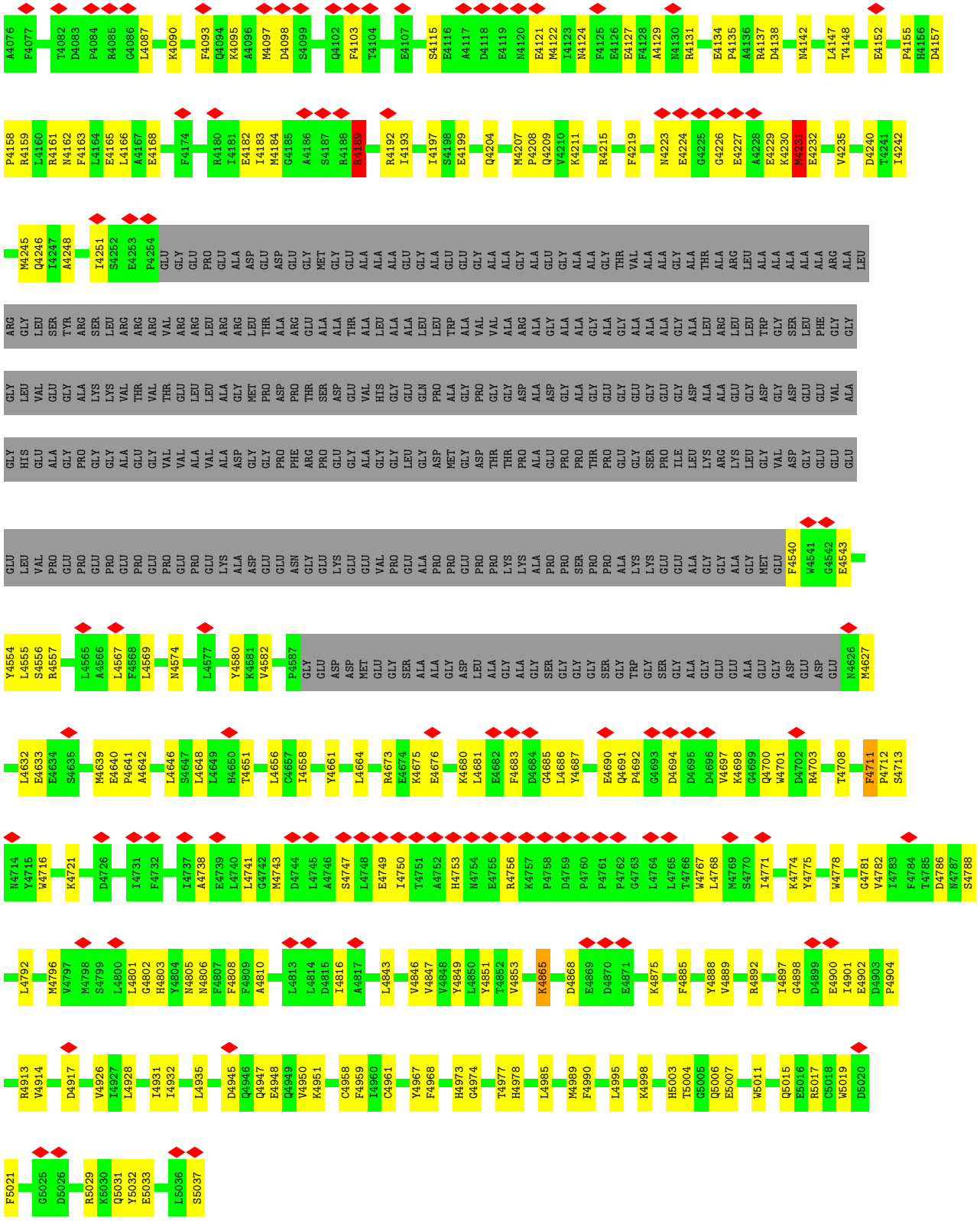
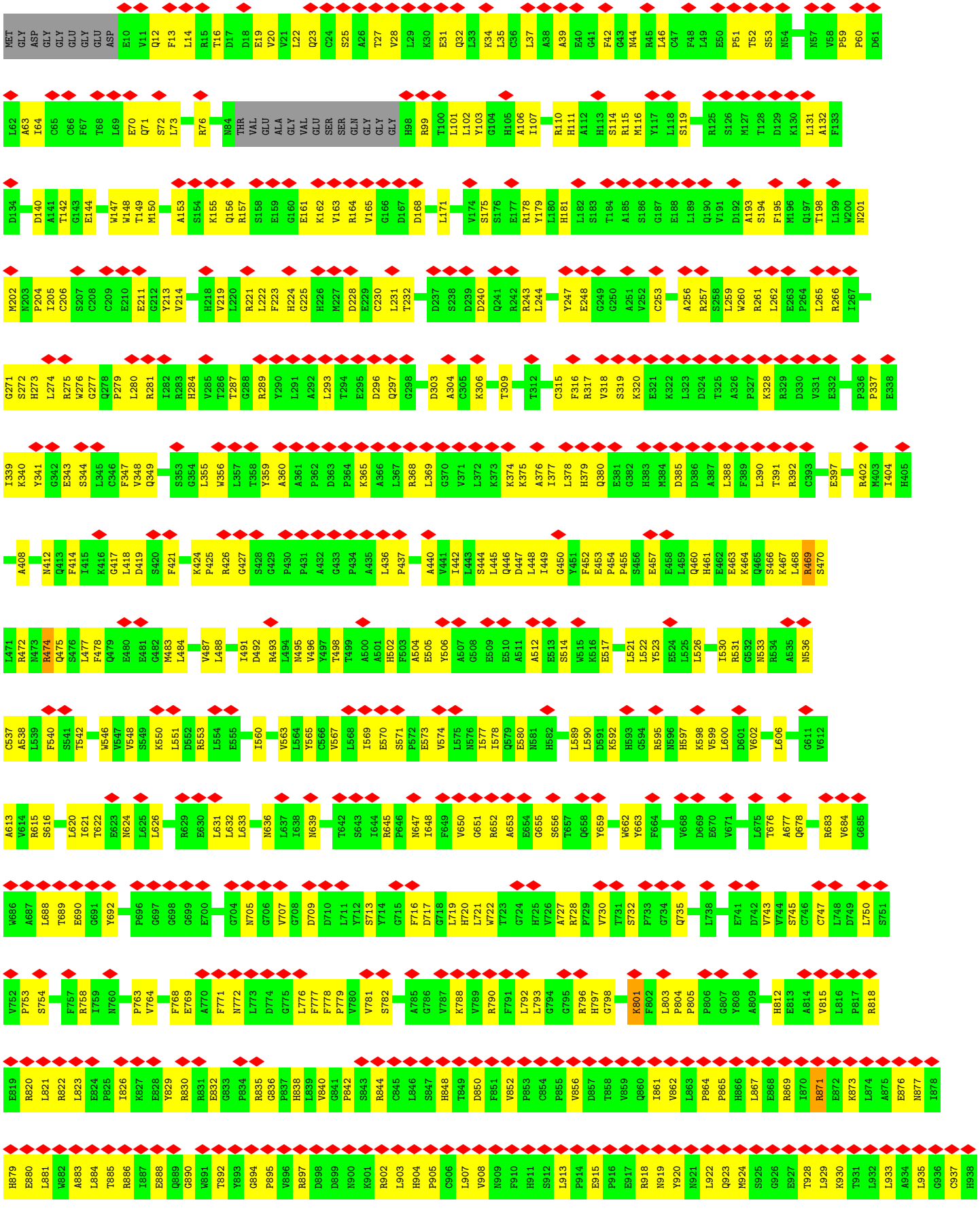


• Molecule 1: Ryanodine receptor 1

Chain B: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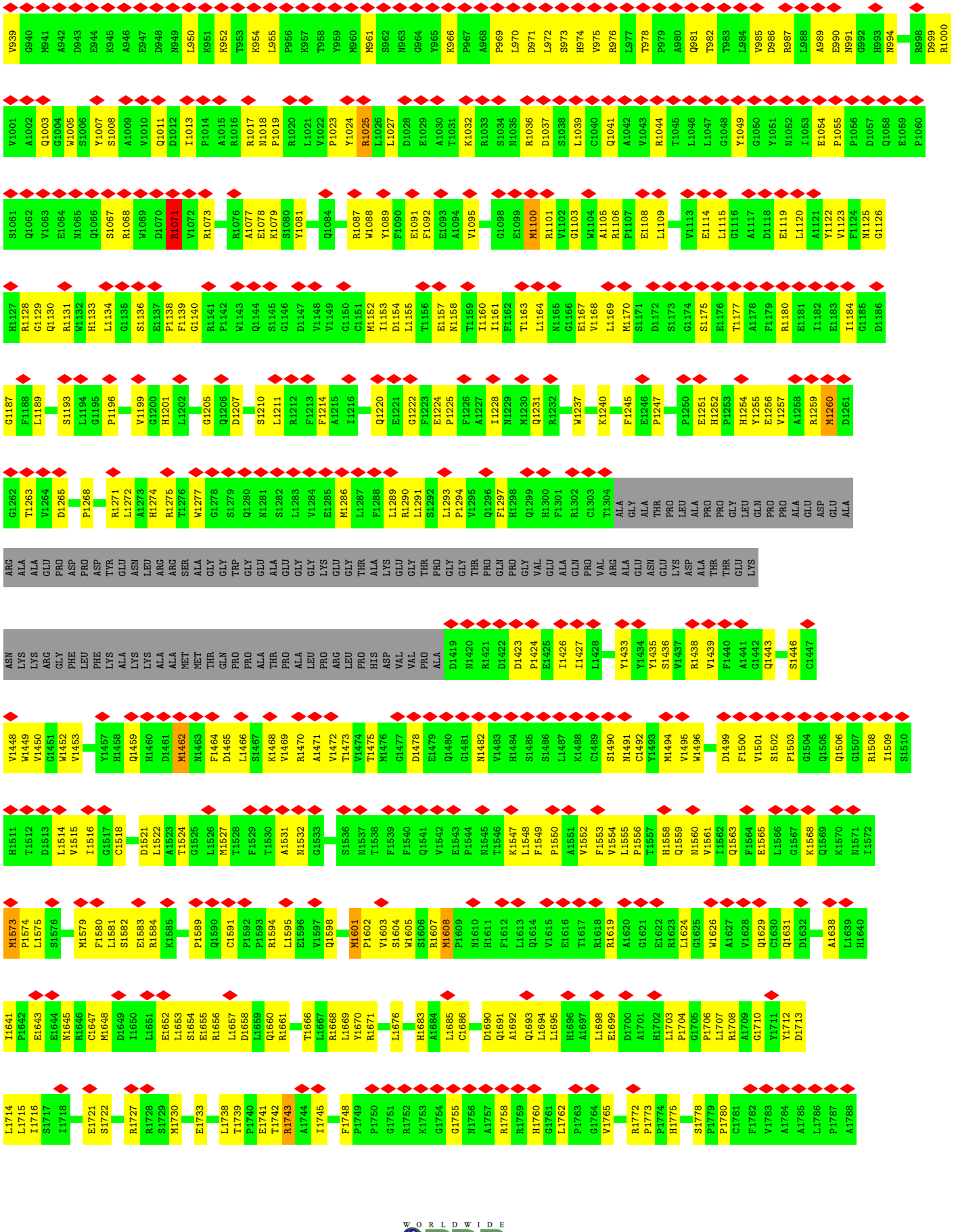
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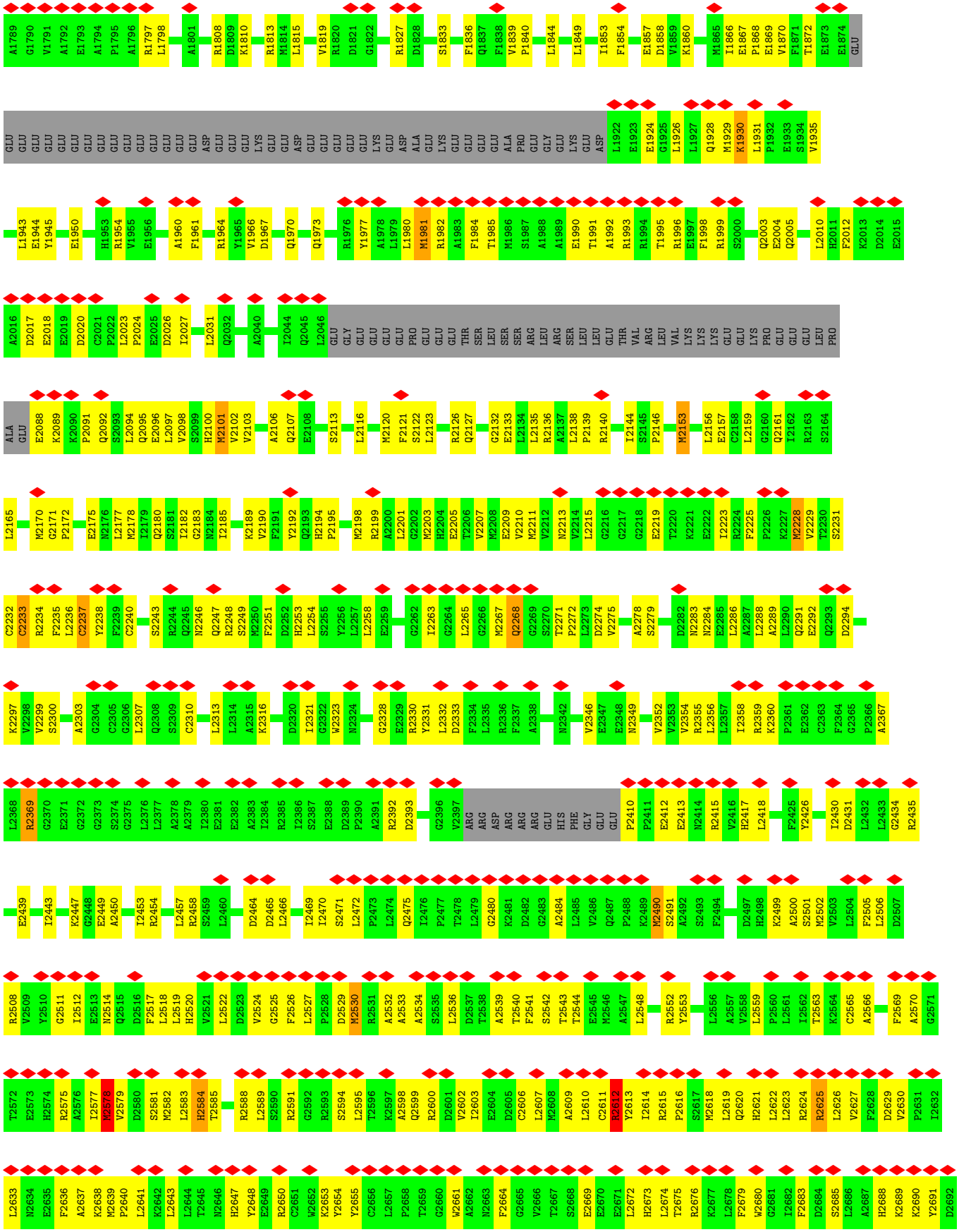
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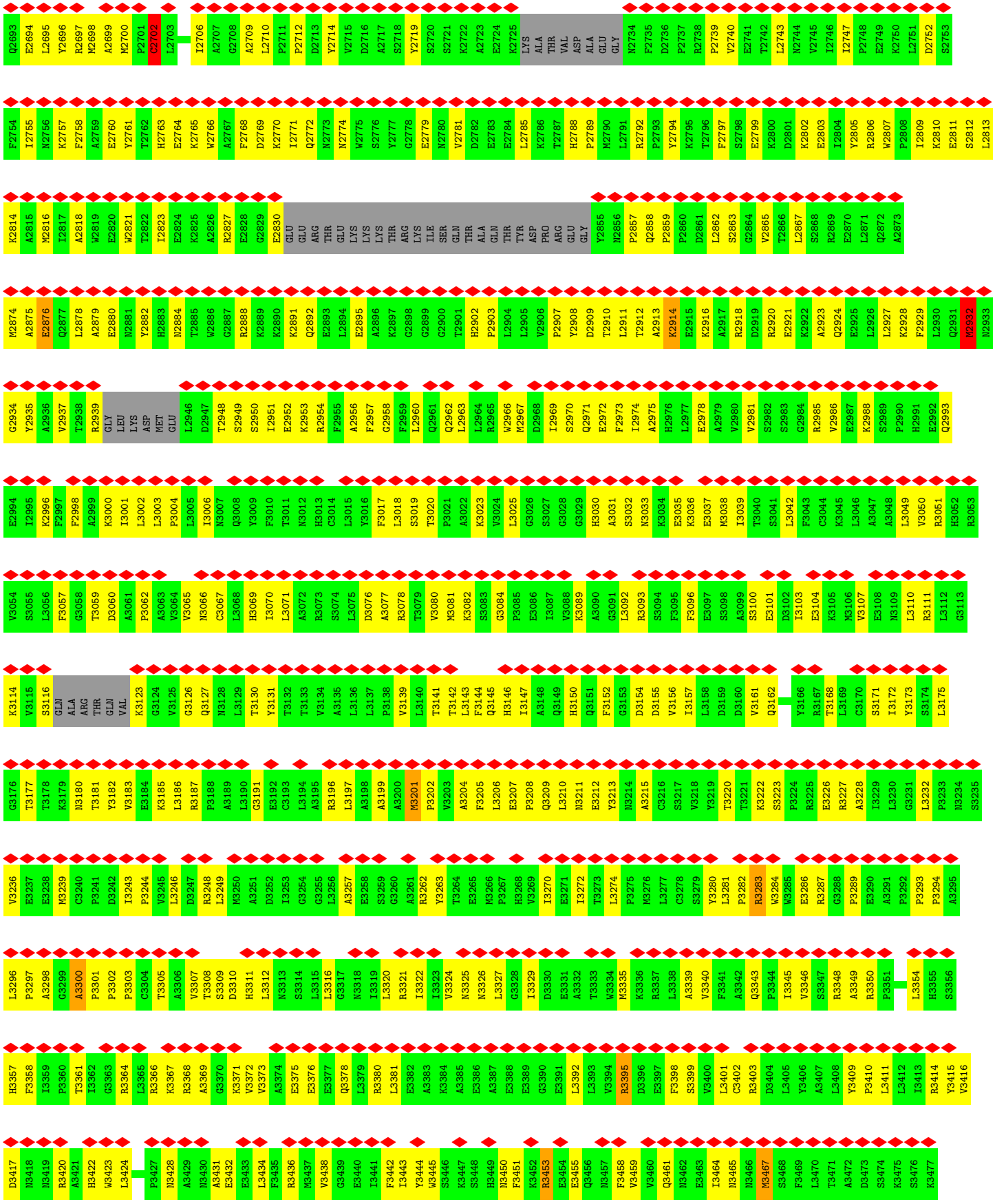
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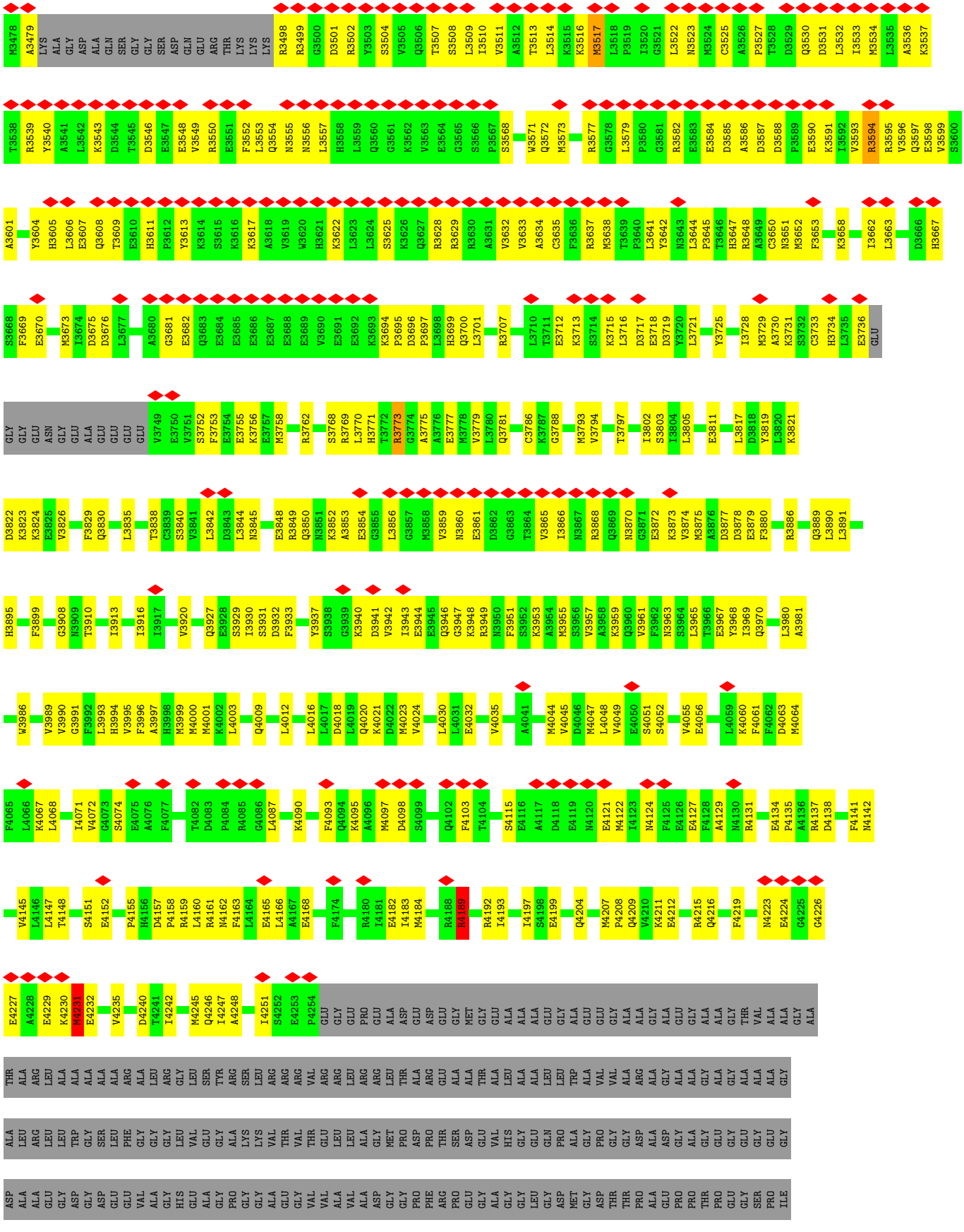
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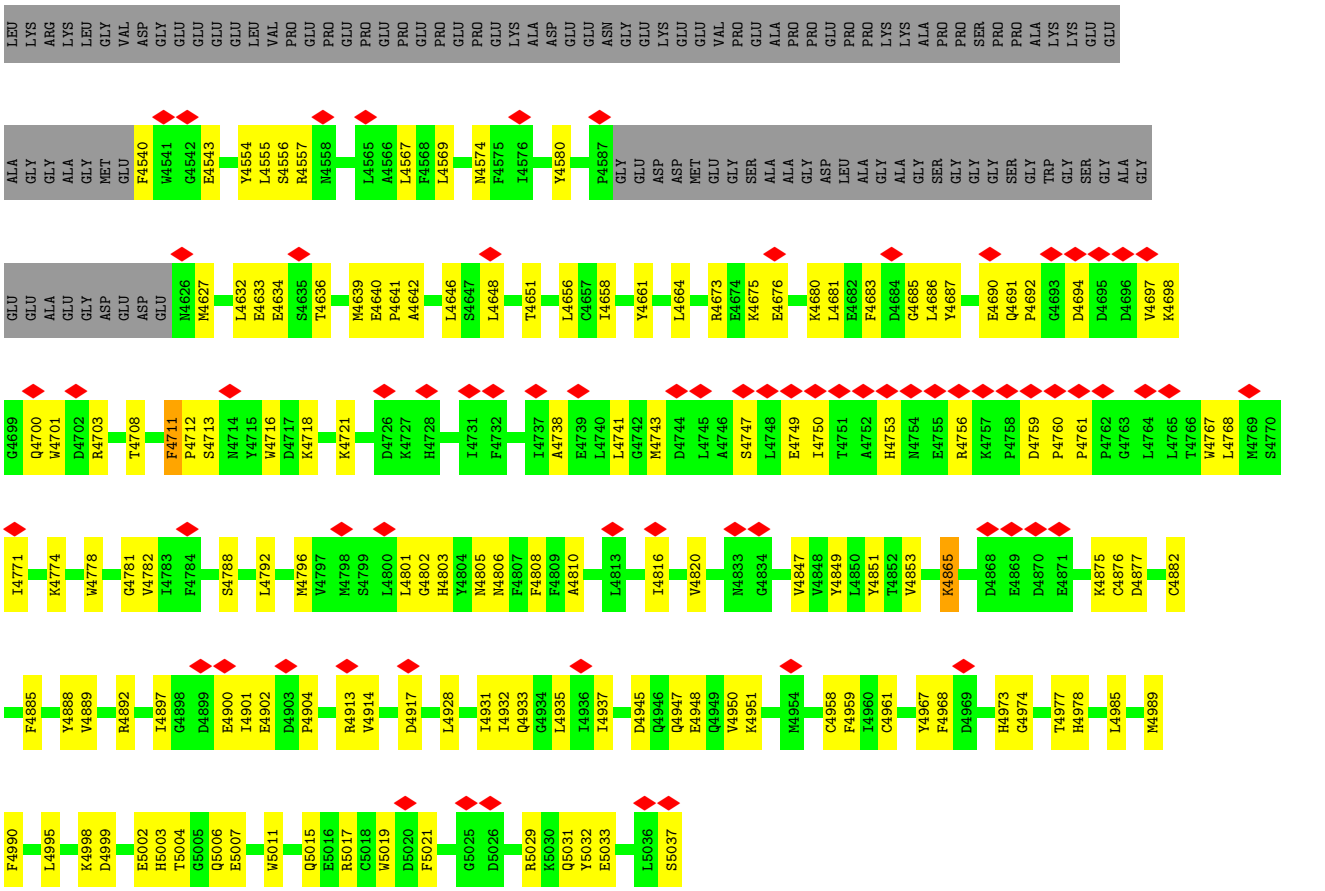
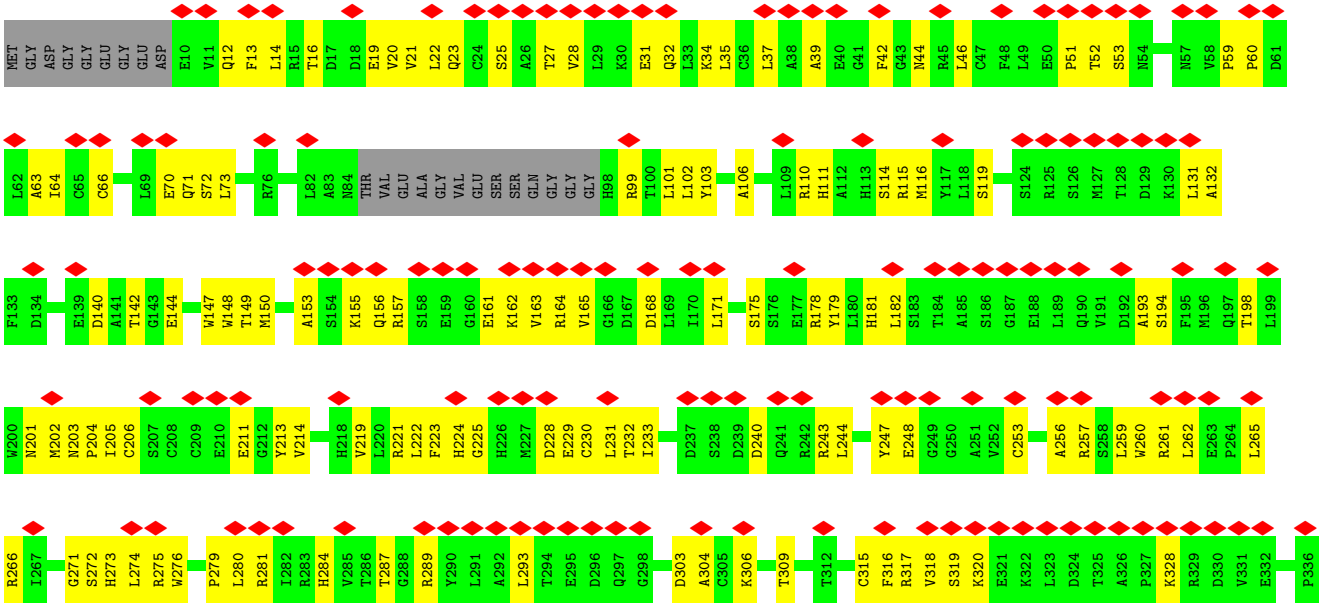
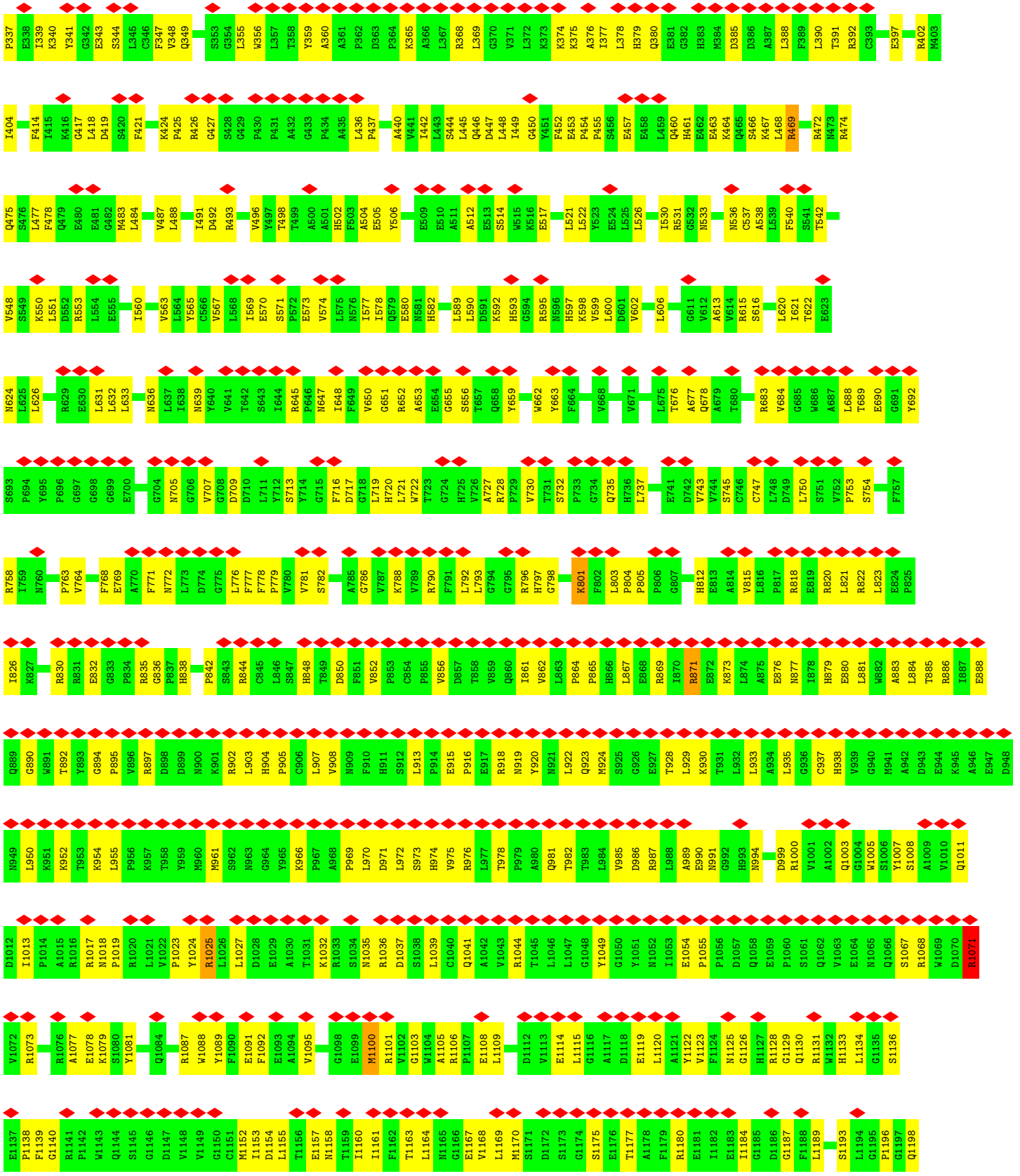


• Molecule 1: Ryanodine receptor 1

Chain D:

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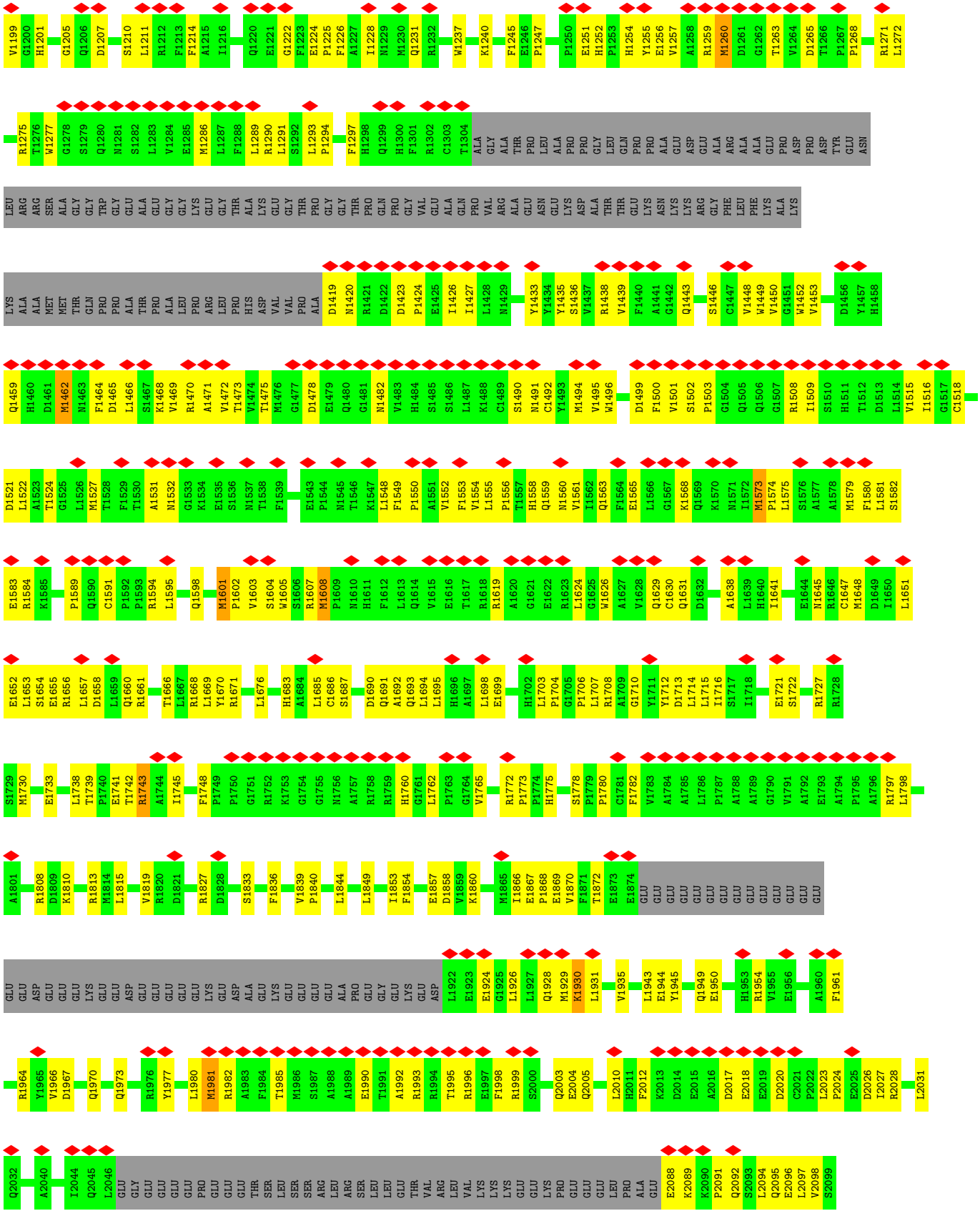
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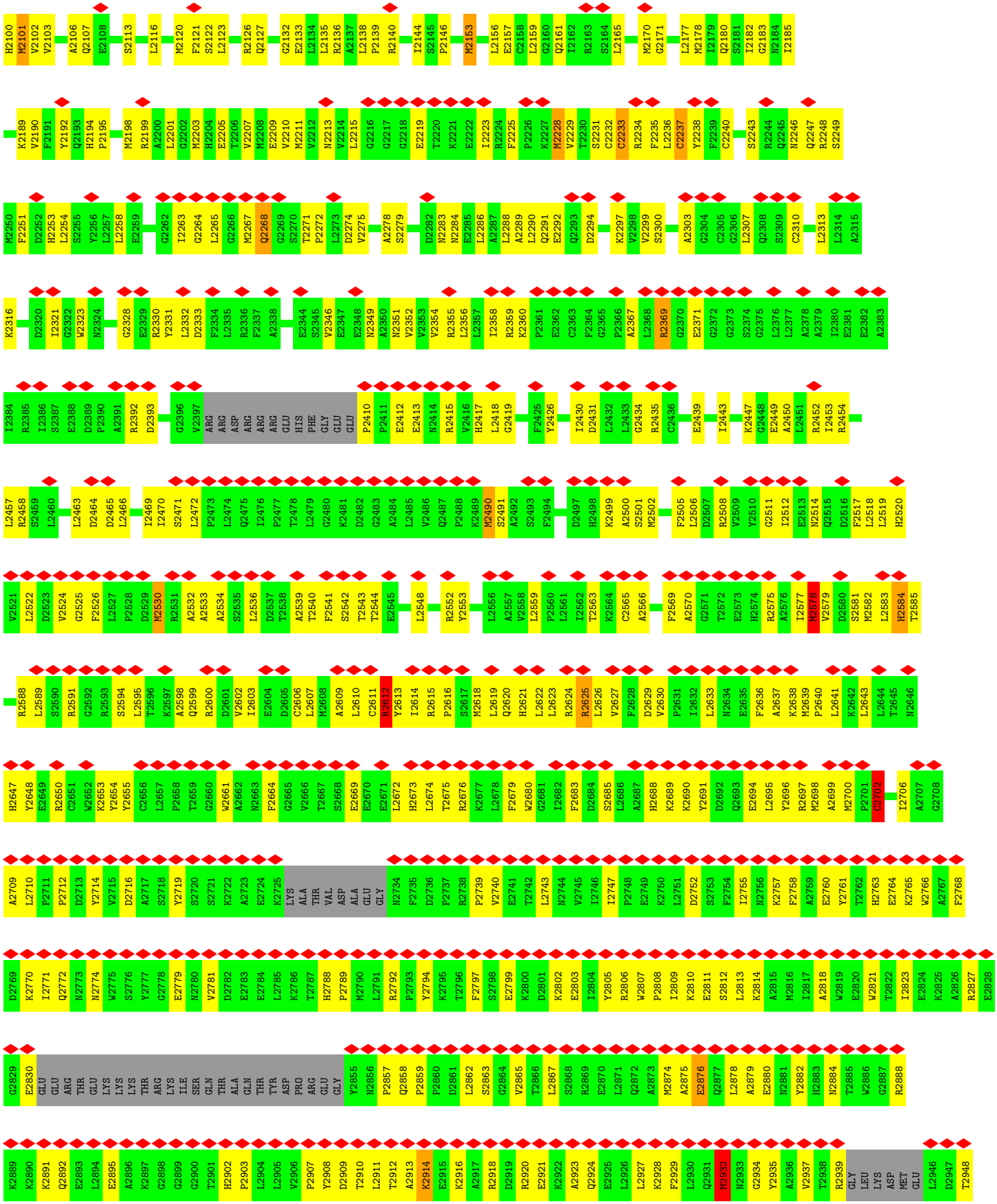
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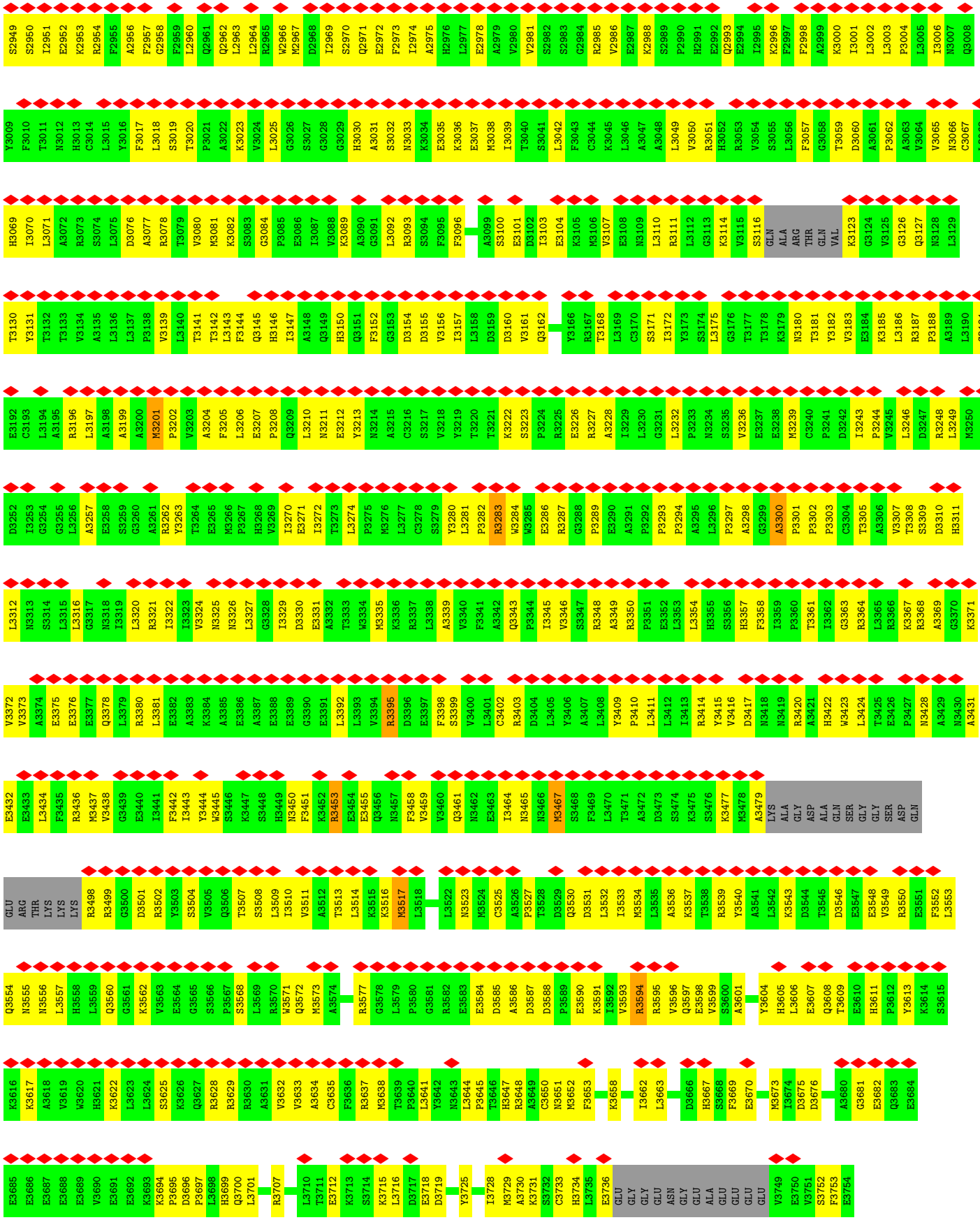
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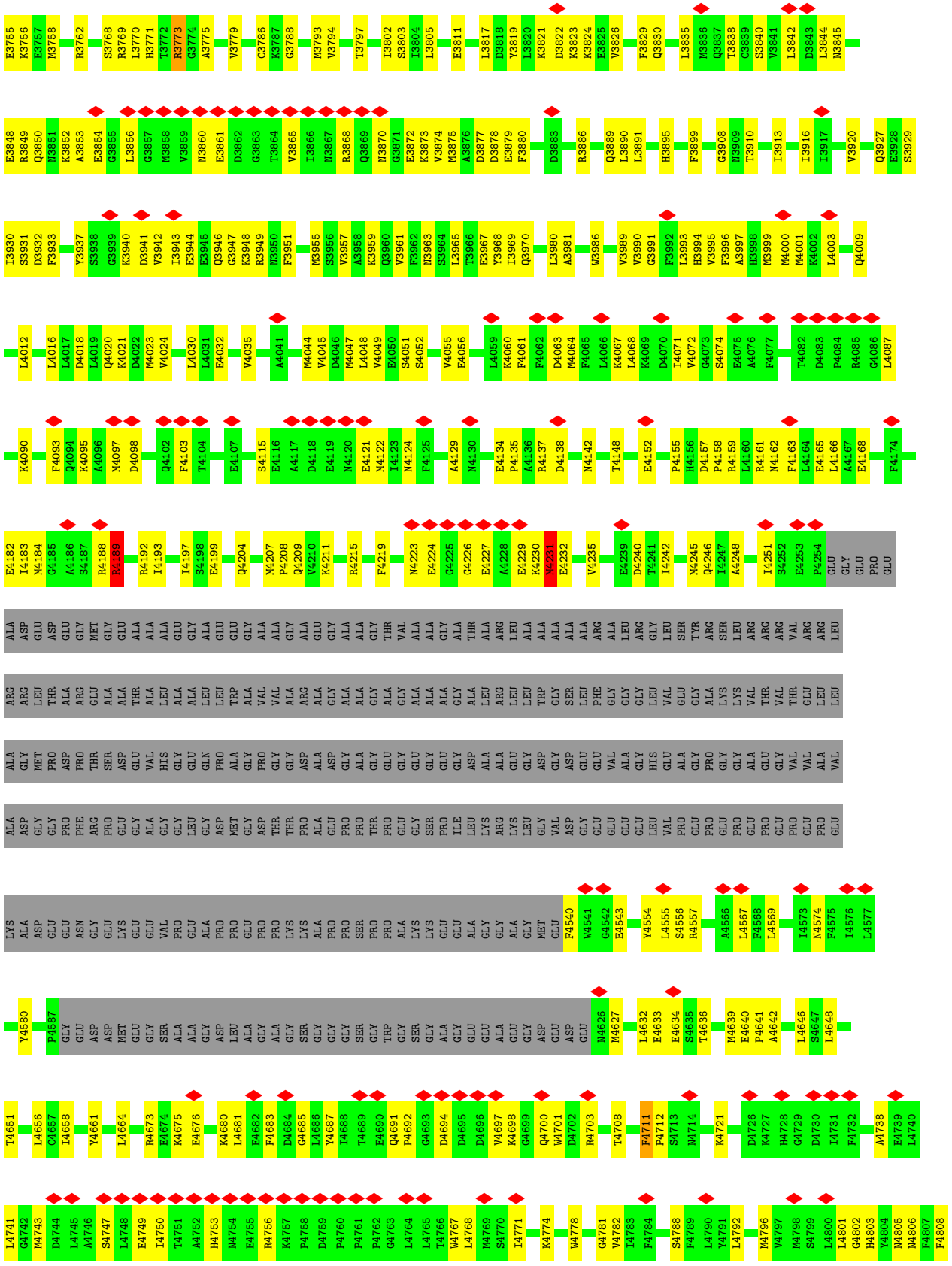
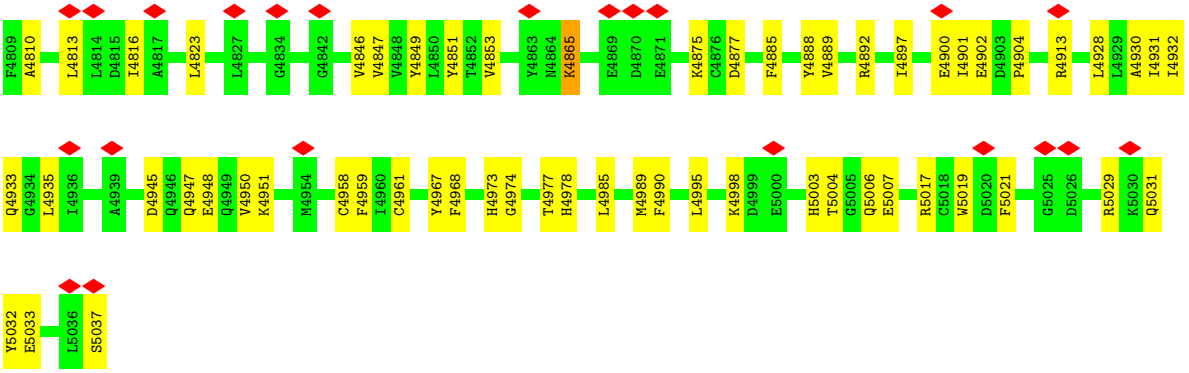
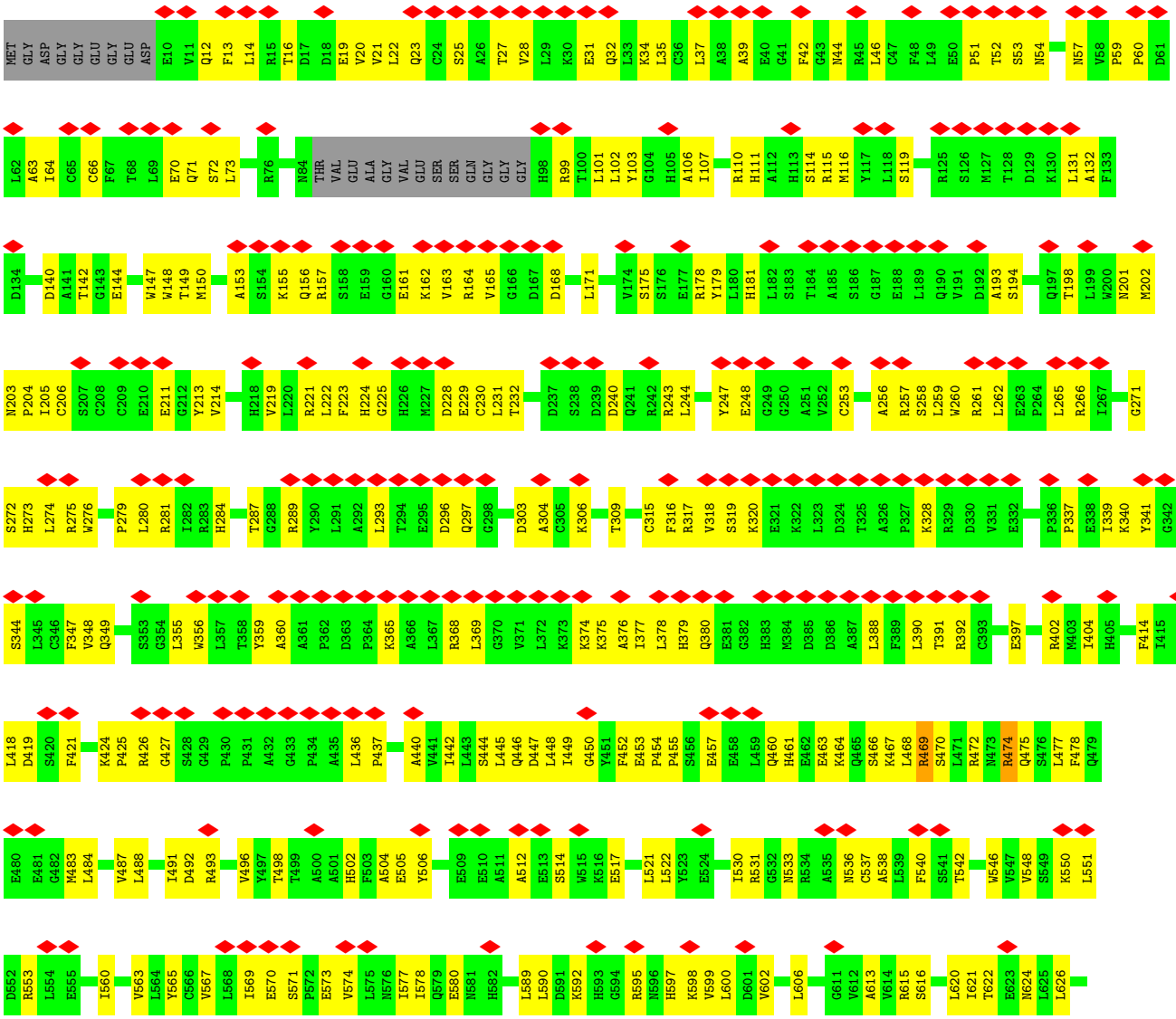
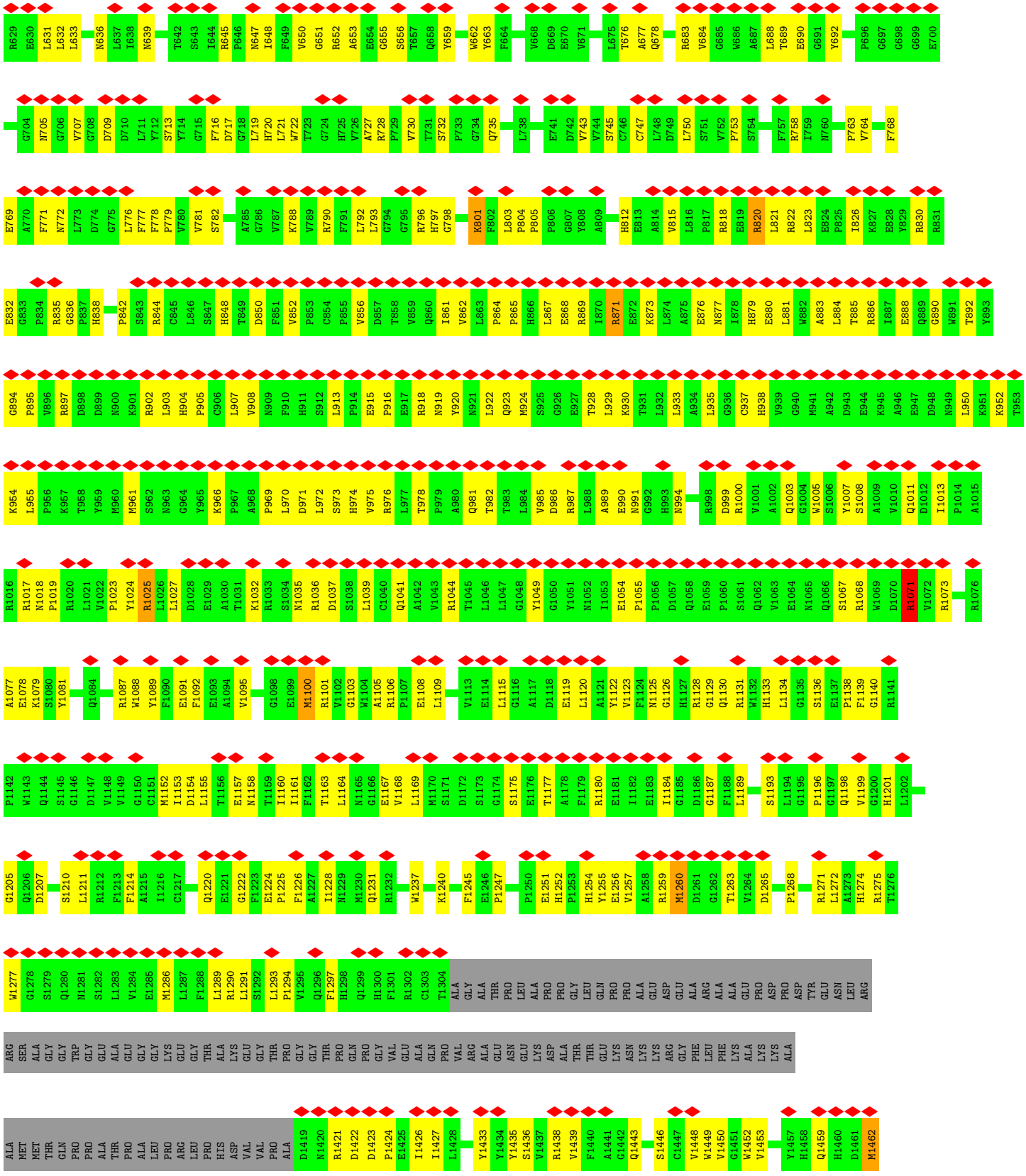




• Molecule 1: Ryanodine receptor 1

Chain C:

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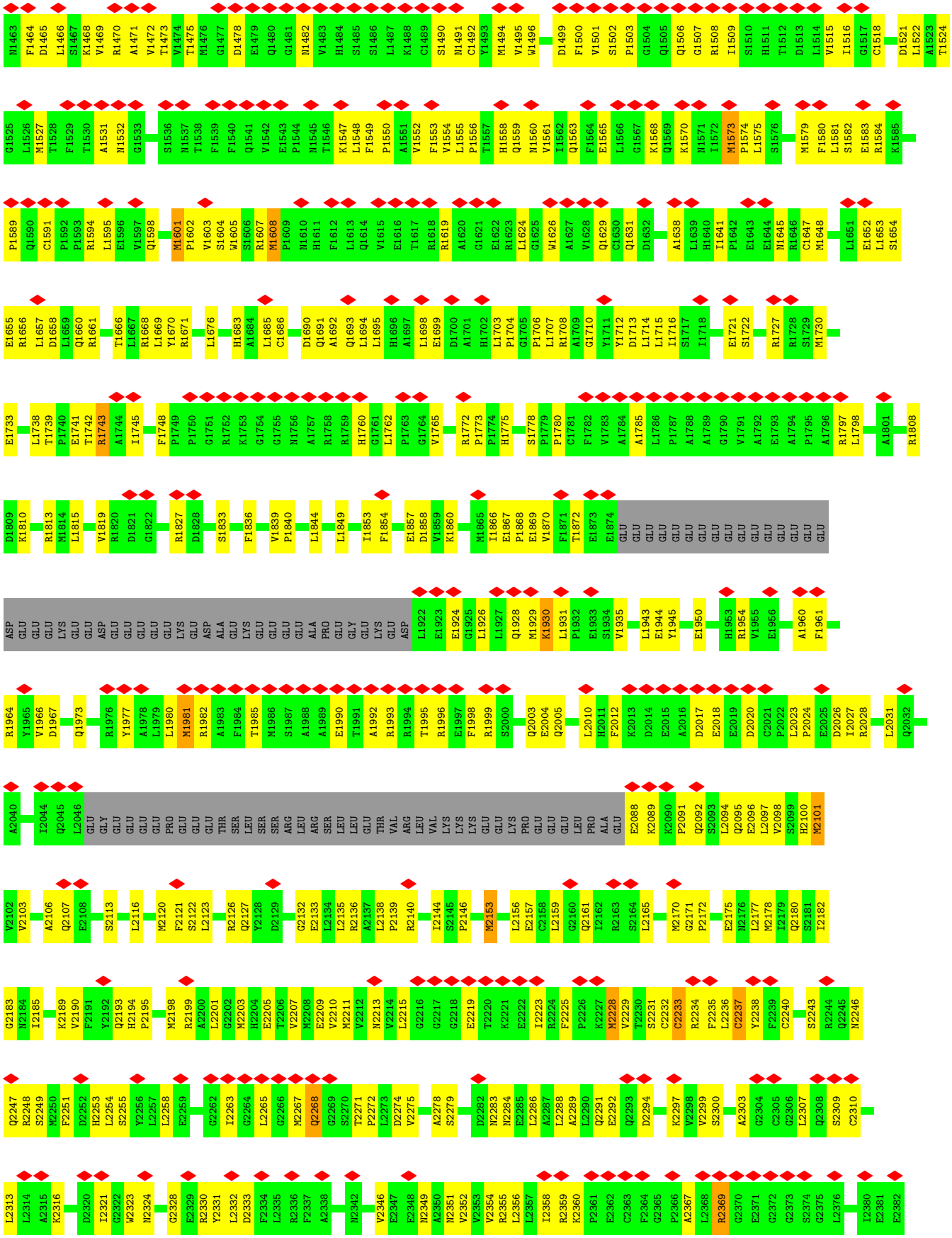

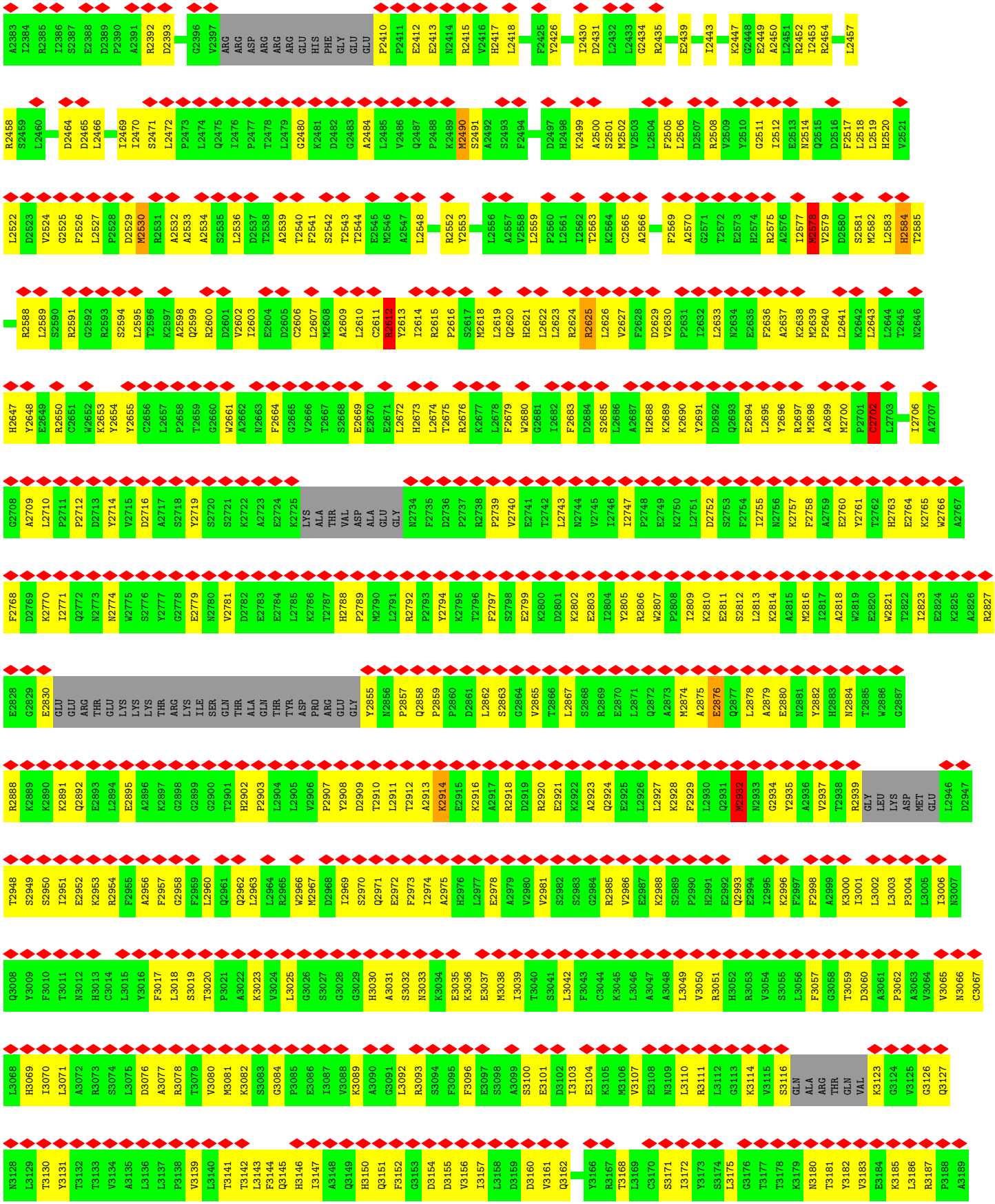
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R2458 S2459 L2460 D2464 D2465 L2466 I2469 I2470 S2471 L2472 P2473 L2474 Q2475 I2476 P2477 T2478 L2479 G2480 K2481 D2482 G2483 A2484 L2485 V2486 Q2487 P2488 K2489 M2490 S2491 A2492 S2493 F2494 D2497 H2498 K2499 A2500 S2501 M2502 V2503 L2504 F2505 L2506 D2507 R2508 V2509 Y2510 G2511 I2512 E2513 N2514 Q2515 D2516 F2517 L2518 L2519 H2520 V2521
L2522 D2523 V2524 G2525 F2526 L2527 P2528 D2529 M2530 R2531 A2532 A2533 A2534 S2535 L2536 D2537 T2538 A2539 T2540 F2541 S2542 T2543 T2544 E2545 M2546 A2547 L2548 R2552 Y2553 L2556 A2557 V2558 L2559 P2560 L2561 I2562 T2563 K2564 C2565 A2566 F2569 A2570 G2571 T2572 E2573 H2574 R2575 A2576 I2577 W2578 V2579 D2580 S2581 M2582 L2583 H2584 T2585
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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
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T2948 S2949 S2950 I2951 E2952 K2953 R2954 F2955 A2956 F2957 G2958 F2959 L2960 Q2961 Q2962 L2963 L2964 R2965 W2966 M2967 D2968 I2969 S2970 Q2971 E2972 F2973 I2974 A2975 H2976 L2977 E2978 A2979 V2980 V2981 S2982 S2983 G2984 R2985 V2986 E2987 K2988 S2989 P2990 H2991 E2992 Q2993 E2994 I2995 K2996 F2997 F2998 A2999 K3000 I3001 L3002 L3003 P3004 L3005 I3006 N3007
Q3008 Y3009 F3010 T3011 N3012 H3013 C3014 L3015 Y3016 F3017 L3018 S3019 T3020 P3021 A3022 K3023 V3024 L3025 G3026 S3027 G3028 G3029 H3030 A3031 S3032 N3033 K3034 E3035 K3036 E3037 M3038 I3039 T3040 S3041 L3042 F3043 C3044 K3045 L3046 A3047 A3048 L3049 V3050 R3051 H3052 R3053 V3054 S3055 L3056 F3057 G3058 T3059 D3060 A3061 P3062 A3063 V3064 V3065 N3066 C3067
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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 A3536 K3537 T3538 R3539 Y3540 A3541 L3542 K3543 D3544 T3545 D3546 E3547 E3548 V3549 R3550 E3551
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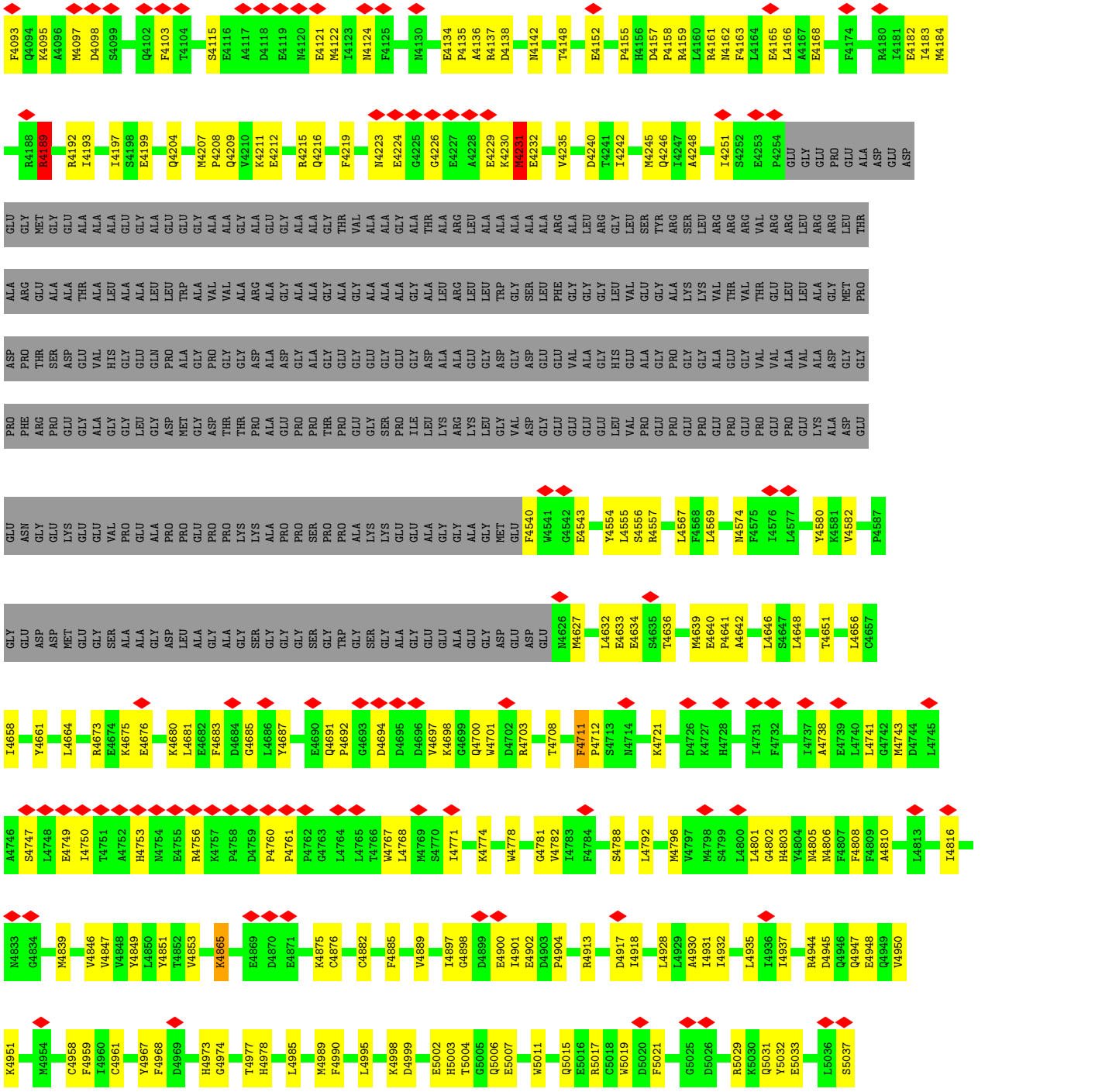
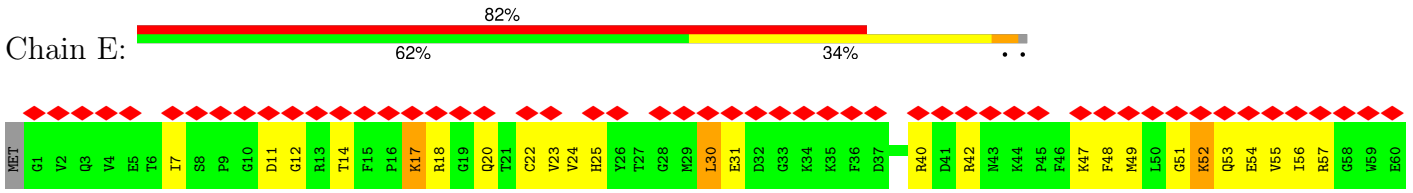
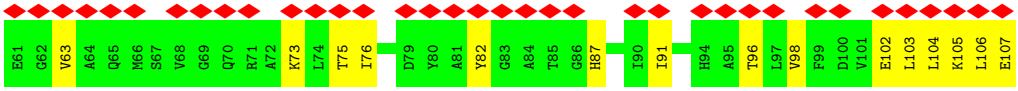


• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

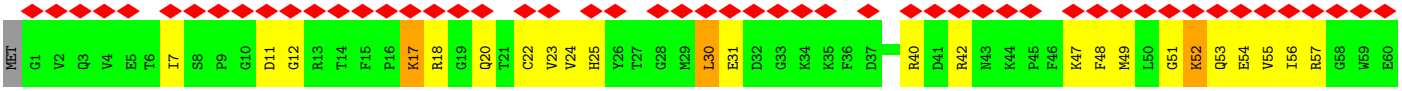
Chain E:

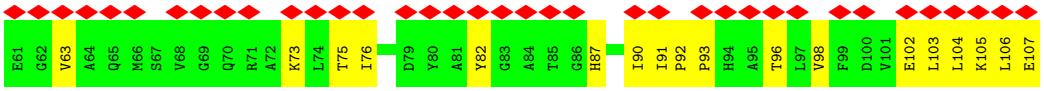




• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

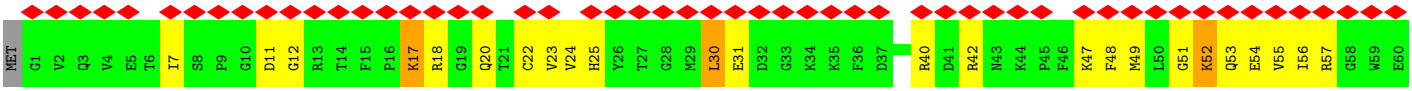
Chain H:

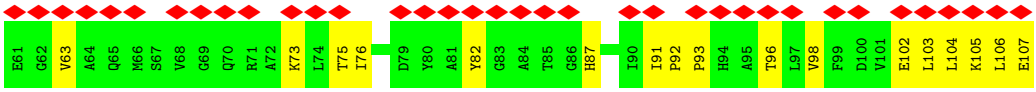




• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

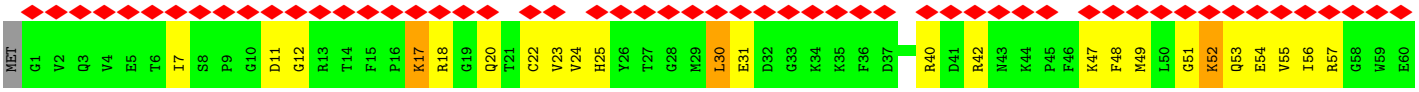
Chain G:

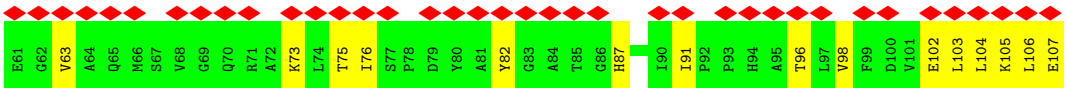




• Molecule 2: Peptidyl-prolyl cis-trans isomerase FKBP1A

Chain F:





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	3336	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	0.283	Depositor
Minimum map value	-0.122	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.018	Depositor
Recommended contour level	0.1	Depositor
Map size (Å)	428.544, 428.544, 428.544	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.837, 0.837, 0.837	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.27	2/35977 (0.0%)	0.54	14/48726 (0.0%)
1	B	0.27	2/35977 (0.0%)	0.54	14/48726 (0.0%)
1	C	0.27	2/35977 (0.0%)	0.54	14/48726 (0.0%)
1	D	0.27	2/35977 (0.0%)	0.54	14/48726 (0.0%)
2	E	0.27	0/850	0.59	1/1146 (0.1%)
2	F	0.27	0/850	0.59	1/1146 (0.1%)
2	G	0.27	0/850	0.59	1/1146 (0.1%)
2	H	0.27	0/850	0.59	1/1146 (0.1%)
All	All	0.27	8/147308 (0.0%)	0.55	60/199488 (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	2
1	B	0	2
1	C	0	2
1	D	0	2
All	All	0	8

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	2233	CYS	CB-SG	-5.92	1.72	1.81
1	C	2233	CYS	CB-SG	-5.91	1.72	1.81
1	A	2233	CYS	CB-SG	-5.91	1.72	1.81
1	B	2233	CYS	CB-SG	-5.90	1.72	1.81
1	A	2237	CYS	CB-SG	5.70	1.92	1.82

The worst 5 of 60 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	D	2578	MET	CB-CG-SD	8.49	137.88	112.40
1	A	2578	MET	CB-CG-SD	8.48	137.85	112.40
1	B	2578	MET	CB-CG-SD	8.48	137.85	112.40
1	C	2578	MET	CB-CG-SD	8.48	137.83	112.40
1	A	1071	ARG	CA-CB-CG	7.34	129.54	113.40

There are no chirality outliers.

5 of 8 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1608	MET	Peptide
1	A	4189	ARG	Sidechain
1	B	1608	MET	Peptide
1	B	4189	ARG	Sidechain
1	D	1608	MET	Peptide

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	35150	0	34793	1452	0
1	B	35150	0	34793	1463	0
1	C	35150	0	34793	1445	0
1	D	35150	0	34793	1424	0
2	E	831	0	831	31	0
2	F	831	0	831	27	0
2	G	831	0	831	29	0
2	H	831	0	831	30	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

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
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	20	0	18	2	0
6	B	20	0	18	2	0
6	C	20	0	18	1	0
6	D	20	0	18	1	0
All	All	144136	0	142616	5816	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 20.

The worst 5 of 5816 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:B:2639:MET:HG2	1:B:2640:PRO:HD3	1.47	0.97
1:C:2639:MET:HG2	1:C:2640:PRO:HD3	1.47	0.96
1:D:2639:MET:HG2	1:D:2640:PRO:HD3	1.47	0.96
1:A:2639:MET:HG2	1:A:2640:PRO:HD3	1.47	0.96
1:A:2821:TRP:NE1	1:A:2874:MET:SD	2.46	0.89

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%)	4260 (97%)	121 (3%)	4 (0%)	48 81
1	B	4385/5037 (87%)	4260 (97%)	121 (3%)	4 (0%)	48 81
1	C	4385/5037 (87%)	4260 (97%)	121 (3%)	4 (0%)	48 81

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	D	4385/5037 (87%)	4261 (97%)	120 (3%)	4 (0%)	48 81
2	E	105/108 (97%)	102 (97%)	3 (3%)	0	100 100
2	F	105/108 (97%)	102 (97%)	3 (3%)	0	100 100
2	G	105/108 (97%)	102 (97%)	3 (3%)	0	100 100
2	H	105/108 (97%)	102 (97%)	3 (3%)	0	100 100
All	All	17960/20580 (87%)	17449 (97%)	495 (3%)	16 (0%)	50 81

5 of 16 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	908	VAL
1	A	3300	ALA
1	A	4711	PHE
1	B	908	VAL
1	B	3300	ALA

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%)	3776 (98%)	60 (2%)	58 74
1	B	3836/4276 (90%)	3776 (98%)	60 (2%)	58 74
1	C	3836/4276 (90%)	3776 (98%)	60 (2%)	58 74
1	D	3836/4276 (90%)	3776 (98%)	60 (2%)	58 74
2	E	89/90 (99%)	86 (97%)	3 (3%)	32 54
2	F	89/90 (99%)	86 (97%)	3 (3%)	32 54
2	G	89/90 (99%)	86 (97%)	3 (3%)	32 54
2	H	89/90 (99%)	86 (97%)	3 (3%)	32 54
All	All	15700/17464 (90%)	15448 (98%)	252 (2%)	62 74

5 of 252 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	3201	MET
1	C	2369[B]	ARG
1	D	1260	MET
1	C	2268[B]	GLN
1	C	3283	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 98 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	866	HIS
1	D	3734	HIS
1	D	1252	HIS
1	D	2971	GLN
1	C	156	GLN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry

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	0.62	0	34,52,52	0.95	2 (5%)
3	ATP	D	5301	-	28,33,33	0.62	0	34,52,52	0.94	2 (5%)
6	PNX	C	5304	-	13,21,21	1.35	2 (15%)	13,30,30	1.06	1 (7%)
6	PNX	A	5304	-	13,21,21	1.36	2 (15%)	13,30,30	1.06	1 (7%)
3	ATP	B	5301	-	28,33,33	0.63	0	34,52,52	0.95	2 (5%)
3	ATP	C	5301	-	28,33,33	0.61	0	34,52,52	0.95	2 (5%)
6	PNX	D	5304	-	13,21,21	1.36	2 (15%)	13,30,30	1.07	1 (7%)
6	PNX	B	5304	-	13,21,21	1.37	2 (15%)	13,30,30	1.07	1 (7%)

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	-	-	4/18/38/38	0/3/3/3
3	ATP	D	5301	-	-	4/18/38/38	0/3/3/3
6	PNX	C	5304	-	-	4/7/7/7	0/2/2/2
6	PNX	A	5304	-	-	4/7/7/7	0/2/2/2
3	ATP	B	5301	-	-	4/18/38/38	0/3/3/3
3	ATP	C	5301	-	-	4/18/38/38	0/3/3/3
6	PNX	D	5304	-	-	4/7/7/7	0/2/2/2
6	PNX	B	5304	-	-	4/7/7/7	0/2/2/2

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

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	5304	PNX	C6-N1	-3.10	1.32	1.38
6	A	5304	PNX	C6-N1	-3.08	1.33	1.38
6	D	5304	PNX	C6-N1	-3.06	1.33	1.38
6	C	5304	PNX	C6-N1	-3.04	1.33	1.38
6	D	5304	PNX	O6-C6	-2.41	1.18	1.24

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

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	B	5301	ATP	C4'-O4'-C1'	-4.29	106.00	109.92
3	A	5301	ATP	C4'-O4'-C1'	-4.26	106.02	109.92

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	5301	ATP	C4'-O4'-C1'	-4.24	106.04	109.92
3	D	5301	ATP	C4'-O4'-C1'	-4.24	106.05	109.92
6	B	5304	PNX	C4-C5-C6	-2.69	117.91	119.96

There are no chirality outliers.

5 of 32 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	5304	PNX	CAI-CAH-CAJ-CAM
6	B	5304	PNX	CAI-CAH-CAJ-CAM
6	D	5304	PNX	CAI-CAH-CAJ-CAM
6	C	5304	PNX	CAI-CAH-CAJ-CAM
6	A	5304	PNX	CAH-CAJ-CAM-OAD

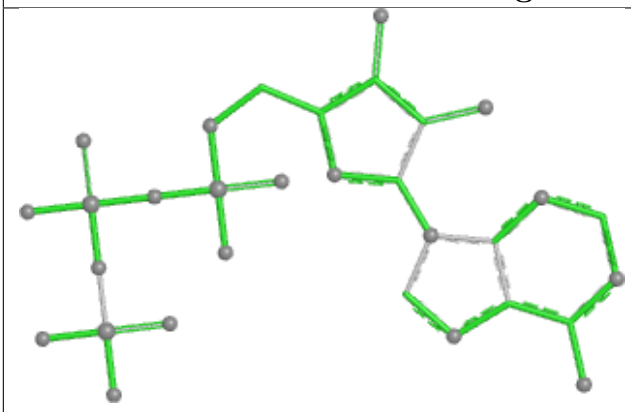
There are no ring outliers.

4 monomers are involved in 6 short contacts:

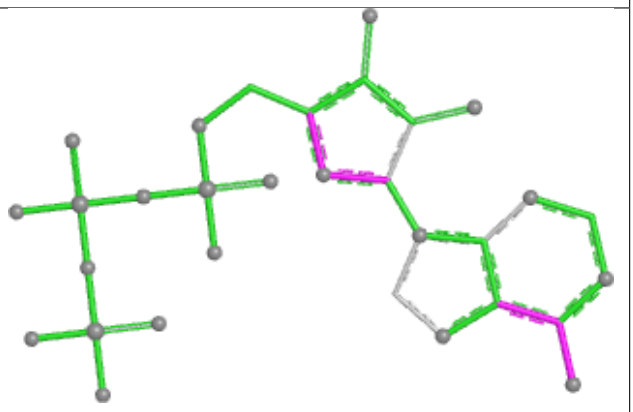
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	C	5304	PNX	1	0
6	A	5304	PNX	2	0
6	D	5304	PNX	1	0
6	B	5304	PNX	2	0

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.

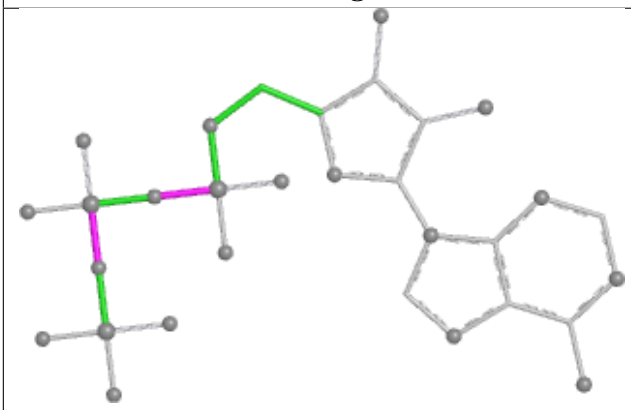
Ligand ATP A 5301



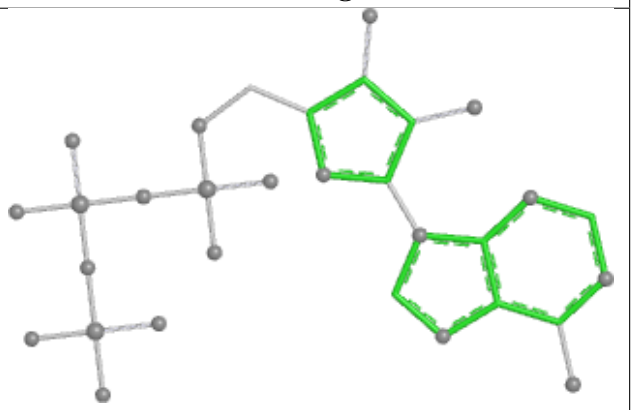
Bond lengths



Bond angles

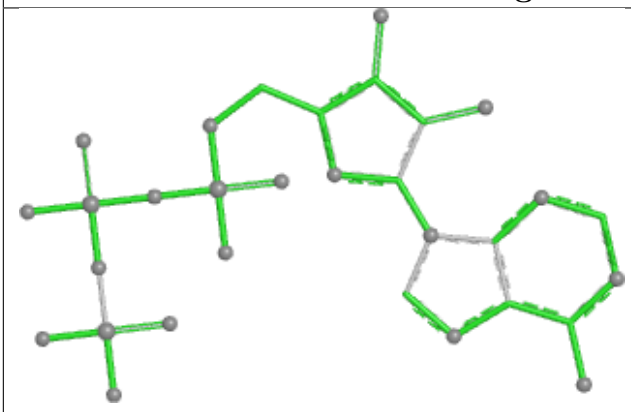


Torsions



Rings

Ligand ATP D 5301



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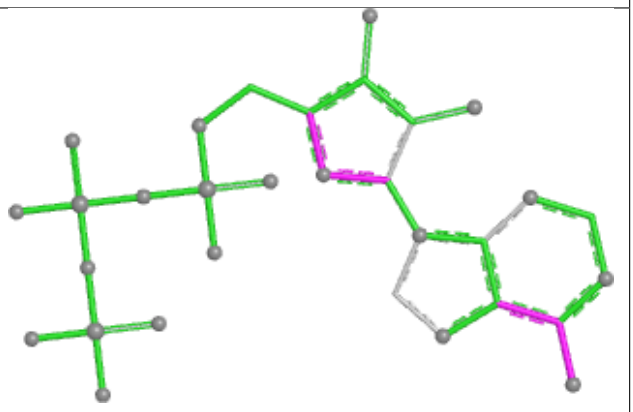

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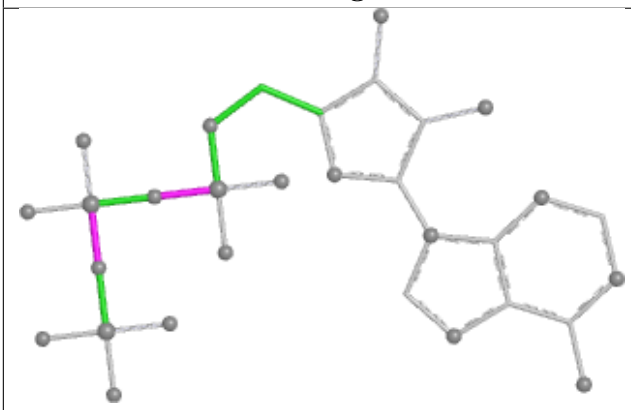

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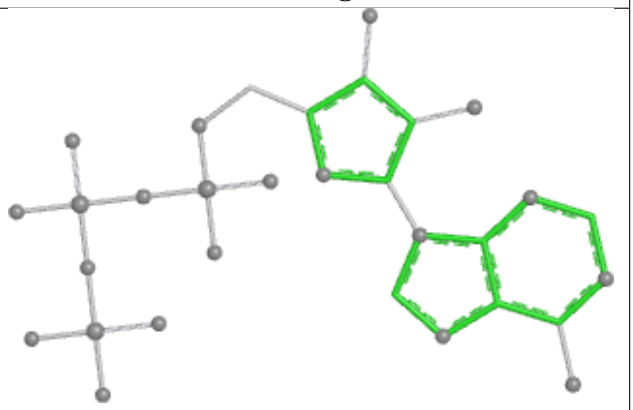
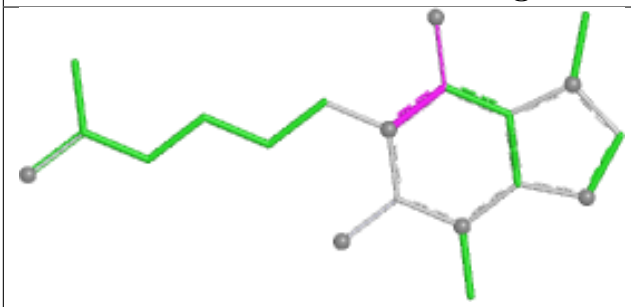


Rings

Ligand PNX C 5304



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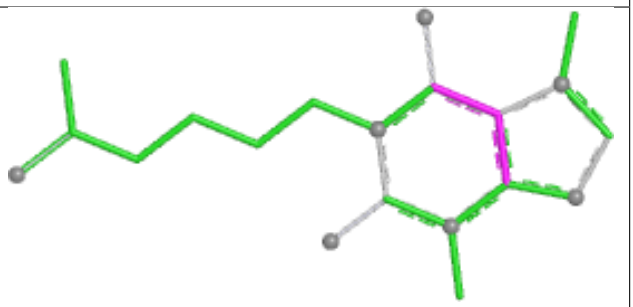
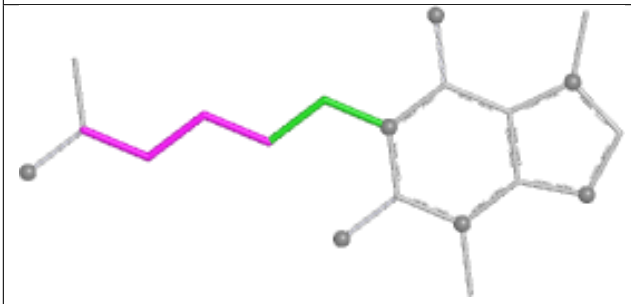
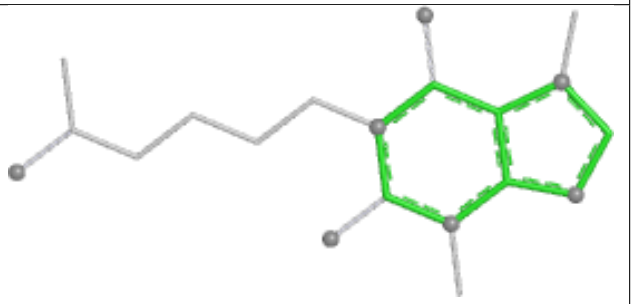


Bond angles

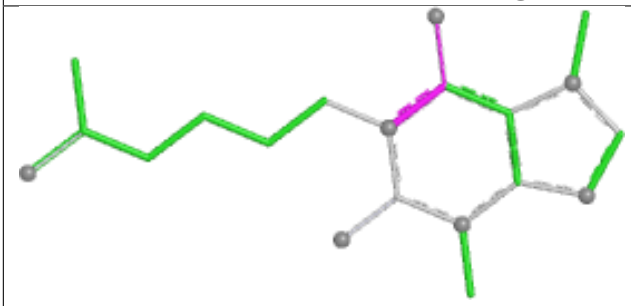


Torsions

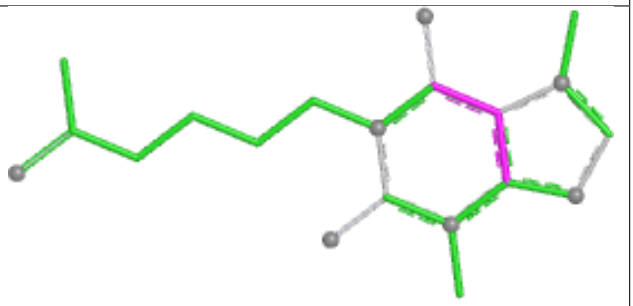


Rings

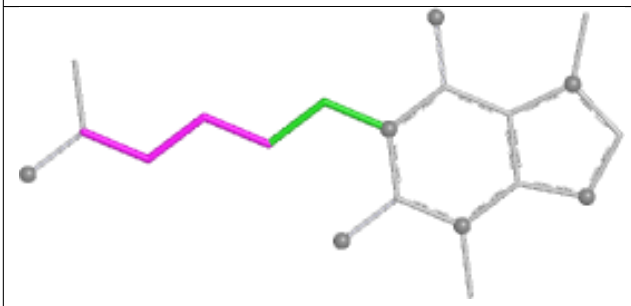
Ligand PNX A 5304



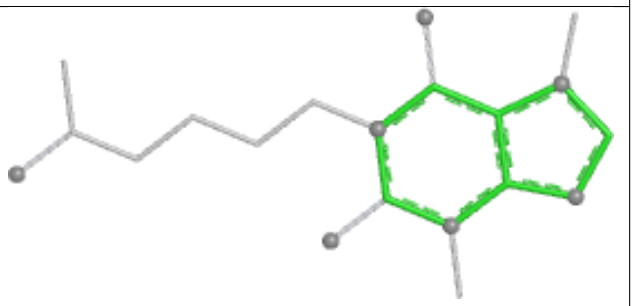
Bond lengths



Bond angles

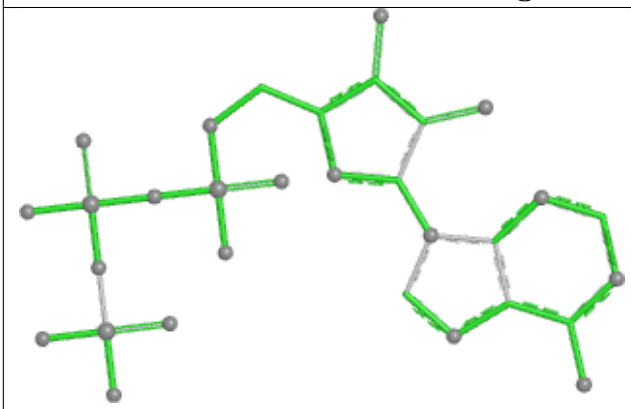


Torsions

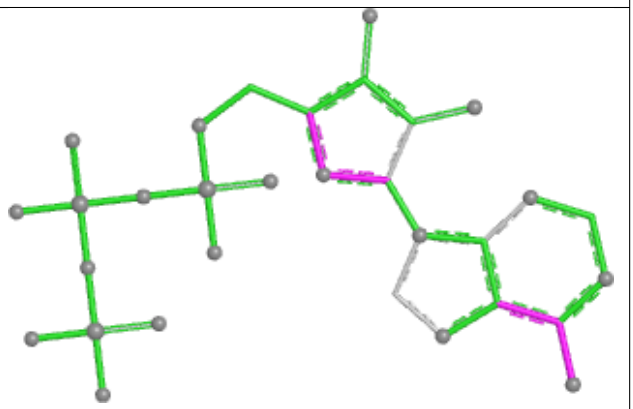


Rings

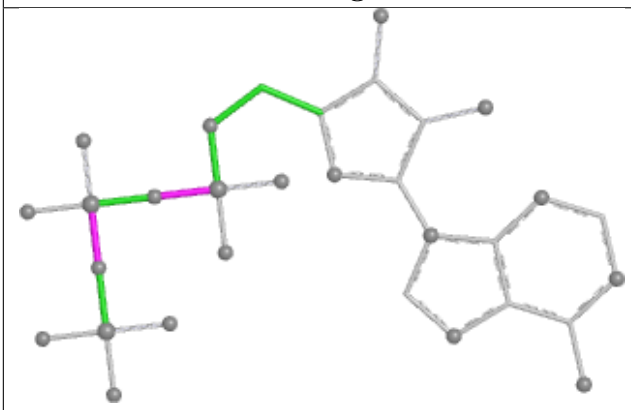
Ligand ATP B 5301



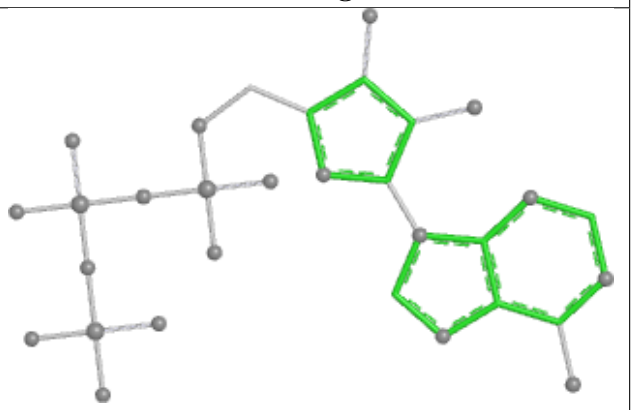
Bond lengths



Bond angles

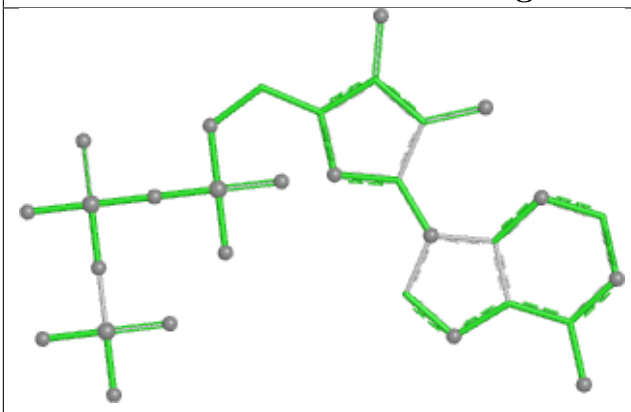


Torsions

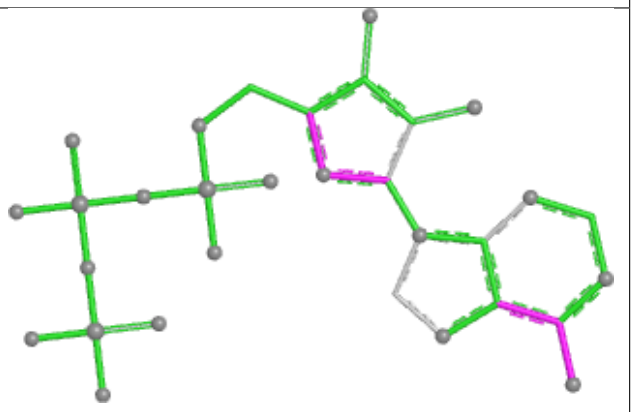


Rings

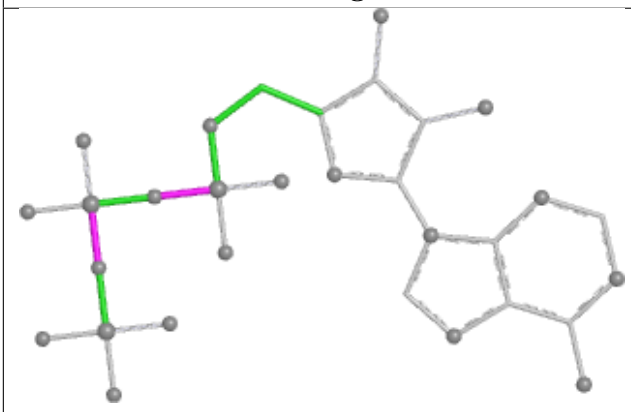
Ligand ATP C 5301



Bond lengths



Bond angles



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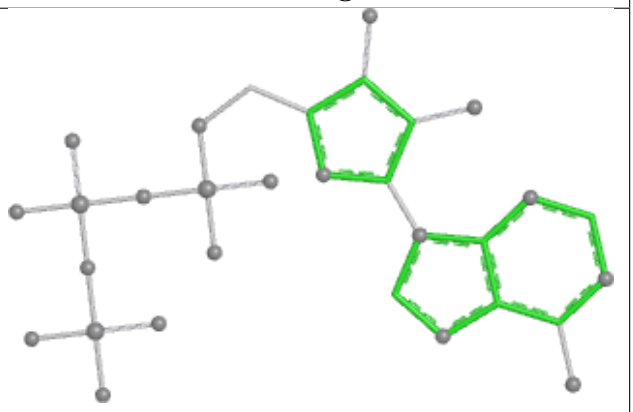
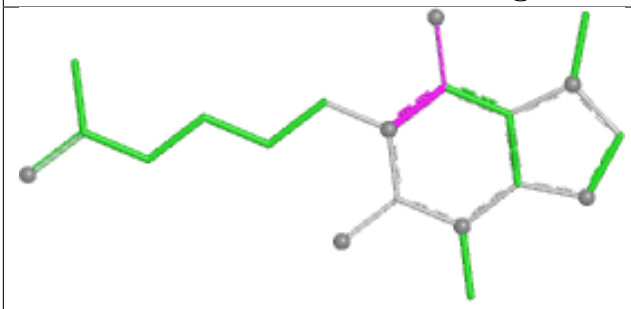
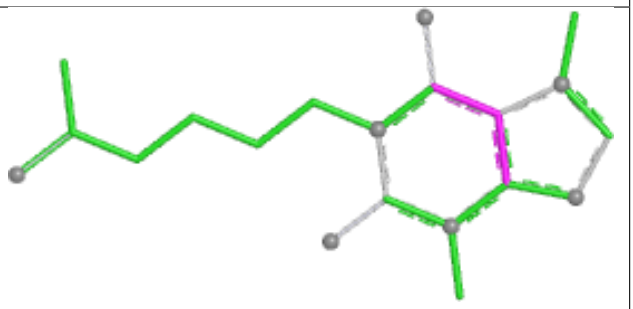


Rings

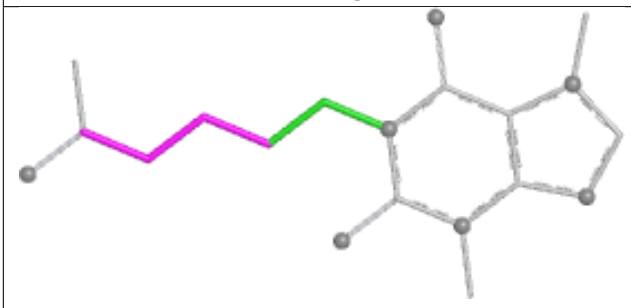
Ligand PNX D 5304



Bond lengths



Bond angles



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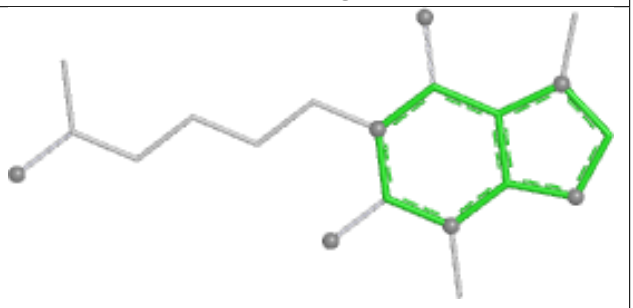
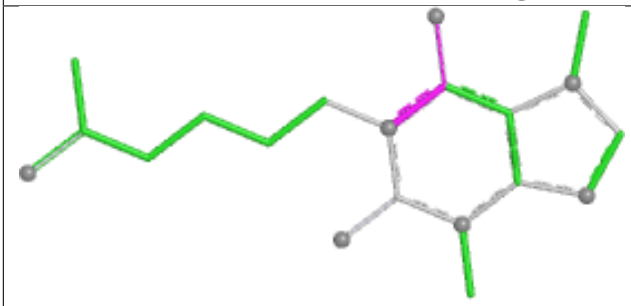
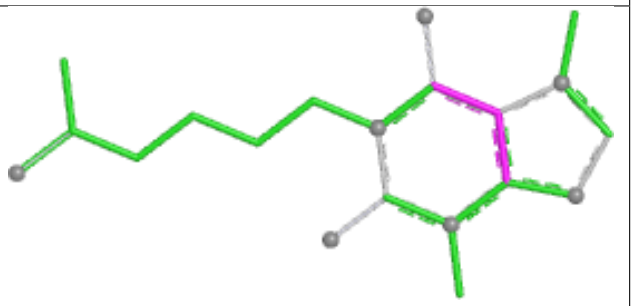


Rings

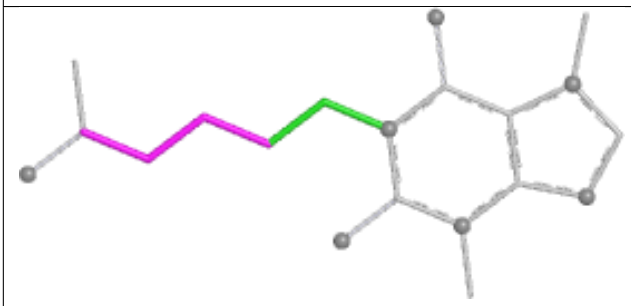
Ligand PNX B 5304



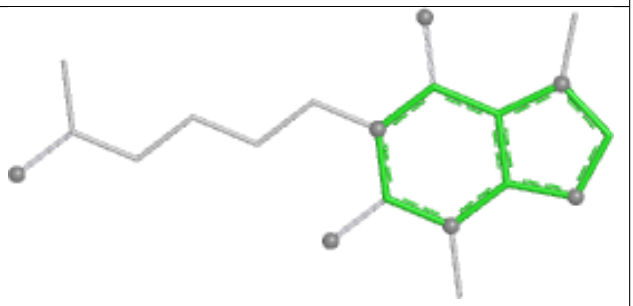
Bond lengths



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.

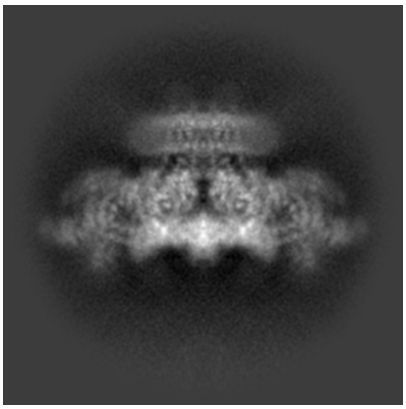
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-47386. These allow visual inspection of the internal detail of the map and identification of artifacts.

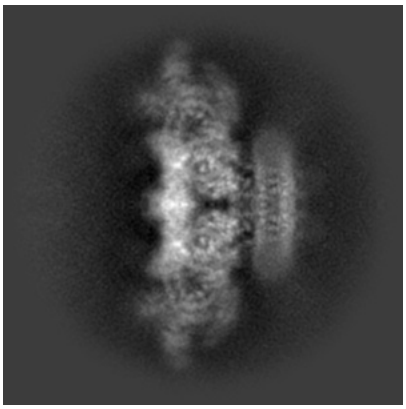
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

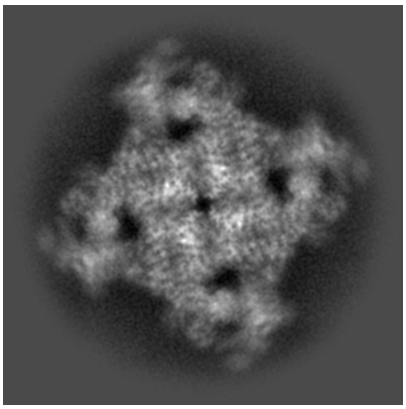
6.1.1 Primary map



X

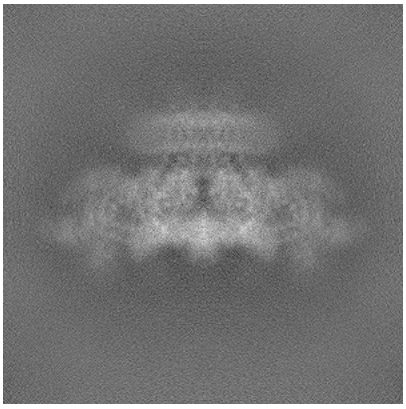


Y

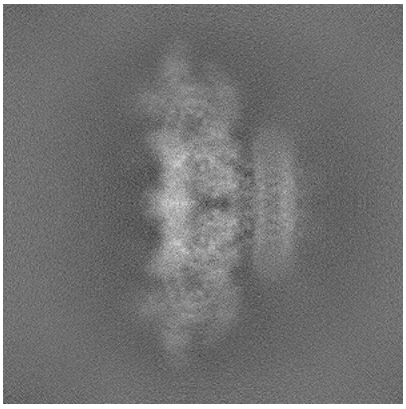


Z

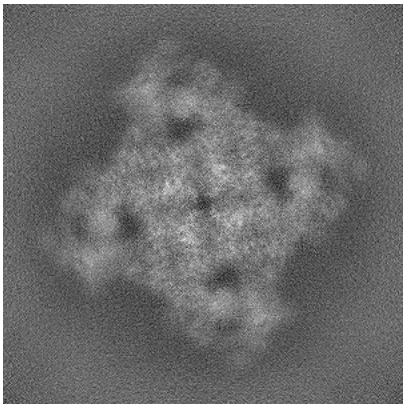
6.1.2 Raw map



X



Y

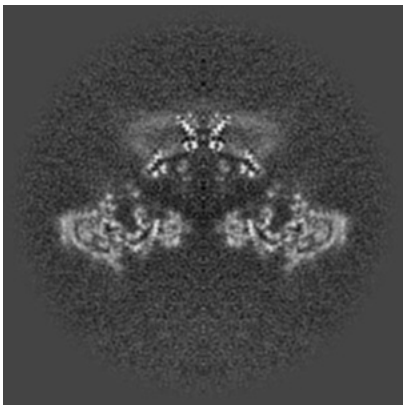


Z

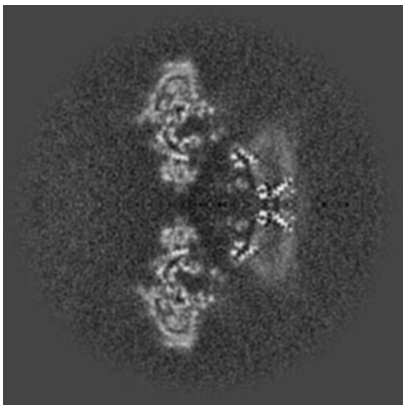
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

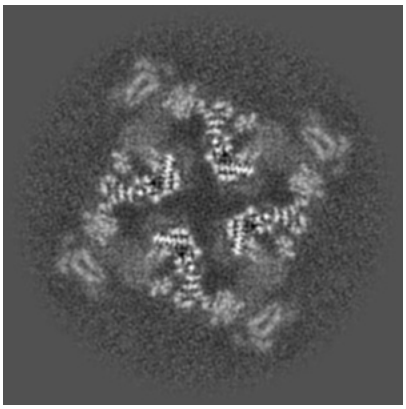
6.2.1 Primary map



X Index: 256

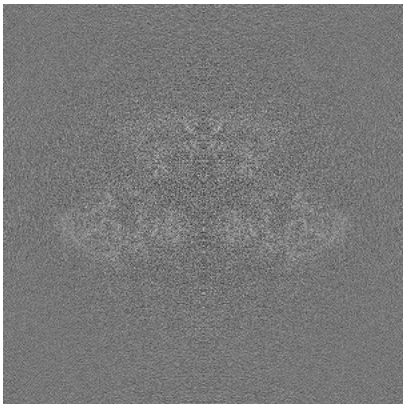


Y Index: 256

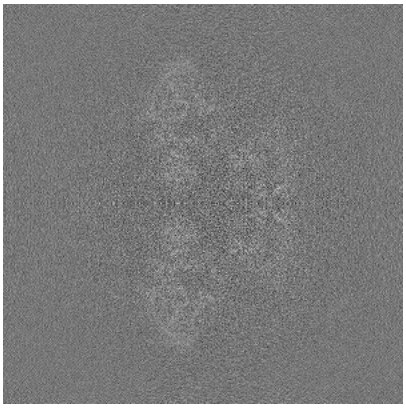


Z Index: 256

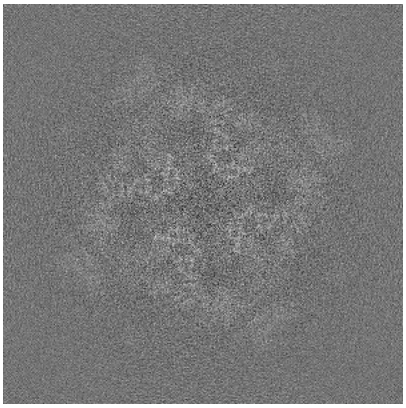
6.2.2 Raw map



X Index: 256



Y Index: 256

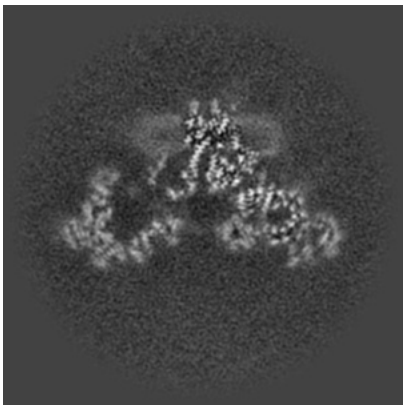


Z Index: 256

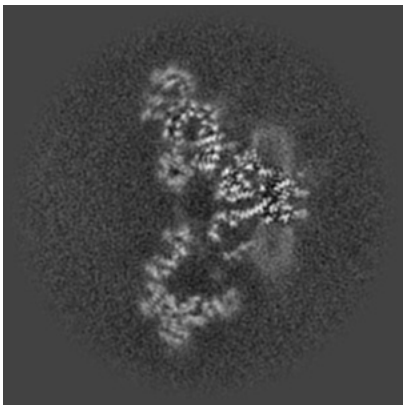
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

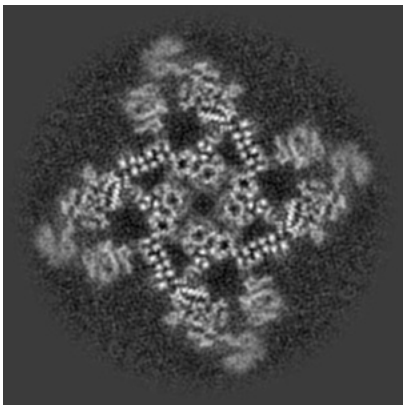
6.3.1 Primary map



X Index: 269

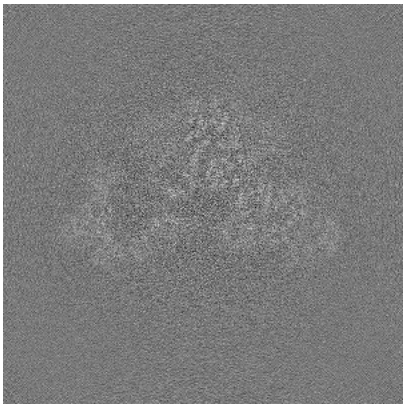


Y Index: 243

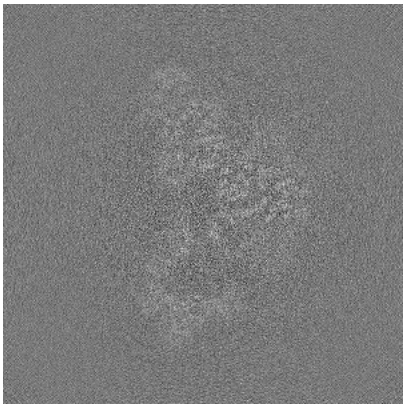


Z Index: 229

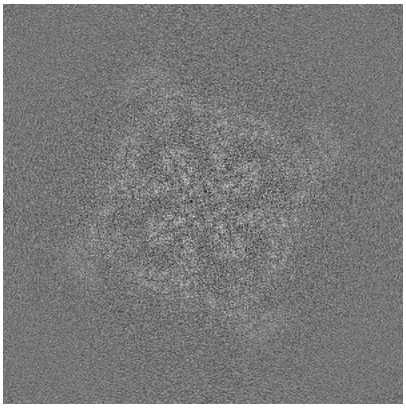
6.3.2 Raw map



X Index: 270



Y Index: 242

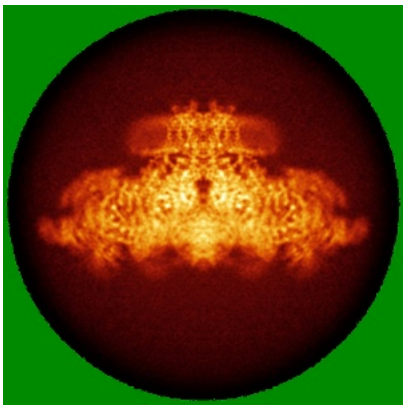


Z Index: 275

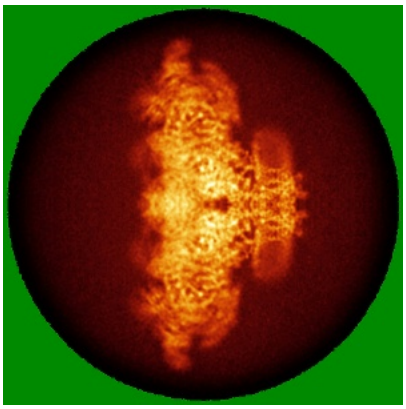
The images above show the largest variance slices of the map in three orthogonal directions.

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

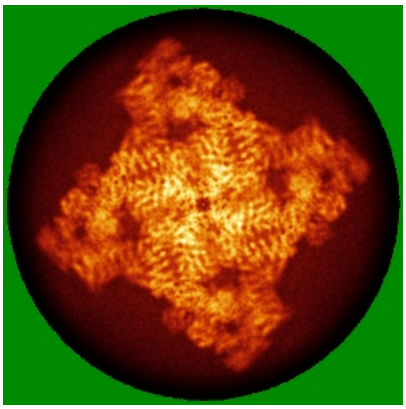
6.4.1 Primary map



X

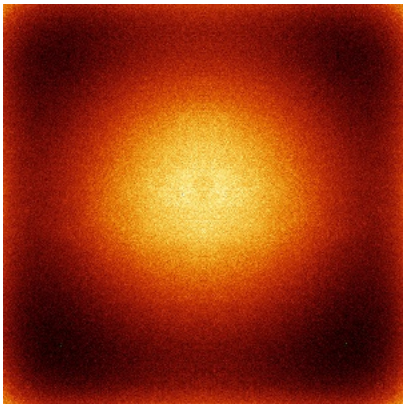


Y

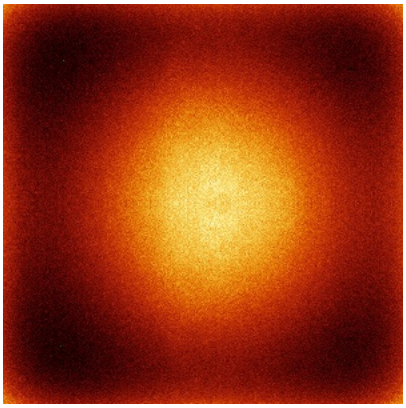


Z

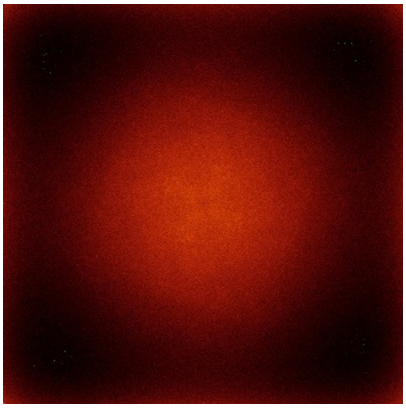
6.4.2 Raw map



X



Y

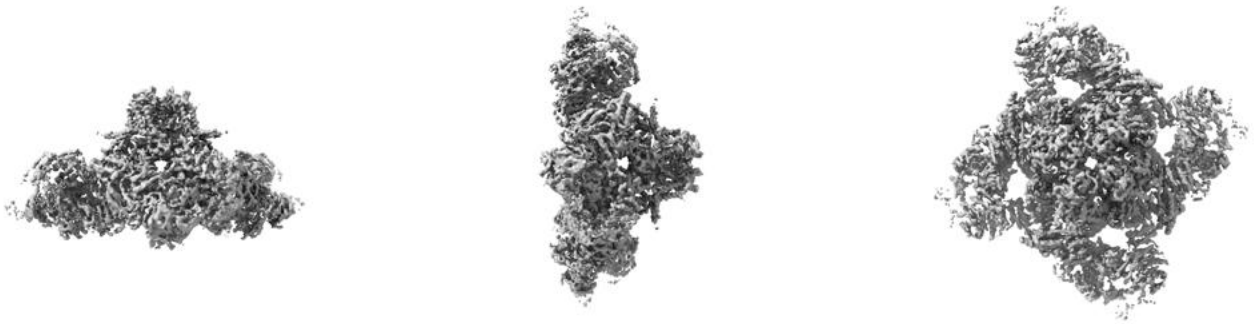


Z

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)

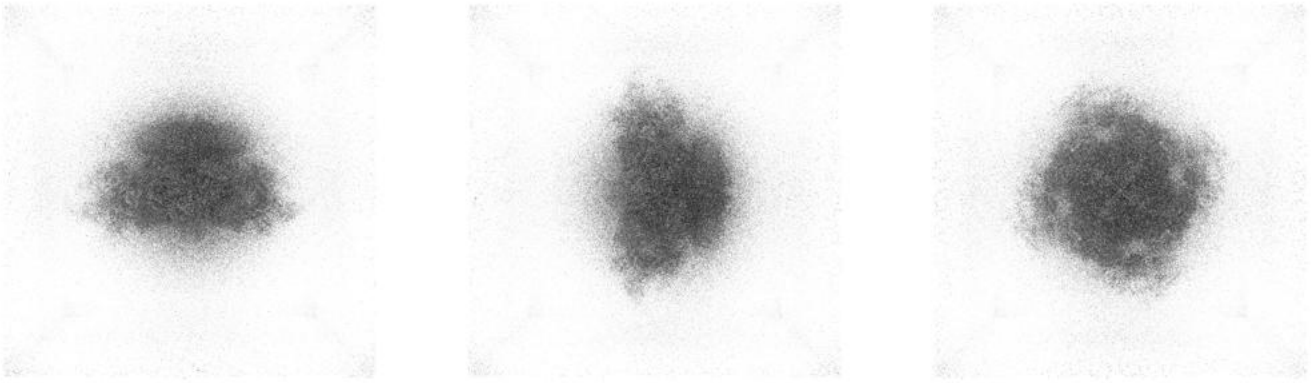
6.5.1 Primary map



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.

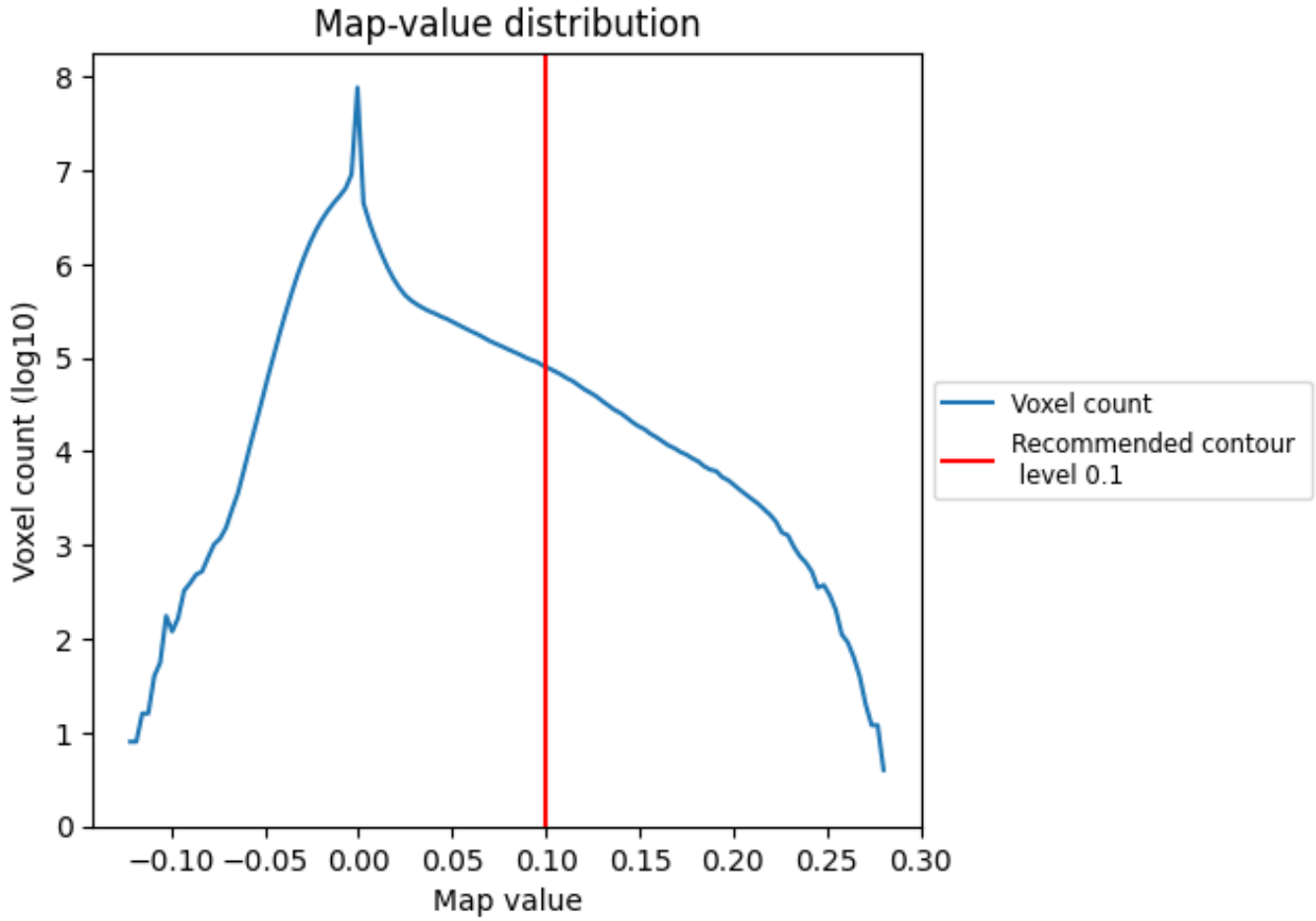
6.6 Mask visualisation (i)

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

7 Map analysis

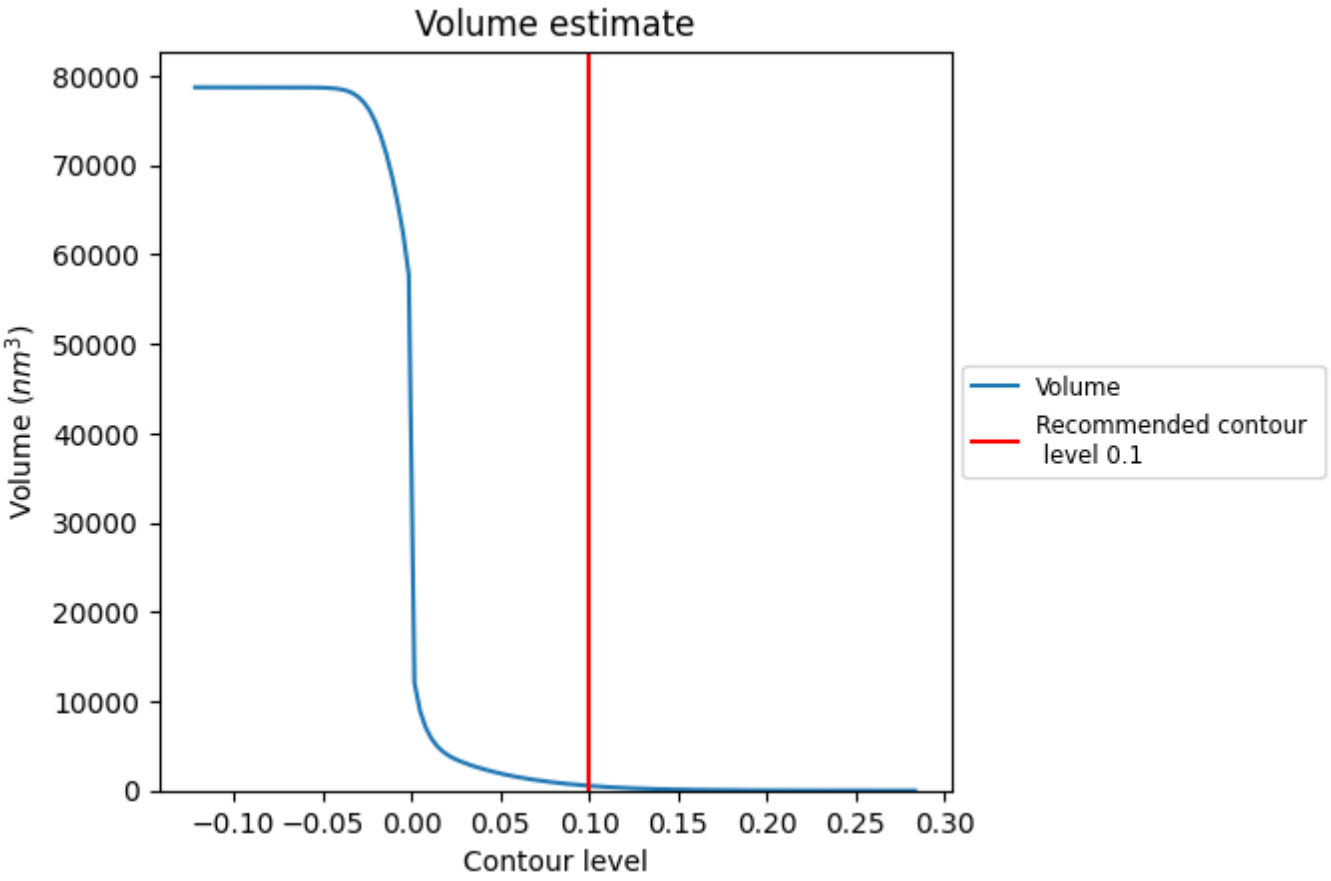
This section contains the results of statistical analysis of the map.

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.

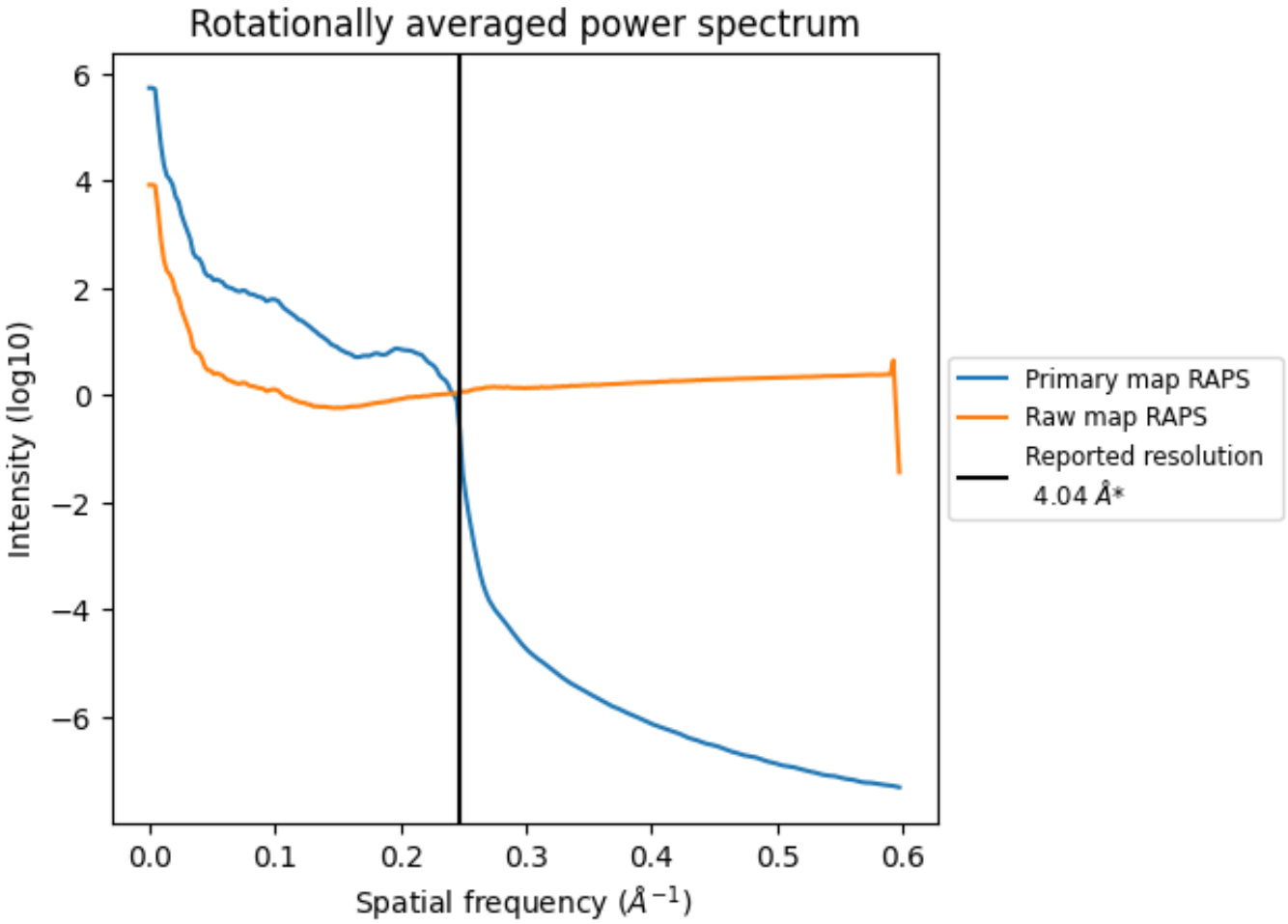
7.2 Volume estimate (i)



The volume at the recommended contour level is 534 nm^3; this corresponds to an approximate mass of 482 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)

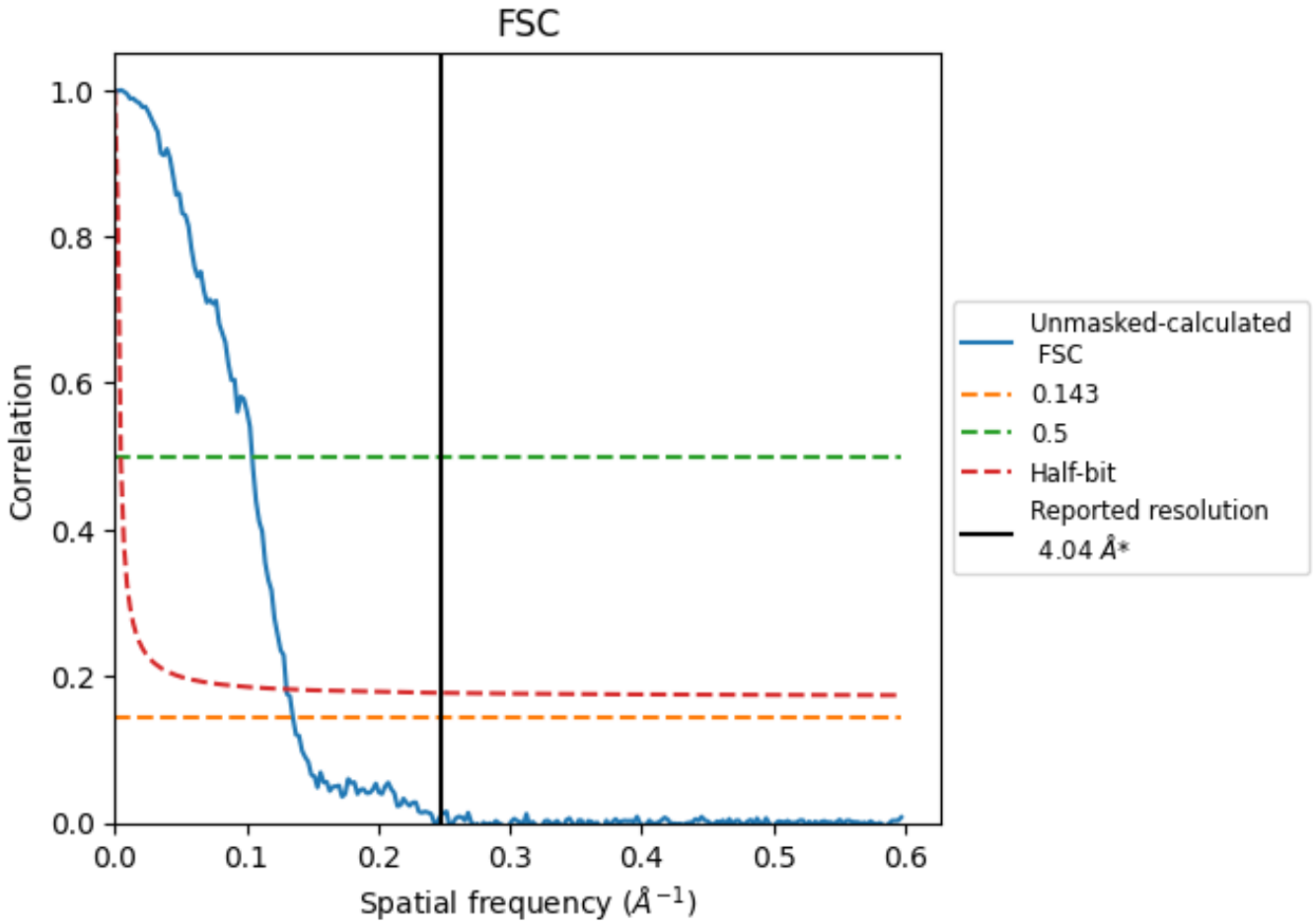


*Reported resolution corresponds to spatial frequency of 0.248 Å^{-1}

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 0.248 Å^{-1}

8.2 Resolution estimates (i)

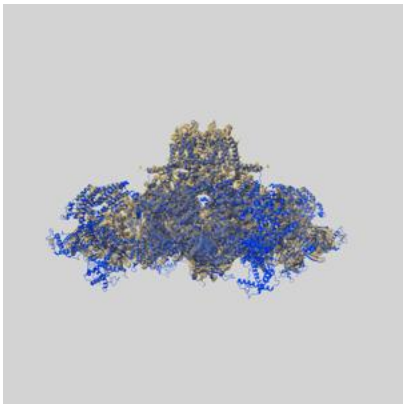
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.04	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	7.39	9.58	7.67

*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 7.39 differs from the reported value 4.04 by more than 10 %

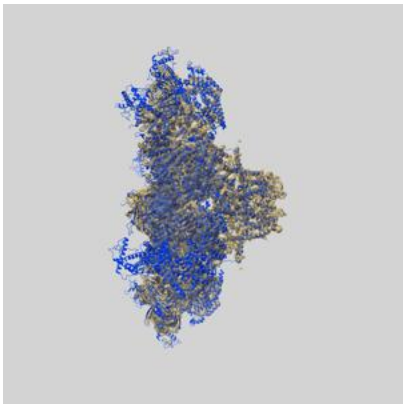
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-47386 and PDB model 9E19. Per-residue inclusion information can be found in section 3 on page 6.

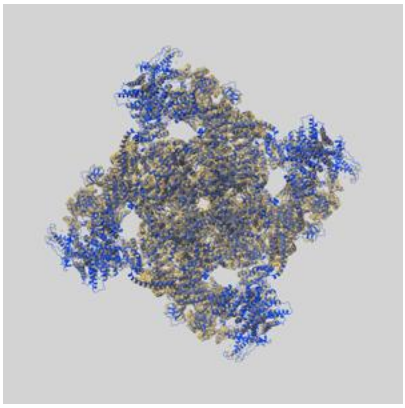
9.1 Map-model overlay



X



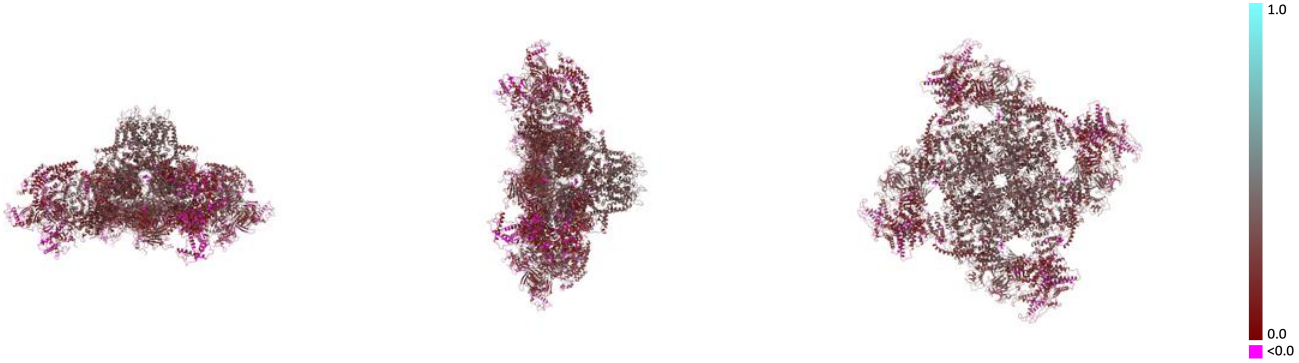
Y



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.

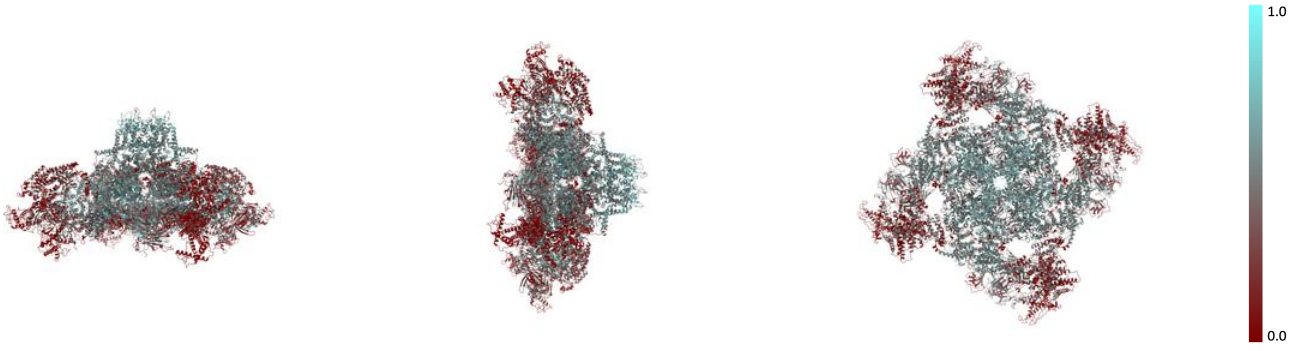
9.2 Q-score mapped to coordinate model



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.

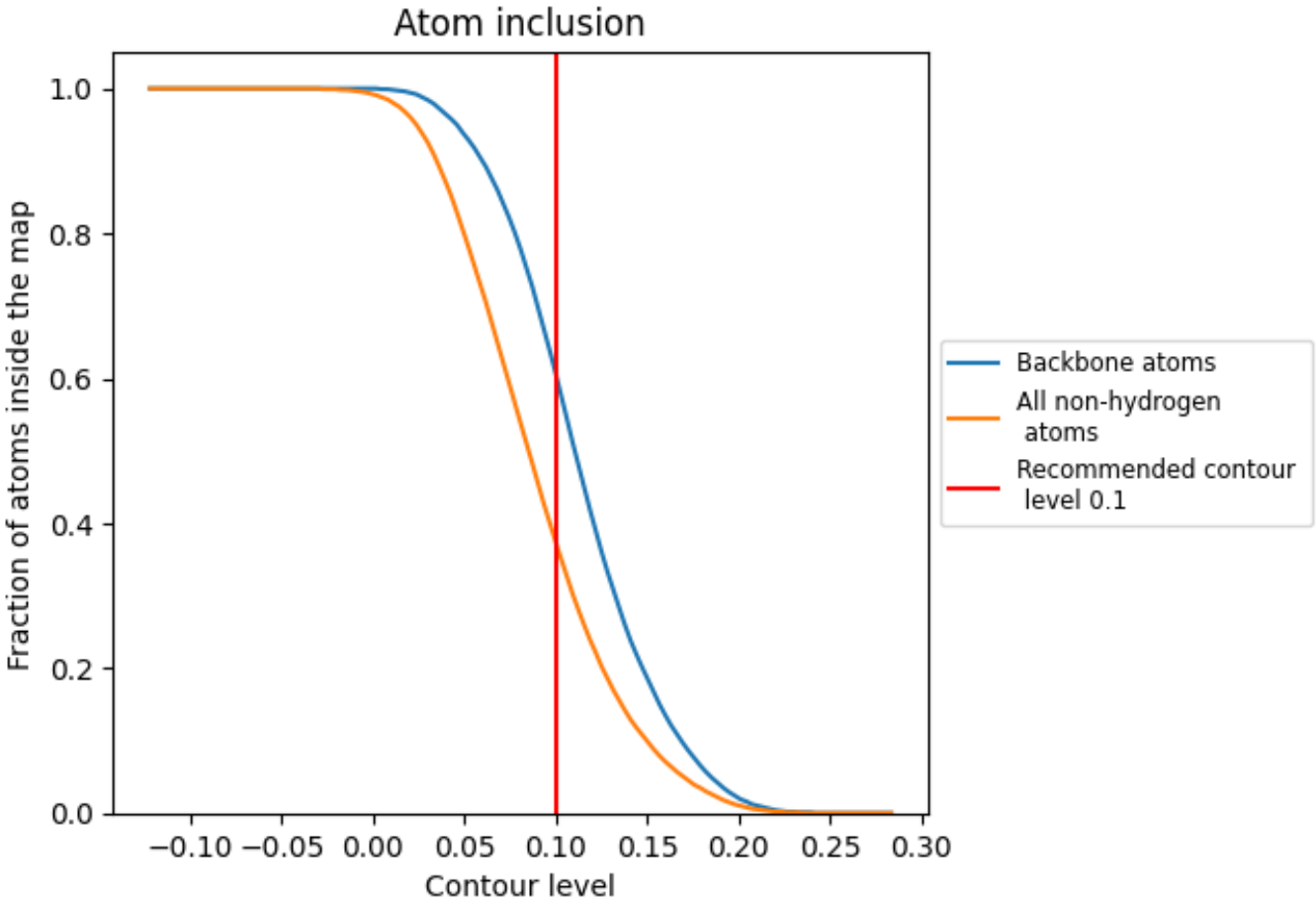
9.3 Atom inclusion mapped to coordinate model



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, 61% of all backbone atoms, 37% 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	0.3740	0.2250
A	0.3800	0.2270
B	0.3770	0.2240
C	0.3780	0.2240
D	0.3790	0.2250
E	0.1930	0.2270
F	0.1950	0.2210
G	0.1980	0.2260
H	0.1910	0.2270