



wwPDB EM Validation Summary Report ⓘ

Jul 10, 2023 – 12:06 PM EDT

PDB ID : 8SEP
EMDB ID : EMD-40424
Title : Cryo-EM Structure of RyR1 + ADP
Authors : Cholak, S.; Saville, J.W.; Zhu, X.; Berezuk, A.M.; Tuttle, K.S.; Haji-Ghassemi, O.; Van Petegem, F.; Subramaniam, S.
Deposited on : 2023-04-10
Resolution : 3.57 Å(reported)

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

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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.dev50
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.34

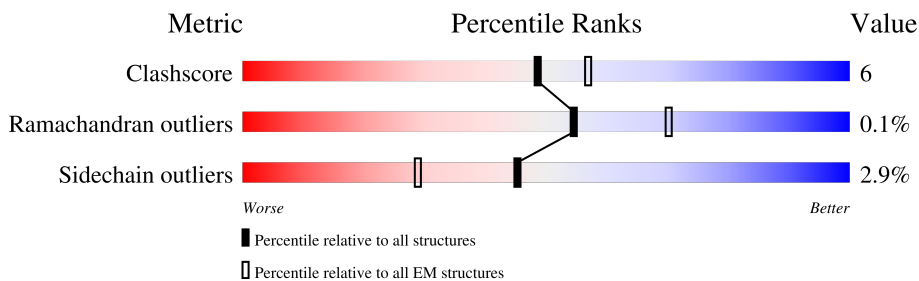
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 3.57 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	
1	B	5037	
1	C	5037	
1	D	5037	
2	E	350	
2	F	350	
2	G	350	
2	H	350	

2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 143100 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
			Total	C	N	O	S		
1	A	4379	34929	22223	6026	6444	236	9	0
1	B	4379	34929	22223	6026	6444	236	9	0
1	C	4379	34929	22223	6026	6444	236	9	0
1	D	4379	34929	22223	6026	6444	236	9	0

- Molecule 2 is a protein called Glutathione S-transferase class-mu 26 kDa isozyme,Peptidyl-prolyl cis-trans isomerase FKBP1B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	E	107	818	516	144	154	4	0	0
2	F	107	818	516	144	154	4	0	0
2	G	107	818	516	144	154	4	0	0
2	H	107	818	516	144	154	4	0	0

There are 100 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
E	-242	MET	-	expression tag	UNP P08515
E	-241	LYS	-	expression tag	UNP P08515
E	-240	SER	-	expression tag	UNP P08515
E	-239	SER	-	expression tag	UNP P08515
E	-238	HIS	-	expression tag	UNP P08515
E	-237	HIS	-	expression tag	UNP P08515
E	-236	HIS	-	expression tag	UNP P08515
E	-235	HIS	-	expression tag	UNP P08515

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-234	HIS	-	expression tag	UNP P08515
E	-233	HIS	-	expression tag	UNP P08515
E	-232	GLY	-	expression tag	UNP P08515
E	-231	SER	-	expression tag	UNP P08515
E	-230	SER	-	expression tag	UNP P08515
E	-11	GLY	-	linker	UNP P08515
E	-10	ILE	-	linker	UNP P08515
E	-9	GLU	-	linker	UNP P08515
E	-8	GLU	-	linker	UNP P08515
E	-7	ASN	-	linker	UNP P08515
E	-6	LEU	-	linker	UNP P08515
E	-5	TYR	-	linker	UNP P08515
E	-4	PHE	-	linker	UNP P08515
E	-3	GLN	-	linker	UNP P08515
E	-2	SER	-	linker	UNP P08515
E	-1	ASN	-	linker	UNP P08515
E	0	ALA	-	linker	UNP P08515
F	-242	MET	-	expression tag	UNP P08515
F	-241	LYS	-	expression tag	UNP P08515
F	-240	SER	-	expression tag	UNP P08515
F	-239	SER	-	expression tag	UNP P08515
F	-238	HIS	-	expression tag	UNP P08515
F	-237	HIS	-	expression tag	UNP P08515
F	-236	HIS	-	expression tag	UNP P08515
F	-235	HIS	-	expression tag	UNP P08515
F	-234	HIS	-	expression tag	UNP P08515
F	-233	HIS	-	expression tag	UNP P08515
F	-232	GLY	-	expression tag	UNP P08515
F	-231	SER	-	expression tag	UNP P08515
F	-230	SER	-	expression tag	UNP P08515
F	-11	GLY	-	linker	UNP P08515
F	-10	ILE	-	linker	UNP P08515
F	-9	GLU	-	linker	UNP P08515
F	-8	GLU	-	linker	UNP P08515
F	-7	ASN	-	linker	UNP P08515
F	-6	LEU	-	linker	UNP P08515
F	-5	TYR	-	linker	UNP P08515
F	-4	PHE	-	linker	UNP P08515
F	-3	GLN	-	linker	UNP P08515
F	-2	SER	-	linker	UNP P08515
F	-1	ASN	-	linker	UNP P08515
F	0	ALA	-	linker	UNP P08515

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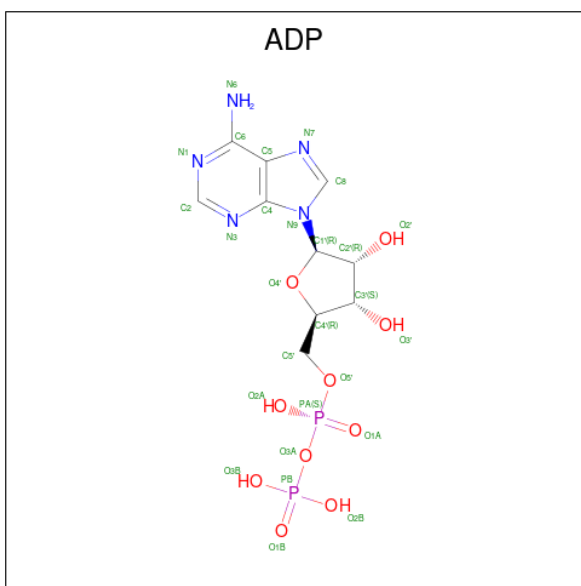
Chain	Residue	Modelled	Actual	Comment	Reference
G	-242	MET	-	expression tag	UNP P08515
G	-241	LYS	-	expression tag	UNP P08515
G	-240	SER	-	expression tag	UNP P08515
G	-239	SER	-	expression tag	UNP P08515
G	-238	HIS	-	expression tag	UNP P08515
G	-237	HIS	-	expression tag	UNP P08515
G	-236	HIS	-	expression tag	UNP P08515
G	-235	HIS	-	expression tag	UNP P08515
G	-234	HIS	-	expression tag	UNP P08515
G	-233	HIS	-	expression tag	UNP P08515
G	-232	GLY	-	expression tag	UNP P08515
G	-231	SER	-	expression tag	UNP P08515
G	-230	SER	-	expression tag	UNP P08515
G	-11	GLY	-	linker	UNP P08515
G	-10	ILE	-	linker	UNP P08515
G	-9	GLU	-	linker	UNP P08515
G	-8	GLU	-	linker	UNP P08515
G	-7	ASN	-	linker	UNP P08515
G	-6	LEU	-	linker	UNP P08515
G	-5	TYR	-	linker	UNP P08515
G	-4	PHE	-	linker	UNP P08515
G	-3	GLN	-	linker	UNP P08515
G	-2	SER	-	linker	UNP P08515
G	-1	ASN	-	linker	UNP P08515
G	0	ALA	-	linker	UNP P08515
H	-242	MET	-	expression tag	UNP P08515
H	-241	LYS	-	expression tag	UNP P08515
H	-240	SER	-	expression tag	UNP P08515
H	-239	SER	-	expression tag	UNP P08515
H	-238	HIS	-	expression tag	UNP P08515
H	-237	HIS	-	expression tag	UNP P08515
H	-236	HIS	-	expression tag	UNP P08515
H	-235	HIS	-	expression tag	UNP P08515
H	-234	HIS	-	expression tag	UNP P08515
H	-233	HIS	-	expression tag	UNP P08515
H	-232	GLY	-	expression tag	UNP P08515
H	-231	SER	-	expression tag	UNP P08515
H	-230	SER	-	expression tag	UNP P08515
H	-11	GLY	-	linker	UNP P08515
H	-10	ILE	-	linker	UNP P08515
H	-9	GLU	-	linker	UNP P08515
H	-8	GLU	-	linker	UNP P08515

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Chain	Residue	Modelled	Actual	Comment	Reference
H	-7	ASN	-	linker	UNP P08515
H	-6	LEU	-	linker	UNP P08515
H	-5	TYR	-	linker	UNP P08515
H	-4	PHE	-	linker	UNP P08515
H	-3	GLN	-	linker	UNP P08515
H	-2	SER	-	linker	UNP P08515
H	-1	ASN	-	linker	UNP P08515
H	0	ALA	-	linker	UNP P08515

- Molecule 3 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
3	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
3	B	1	Total	C	N	O	P	0
			27	10	5	10	2	
3	C	1	Total	C	N	O	P	0
			27	10	5	10	2	
3	D	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

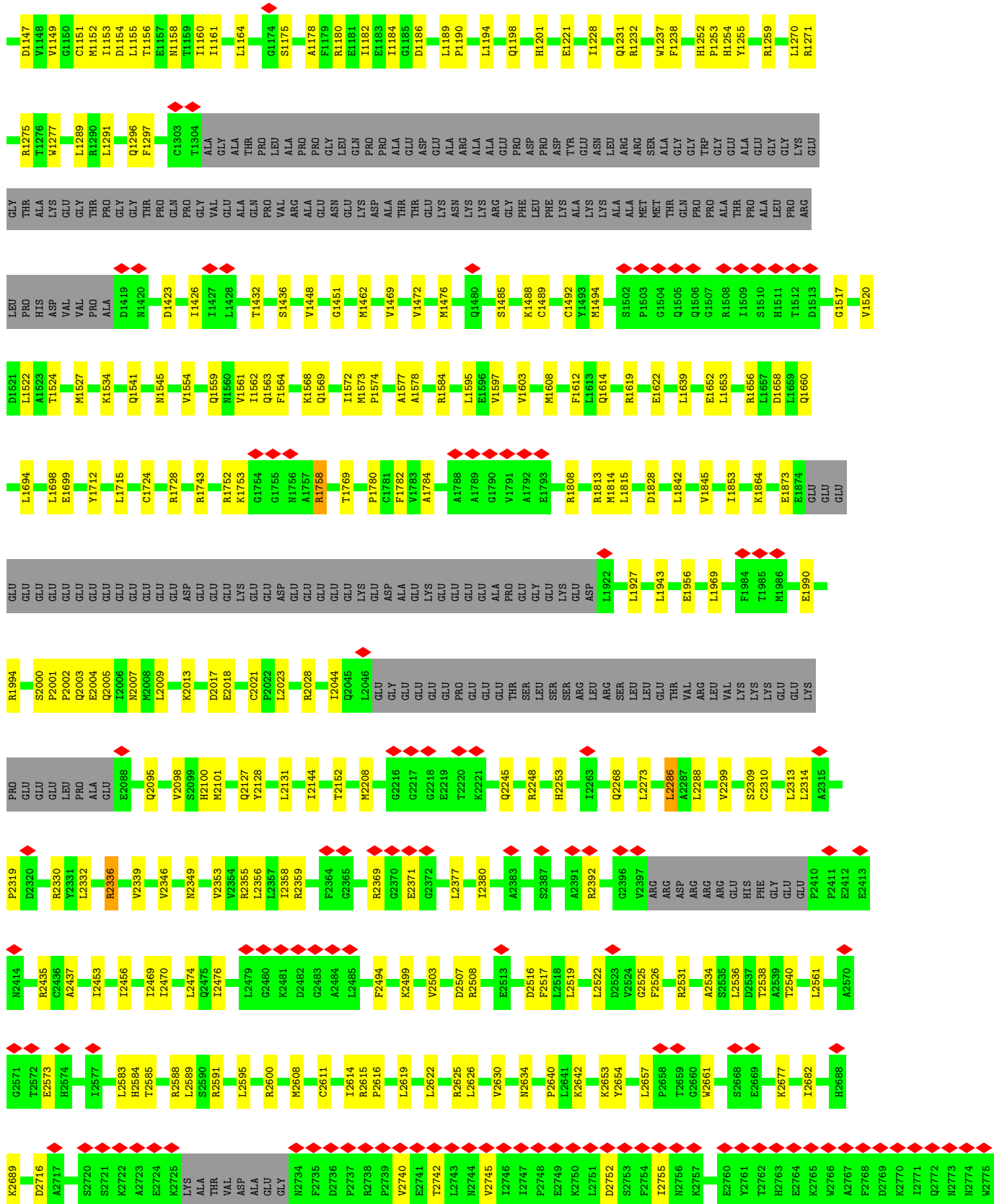
Mol	Chain	Residues	Atoms		AltConf
4	A	1	Total 1	Zn 1	0
4	B	1	Total 1	Zn 1	0
4	C	1	Total 1	Zn 1	0
4	D	1	Total 1	Zn 1	0

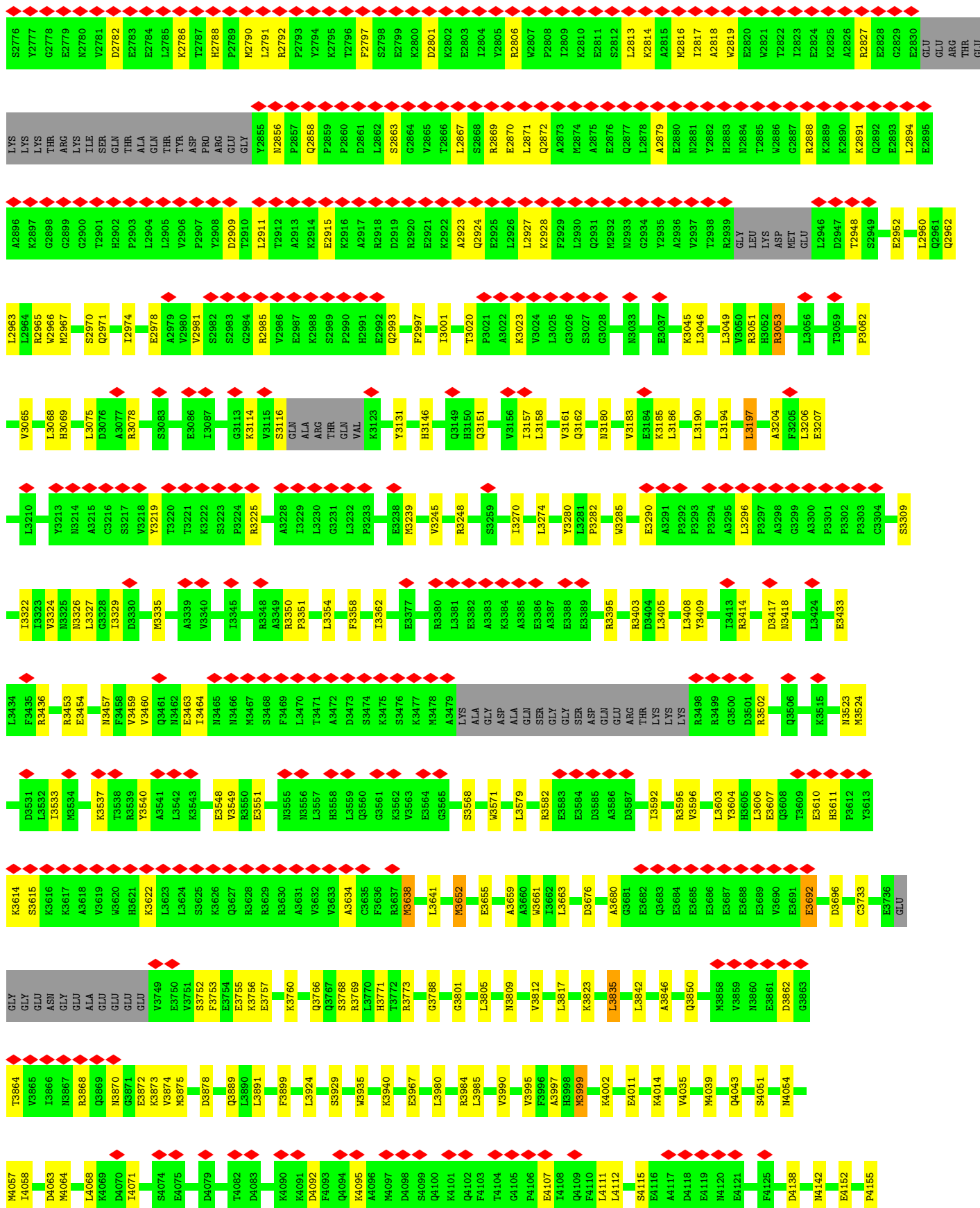
3 Residue-property plots

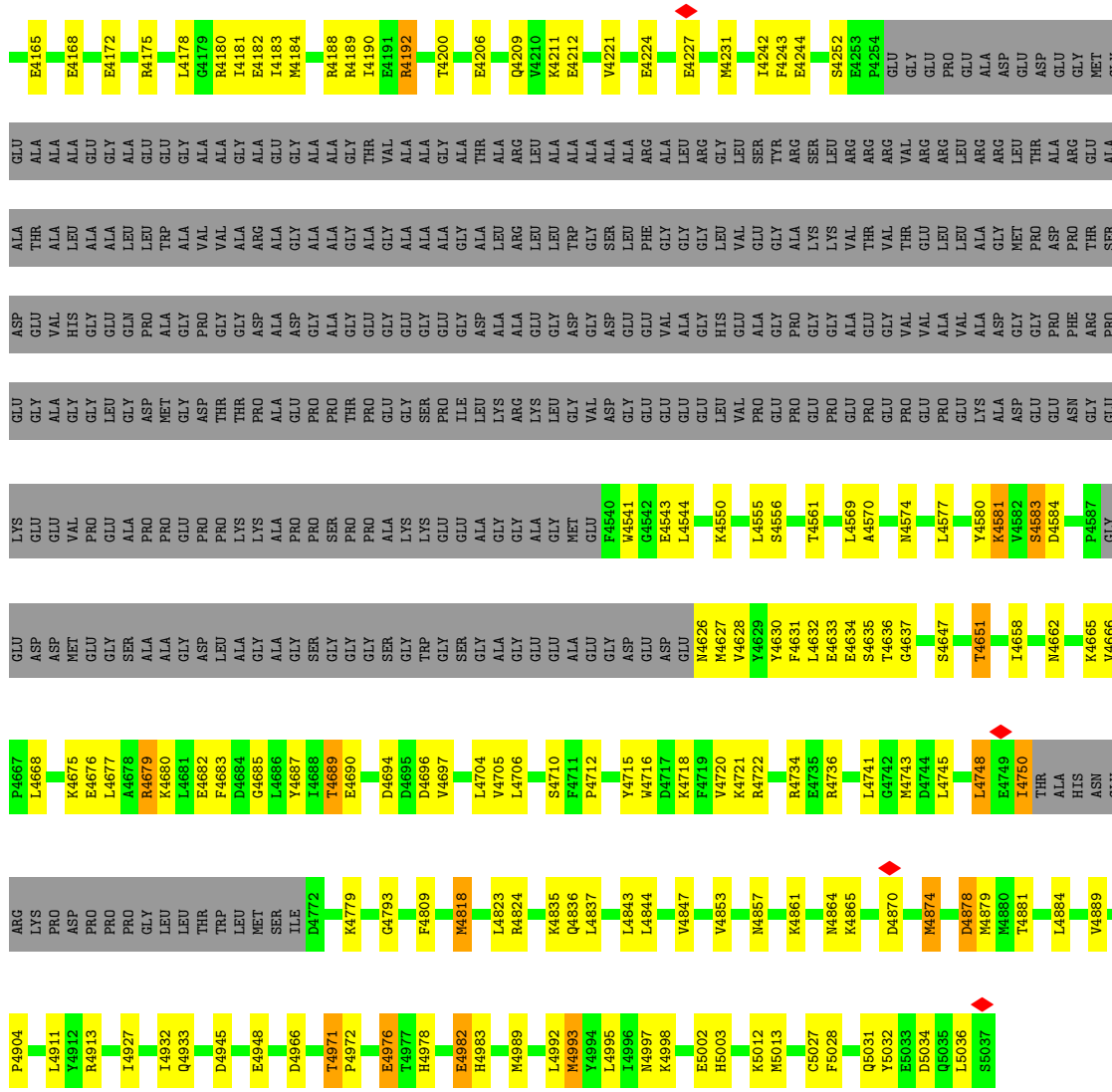
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

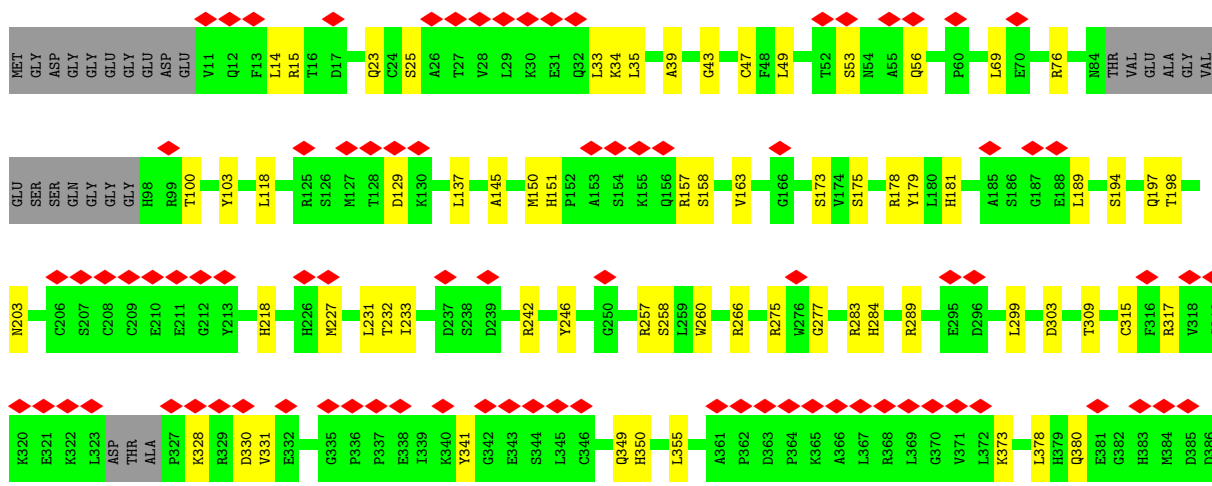


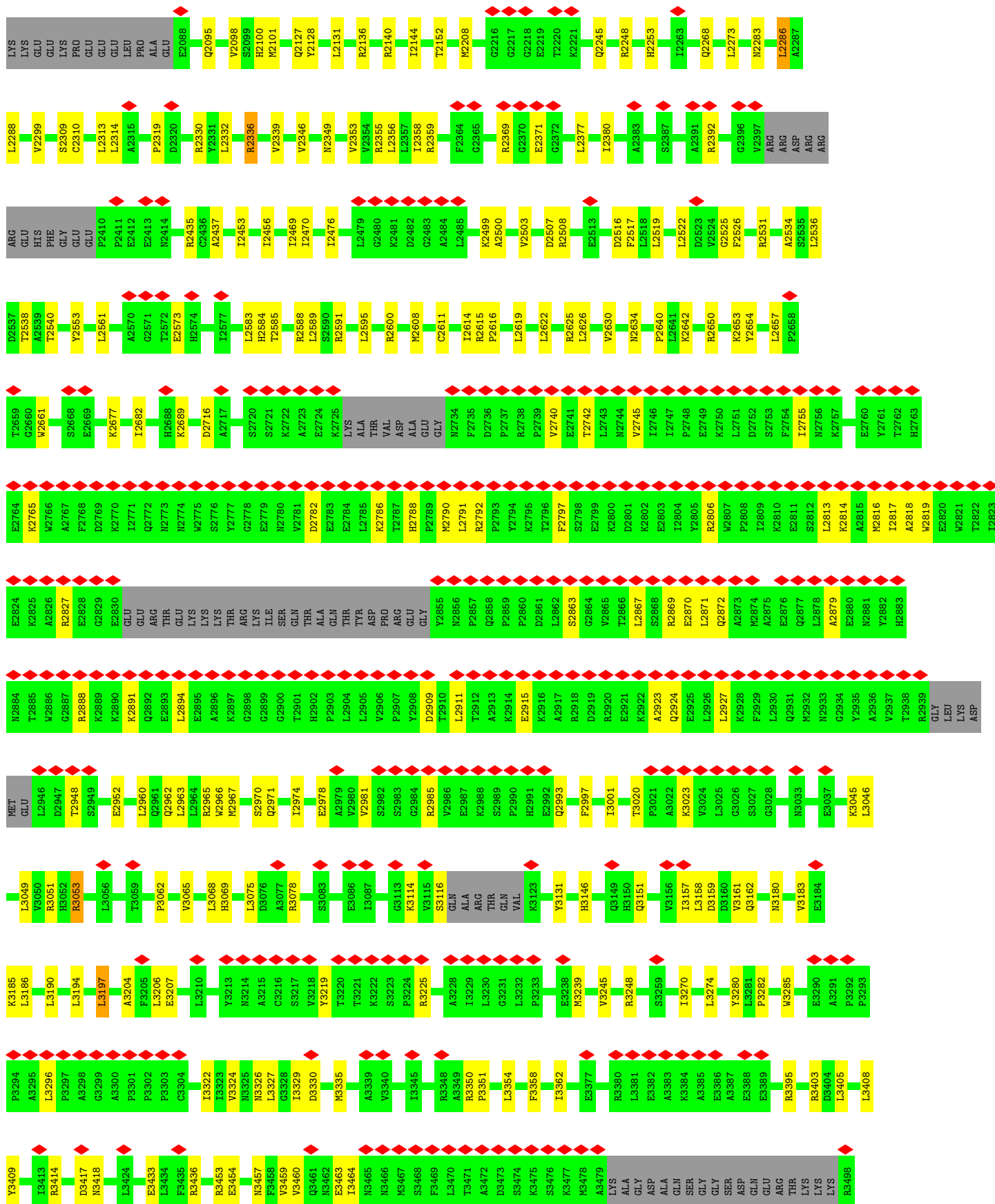






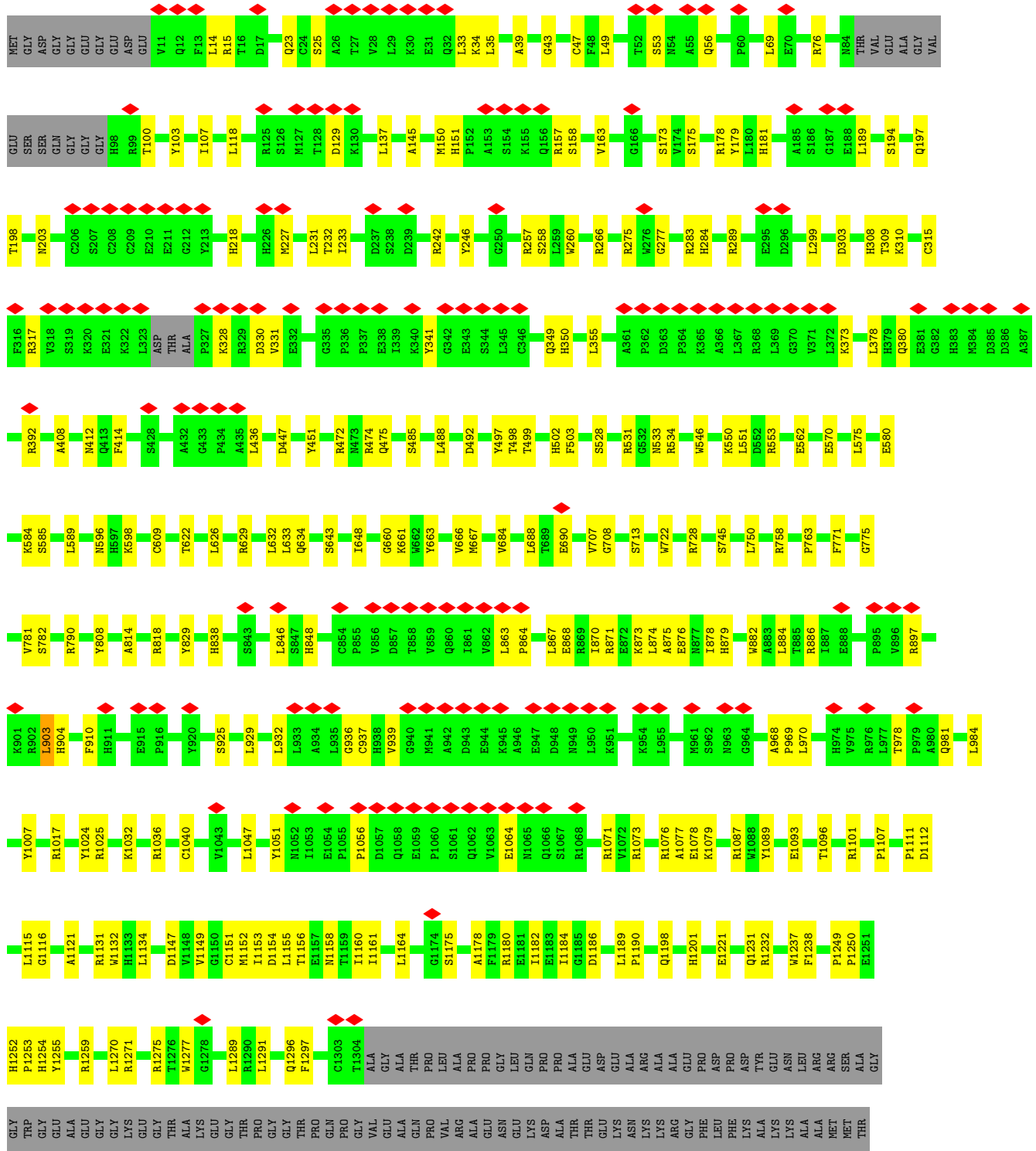
• Molecule 1: Ryanodine receptor 1

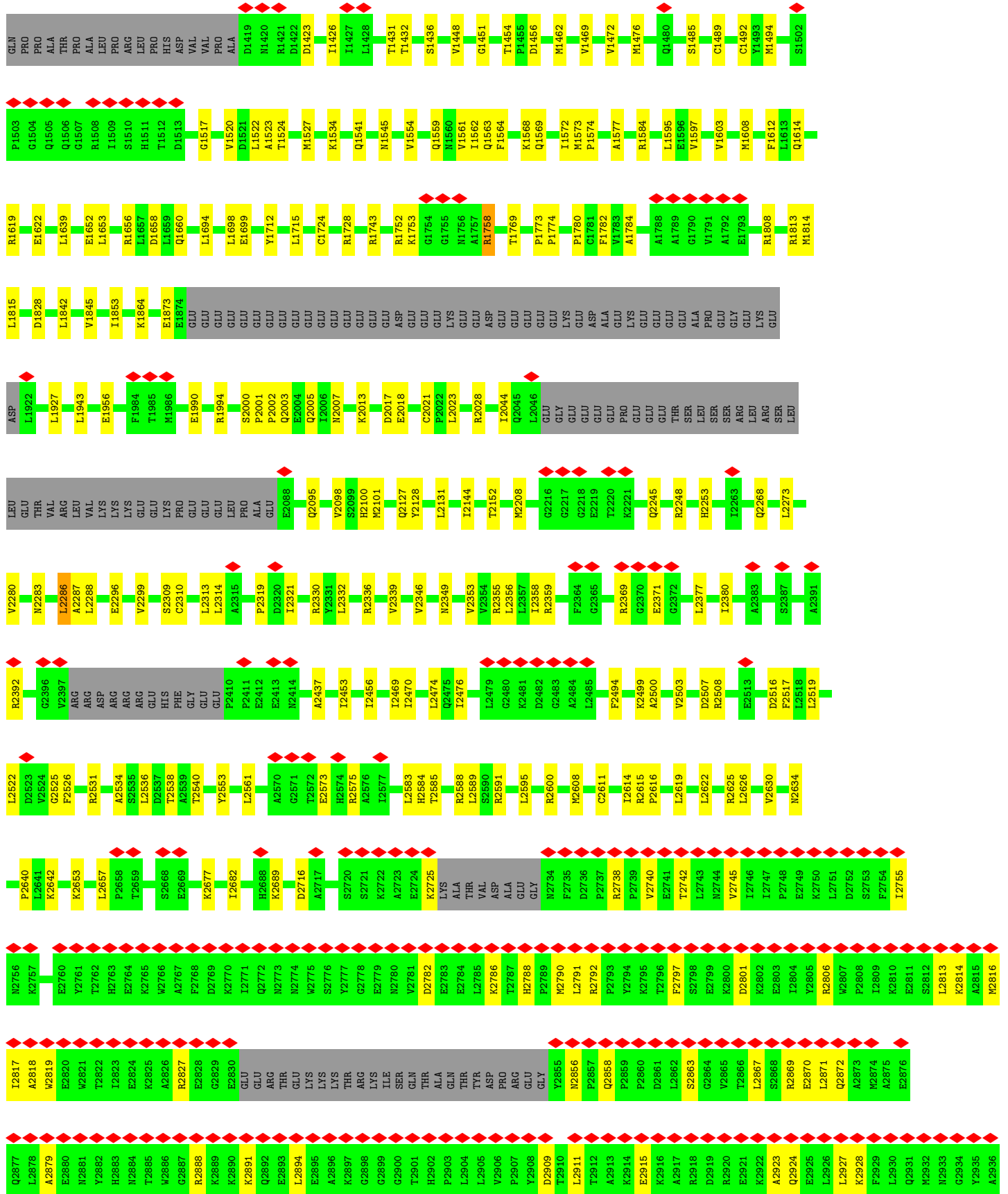




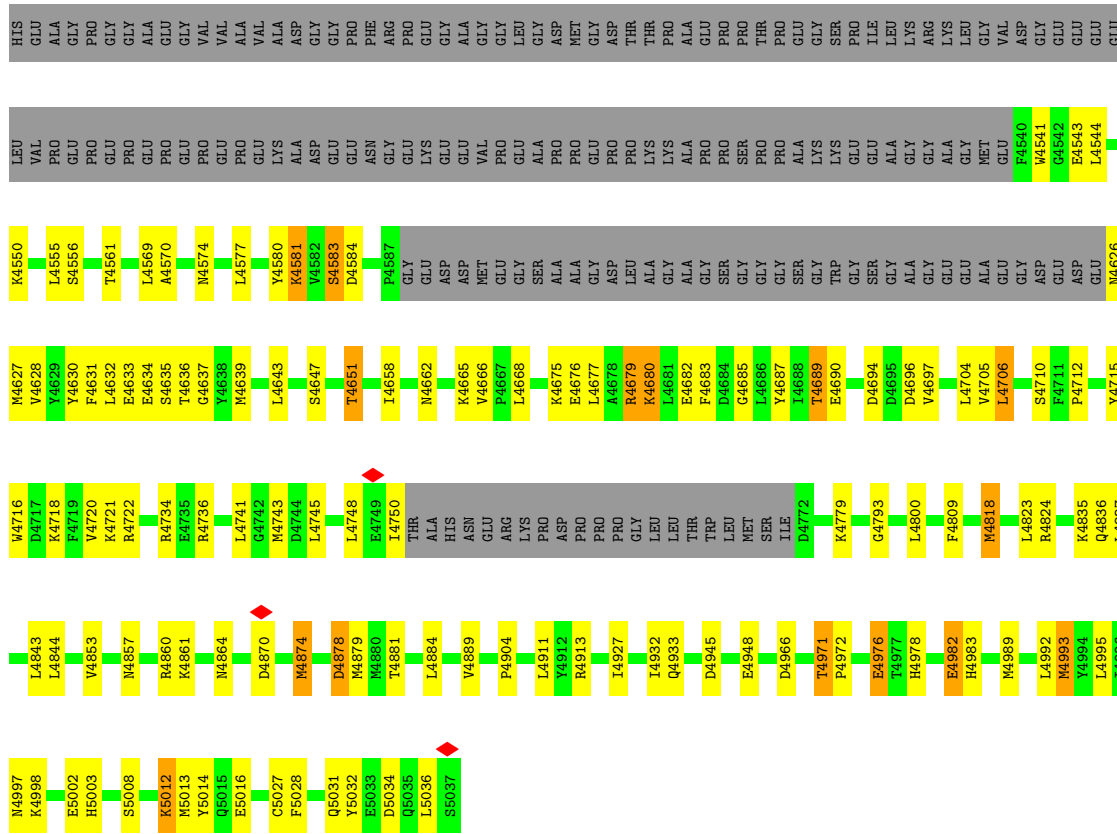


● Molecule 1: Ryanodine receptor 1

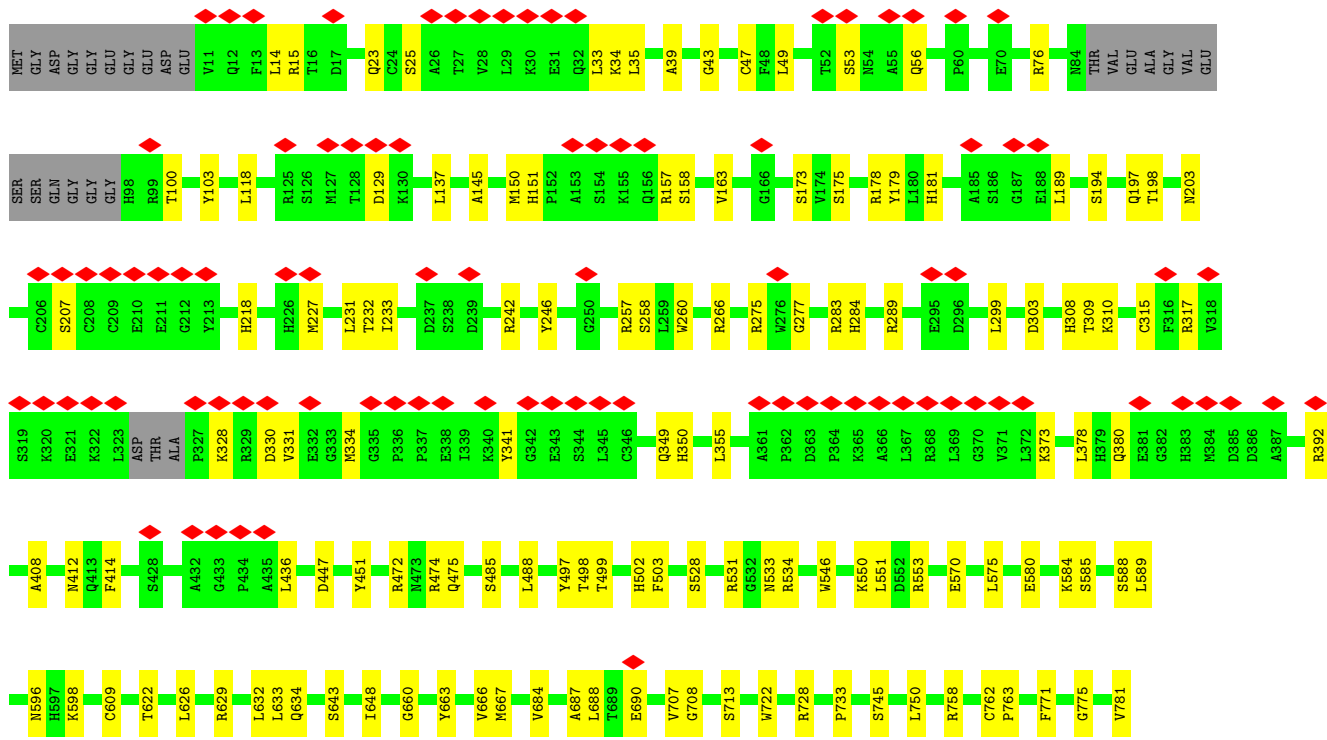


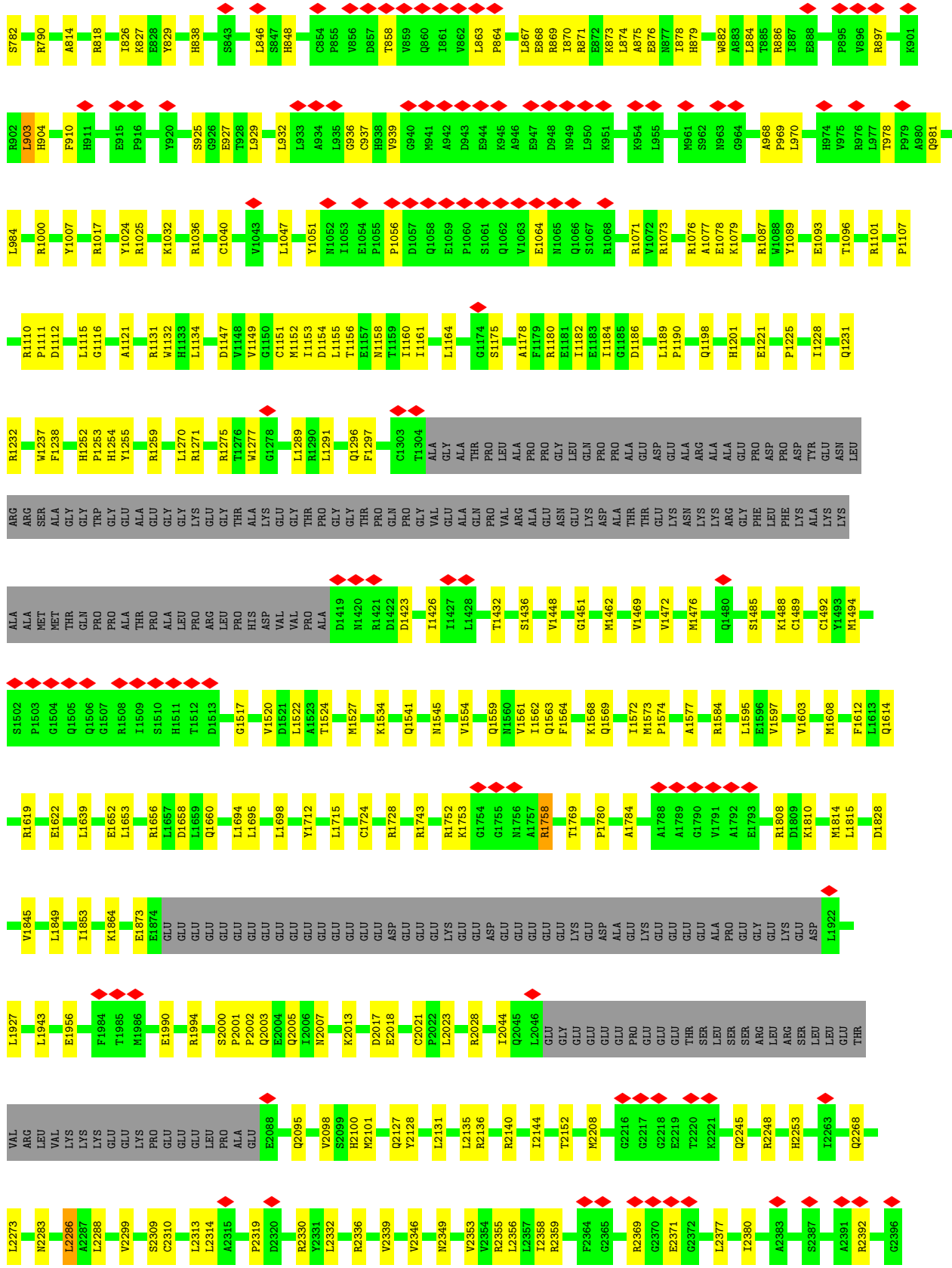


V2937	L3025	A3383	E5583	D3676	N3809	A3997	E4107	E4239	GLY
T2938	G3026	K3384	E3584	A3680	V3812	H3998	T4108	I4242	LEU
R2939	S3027	A3385	D3585	G3681	V3817	M3999	Q4109	F4243	SER
LEU	G3028	E3386	A3586	E3682	L3817	K4002	F4110	E4244	TYR
LYS	N3033	A3387	D3587	Q3683	L3835	L4003	L4111	S4252	ALA
ASP	E3037	E3388	I3592	E3684	L3842	Q4009	L4112	S4253	SER
MET	K3045	E3389	R3595	E3685	A3846	T4010	S4115	P4254	LEU
GLU	L3046	R3395	R3596	E3686	A3846	E4011	A4116	F4254	ARG
L2946	K3046	R3403	R3596	E3687	Q3850	E4014	A4117	G4254	VAL
L2947	L3049	L3403	L3603	E3688	Q3850	K4014	D4118	L4254	THR
T2948	V3049	D3404	Y3604	E3689	M3858	V4035	E4119	M4120	GLU
S2949	V3050	L3405	H3605	V3690	V3859	M4039	M4120	E4121	LEU
E2952	R3051	L3405	L3606	E3691	N3860	Q4043	M4121	F4125	ALA
L2960	H3052	L3408	H3606	E3692	N3860	Q4043	F4125	F4125	ARG
H2961	R3053	L3413	T3609	D3696	E3861	S4051	E4152	E4152	GLY
H2962	L3056	R3414	E3610	D3696	D3862	M4054	E4152	E4152	THR
L2963	L3056	R3414	E3611	C3733	G3863	M4054	P4155	P4155	MET
L2964	T3059	D3417	H3611	E3736	T3864	M4057	P4155	P4155	GLY
R2965	P3062	N3418	P3612	GLY	V3865	I4058	E4165	E4165	ALA
H2966	V3065	R3424	Y3613	GLY	I3866	L4059	E4168	E4168	ALA
H2967	L3068	L3424	K3614	GLY	N3867	D4063	E4172	E4172	ALA
S2970	H3069	E3433	S3615	GLY	R3868	M4064	E4172	E4172	ALA
Q2971	L3075	L3434	K3616	ASN	Q3869	L4068	R4175	R4175	ALA
L2974	D3076	L3434	K3617	GLY	G3871	K4069	L4178	L4178	ALA
E2978	A3077	R3453	A3618	ALA	G3871	D4070	G4179	G4179	ALA
A2979	R3078	E3454	V3619	GLU	E3872	I4071	R4180	R4180	ALA
V2980	S3083	E3454	W3620	GLU	K3873	I4071	I4181	I4181	ALA
V2981	E3086	N3457	H3621	GLU	M3875	S4074	E4182	E4182	ALA
S2982	I3087	F3458	K3622	GLY	D3878	E4075	I4183	I4183	ALA
S2983	V3107	V3459	L3623	V3749	Q3889	D4075	M4184	M4184	ALA
G2984	G3113	R3460	L3624	E3750	L3890	D4079	R4188	R4188	ALA
R2985	K3114	Q3461	S3625	V3751	L3891	M4079	R4189	R4189	ALA
V2986	V3115	L3462	K3626	F3752	L3924	T4082	I4190	I4190	ALA
E2987	S3116	E3463	Q3627	E3753	S3929	D4083	E4191	E4191	ALA
R2988	GLN	L3464	R3628	E3755	W3935	K4090	E4191	E4191	ALA
S2989	ALA	L3466	R3630	K3756	M3935	F4091	T4200	T4200	ALA
P2990	ARG	L3466	A3631	E3757	K3940	D4092	E4206	E4206	ALA
H2991	THR	S3468	V3632	K3760	Q3935	F4093	E4206	E4206	ALA
E2992	VAL	F3468	V3633	Q3766	M3935	Q4094	Q4209	Q4209	ALA
Q2993	VAL	L3470	A3634	Q3767	K3940	K4095	V4210	V4210	ALA
F2997	VAL	T3471	F3636	S3768	E3987	A4096	K4211	K4211	ALA
I3001	VAL	A3472	M3638	R3769	E3987	M4097	E4212	E4212	ALA
N3007	VAL	R3473	R3637	H3771	L3930	D4098	V4221	V4221	ALA
T3011	VAL	S3474	L3641	R3772	L3930	D4098	V4221	V4221	ALA
T3020	VAL	F3475	L3641	R3773	R3934	S4099	E4224	E4224	ALA
F3021	VAL	R3475	M3652	G3768	L3985	Q4100	E4227	E4227	ALA
A3022	VAL	K3477	E3655	C3801	V3990	K4101	M4231	M4231	ALA
K3023	VAL	M3478	E3655	L3805	V3990	Q4102			ALA
V3024	VAL	A3479	A3659		V3996	F4103			ALA
		LYS	A3660			T4104			ALA
		ALA	W3661			G4105			ALA
		GLY	I3662						ALA
		ASP	L3663						ALA

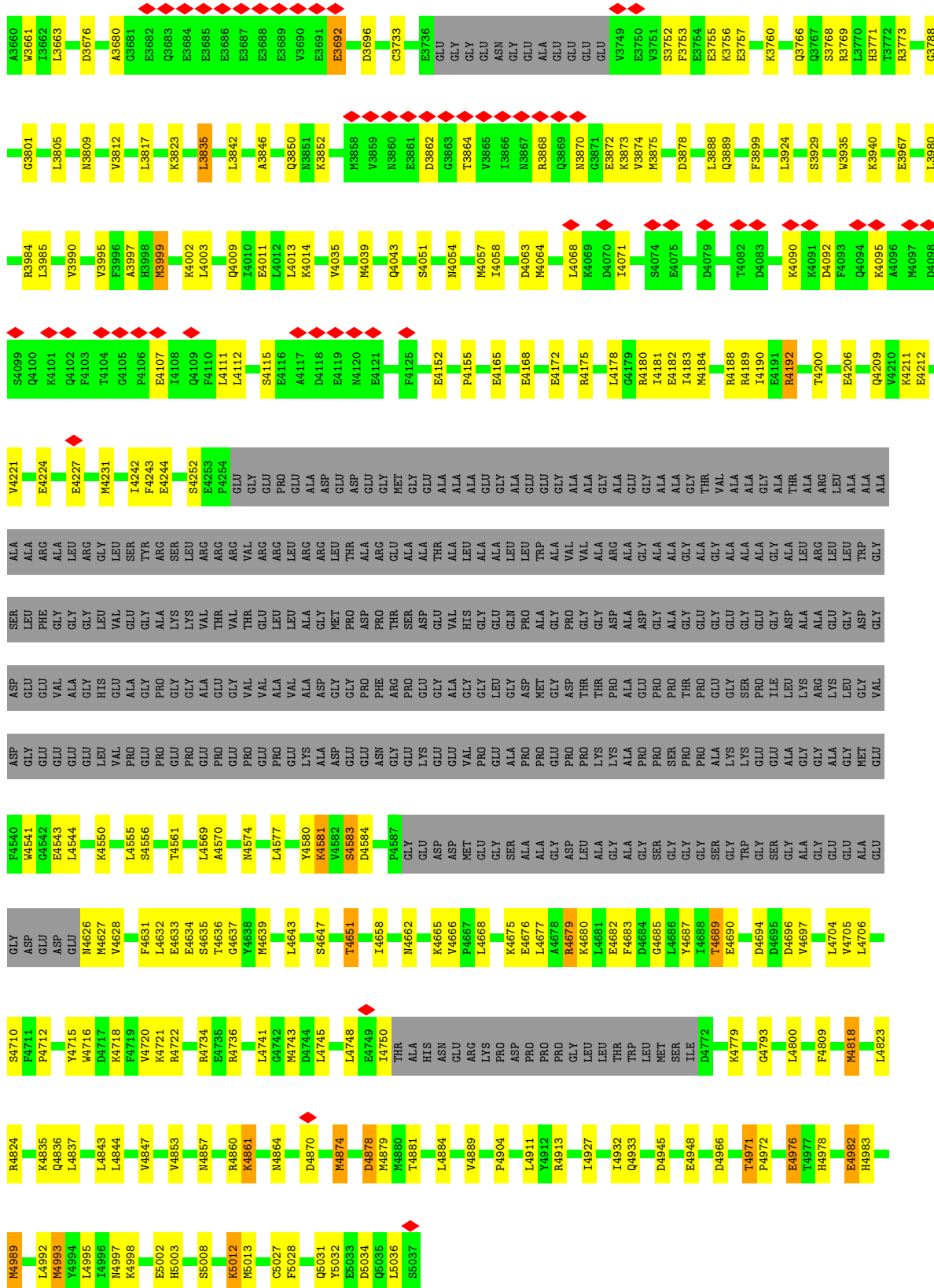


● Molecule 1: Ryanodine receptor 1





K3571	H3582	E3583	E3584	D3585	A3586	D3587	I3592	R3595	V3596	L3603	Y3604	H3605	L3606	E3607	H3608	E3610	H3611	P3612	K3614	S3615	L3633	M3534	K3537	T3538	R3539	Y3540	A3541	L3542	K3543	E3548	V3549	R3550	E3551	M3555	N3556	L3557	H3558	L3559	Q3560	C3635	F3636	R3637	K3638	L3641	R3652	E3655	A3659																																														
ALA	GLN	SER	GLY	GLY	SER	ASP	GLN	GLU	ARG	THR	LYS	LYS	R3498	R3499	G3500	D3501	R3502	Q3506	K3515	K3516	M3523	M3524	D3531	L3532	L3533	M3534	K3537	T3538	F3458	V3459	V3460	Q3461	A3462	C3463	I3464	N3465	N3466	N3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	K3475	S3476	K3477	M3478	A3479	LYS	ALA	GLY	ASP																																							
G3525	F2526	R2531	A2534	S2535	L2536	T2538	A2539	T2540	Y2553	L2561	A2570	G2571	T2572	H2573	I2574	I2577	L2583	H2584	T2585	R2588	L2589	S2590	R2591	L2595	K2481	D2482	G2483	A2484	L2485	F2494	I2614	R2615	P2616	L2619	L2622	R2625	L2626	V2630	N2634	L2638	H2639	P2640	L2641	K2642	K2653	Y2654	L2657	P2658	T2659	G2660	W2661	S2668	E2669	K2677	I2682	H2688	K2689	E2694	D2716	A2717	L2720	S2721	K2722	A2723	E2724	K2725	LYS	ALA	THR	VAL	ASP	ALA	GLU	GLY	N2734	F2735	D2736	R2737	P2738	P2739	V2740	E2741	T2742	L2743	N2744	V2745	I2746	P2748	E2749	K2750	L2751	D2752	V2524
S2753	F2754	I2755	N2756	K2757	E2760	Y2761	T2762	H2763	E2764	K2765	A2767	F2768	D2769	K2770	I2771	Q2772	N2773	M2774	L2775	S2776	Y2777	G2778	E2779	N2780	SER	L2781	D2782	E2783	E2784	LYR	L2785	K2786	T2787	H2788	N2789	L2790	L2791	R2792	P2793	P2794	K2795	E2796	F2797	S2798	E2799	K2800	D2801	K2802	E2803	I2804	Y2805	R2806	W2807	P2808	I2809	K2810	E2811	S2812	L2813																																		
K2814	A2815	M2816	L2817	A2818	W2819	E2820	W2821	T2822	L2823	E2824	K2825	A2826	R2827	E2828	Q2829	E2830	GLU	ARG	GLU	THR	GLU	LYS	LYS	THR	ARG	G2778	L2901	H2902	P2903	V2904	L2905	V2906	P2907	PRO	ARG	GLU	GLY	Y2855	N2856	P2857	Q2858	P2859	P2860	D2861	L2862	G2864	V2865	T2866	S2868	R2869	E2870	L2871	R2806	W2807	P2808	I2809	K2810	E2811	S2812	L2813																																	
W2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884	W2885	T2886	G2887	R2888	K2889	K2890	K2891	Q2892	E2893	L2894	E2895	W2896	A2896	K2897	G2898	G2899	G2900	T2901	H2902	P2903	V2904	L2905	V2906	P2907	PRO	ARG	GLU	GLY	Y2855	N2856	P2857	Q2858	P2859	P2860	D2861	L2862	G2864	V2865	T2866	S2868	R2869	E2870	L2871	R2806	W2807	P2808	I2809	K2810	E2811	S2812	L2813																																
G2934	Y2935	A2936	V2937	T2938	R2939	GLY	LEU	LYS	ASP	MET	L2946	D2947	T2948	S2949	E2952	L2960	Q2961	Q2962	L2963	L2964	E2965	W2966	M2967	S2970	Q2971	I2974	E2978	A2979	V2980	V2981	S2982	S2983	Q2984	R2985	V2986	E2987	S3116	GLN	ALA	ARG	THR	GLN	VAL	K3123	Y3131	H3146	Q3149	H3150	Q3151	V3020	P3021	A3022	V3024	L3025																																							
G3026	S3027	G3028	H3033	E3037	K3045	L3046	L3049	V3050	R3051	H3052	R3053	L3056	T3059	P3062	V3065	L3068	H3069	L3075	D3076	A3077	R3078	S3083	E3086	T3087	V3107	G3113	K3114	V3115	S3116	GLN	ALA	ARG	THR	GLN	VAL	K3123	Y3131	H3146	Q3149	H3150	Q3151	T3270																																																			
V3156	I3157	L3158	V3161	Q3162	S3171	N3180	V3183	E3184	K3185	L3186	L3190	L3194	L3197	A3204	F3205	L3206	E3207	L3210	Y3213	N3214	A3215	C3216	S3217	V3218	Y3219	T3220	T3221	K3222	S3223	P3224	R3225	A3226	I3229	L3230	G3231	L3232	P3233	E3236	M3239	V3245	R3248	S3259	I3270																																																		
L3274	Y3280	L3281	P3282	W3285	E3290	A3291	P3292	P3293	P3294	A3295	L3296	P3297	A3298	G3299	A3300	P3301	P3302	P3303	C3304	I3322	L3323	V3324	M3325	N3326	L3327	G3328	I3329	D3330	M3335	A3339	V3340	I3345	R3348	A3349	P3351	L3354	F3358	I3362	E3377	R3380	L3381	E3382	A3383	K3384																																																	
A3385	E3386	A3387	E3388	E3389	R3395	R3403	D3404	L3405	L3408	Y3409	L3413	R3414	D3417	R3418	N3419	R3420	L3424	E3433	L3434	F3435	R3436	R3453	L3533	M3534	N3457	F3458	V3459	V3460	Q3461	A3462	C3463	I3464	N3465	N3466	N3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	K3475	S3476	K3477	M3478	A3479	LYS	ALA	GLY	ASP																																										
ALA	GLN	SER	GLY	GLY	SER	ASP	GLN	GLU	ARG	THR	LYS	LYS	R3498	R3499	G3500	D3501	R3502	Q3506	K3515	K3516	M3523	M3524	D3531	L3532	L3533	M3534	K3537	T3538	F3458	V3459	V3460	Q3461	A3462	C3463	I3464	N3465	N3466	N3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	K3475	S3476	K3477	M3478	A3479	LYS	ALA	GLY	ASP																																							
M3555	N3556	L3557	H3558	L3559	Q3560	C3635	F3636	R3637	K3638	L3641	R3652	E3655	A3659																																																																																



• Molecule 2: Glutathione S-transferase class-mu 26 kDa isozyme,Peptidyl-prolyl cis-trans isomerase FKBP1B

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	171805	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 ($e^-/\text{\AA}^2$)	40	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	96000	Depositor
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	1.602	Depositor
Minimum map value	-0.818	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.062	Depositor
Recommended contour level	0.263	Depositor
Map size (Å)	515.2, 515.2, 515.2	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.288, 1.288, 1.288	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	A	0.33	0/35746	0.66	14/48409 (0.0%)
1	B	0.33	0/35746	0.66	14/48409 (0.0%)
1	C	0.33	0/35746	0.66	14/48409 (0.0%)
1	D	0.33	0/35746	0.66	14/48409 (0.0%)
2	E	0.33	0/834	0.62	0/1123
2	F	0.33	0/834	0.62	0/1123
2	G	0.33	0/834	0.62	0/1123
2	H	0.33	0/834	0.62	0/1123
All	All	0.33	0/146320	0.66	56/198128 (0.0%)

There are no bond length outliers.

The worst 5 of 56 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	4945	ASP	CB-CG-OD1	7.59	125.13	118.30
1	A	4945	ASP	CB-CG-OD1	7.57	125.11	118.30
1	B	4945	ASP	CB-CG-OD1	7.53	125.07	118.30
1	D	4945	ASP	CB-CG-OD1	7.51	125.06	118.30
1	D	903	LEU	CA-CB-CG	6.81	130.97	115.30

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	34929	0	34552	426	0
1	B	34929	0	34552	434	0
1	C	34929	0	34552	436	0
1	D	34929	0	34552	442	0
2	E	818	0	824	18	0
2	F	818	0	824	20	0
2	G	818	0	824	20	0
2	H	818	0	824	18	0
3	A	27	0	12	1	0
3	B	27	0	12	1	0
3	C	27	0	12	1	0
3	D	27	0	12	1	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
All	All	143100	0	141552	1777	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 6.

The worst 5 of 1777 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:2248:ARG:HB3	1:B:2286:LEU:HD11	1.72	0.71
1:B:4978:HIS:HA	1:B:4982:GLU:HG3	1.72	0.71
1:C:4978:HIS:HA	1:C:4982:GLU:HG3	1.72	0.71
1:D:2248:ARG:HB3	1:D:2286:LEU:HD11	1.72	0.71
1:A:2248:ARG:HB3	1:A:2286:LEU:HD11	1.72	0.71

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	4356/5037 (86%)	4216 (97%)	137 (3%)	3 (0%)	51	84
1	B	4356/5037 (86%)	4216 (97%)	137 (3%)	3 (0%)	51	84
1	C	4356/5037 (86%)	4216 (97%)	137 (3%)	3 (0%)	51	84
1	D	4356/5037 (86%)	4216 (97%)	137 (3%)	3 (0%)	51	84
2	E	105/350 (30%)	102 (97%)	3 (3%)	0	100	100
2	F	105/350 (30%)	102 (97%)	3 (3%)	0	100	100
2	G	105/350 (30%)	102 (97%)	3 (3%)	0	100	100
2	H	105/350 (30%)	102 (97%)	3 (3%)	0	100	100
All	All	17844/21548 (83%)	17272 (97%)	560 (3%)	12 (0%)	54	84

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3615	SER
1	A	4712	PRO
1	B	3615	SER
1	B	4712	PRO
1	C	3615	SER

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	3808/4276 (89%)	3691 (97%)	117 (3%)	40	71
1	B	3808/4276 (89%)	3691 (97%)	117 (3%)	40	71
1	C	3808/4276 (89%)	3691 (97%)	117 (3%)	40	71
1	D	3808/4276 (89%)	3691 (97%)	117 (3%)	40	71
2	E	88/304 (29%)	88 (100%)	0	100	100
2	F	88/304 (29%)	88 (100%)	0	100	100
2	G	88/304 (29%)	88 (100%)	0	100	100
2	H	88/304 (29%)	88 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	15584/18320 (85%)	15116 (97%)	468 (3%)	45 72

5 of 468 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	5027	CYS
1	D	4861	LYS
1	C	4580	TYR
1	D	4818	MET
1	D	4556	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 75 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	1631	GLN
2	E	20	GLN
1	D	2634	ASN
1	D	3895	HIS
1	B	2872	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	ADP	A	5101	-	24,29,29	0.86	1 (4%)	29,45,45	1.29	4 (13%)
3	ADP	B	5101	-	24,29,29	0.86	1 (4%)	29,45,45	1.29	4 (13%)
3	ADP	D	5101	-	24,29,29	0.86	1 (4%)	29,45,45	1.29	4 (13%)
3	ADP	C	5101	-	24,29,29	0.86	1 (4%)	29,45,45	1.29	4 (13%)

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	ADP	A	5101	-	-	4/12/32/32	0/3/3/3
3	ADP	B	5101	-	-	4/12/32/32	0/3/3/3
3	ADP	D	5101	-	-	4/12/32/32	0/3/3/3
3	ADP	C	5101	-	-	4/12/32/32	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	5101	ADP	C5-C4	2.25	1.46	1.40
3	A	5101	ADP	C5-C4	2.24	1.46	1.40
3	C	5101	ADP	C5-C4	2.24	1.46	1.40
3	D	5101	ADP	C5-C4	2.24	1.46	1.40

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	D	5101	ADP	N3-C2-N1	-3.23	123.63	128.68
3	C	5101	ADP	N3-C2-N1	-3.23	123.63	128.68
3	A	5101	ADP	N3-C2-N1	-3.22	123.64	128.68
3	B	5101	ADP	N3-C2-N1	-3.22	123.64	128.68
3	B	5101	ADP	O4'-C1'-C2'	-2.62	103.10	106.93

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

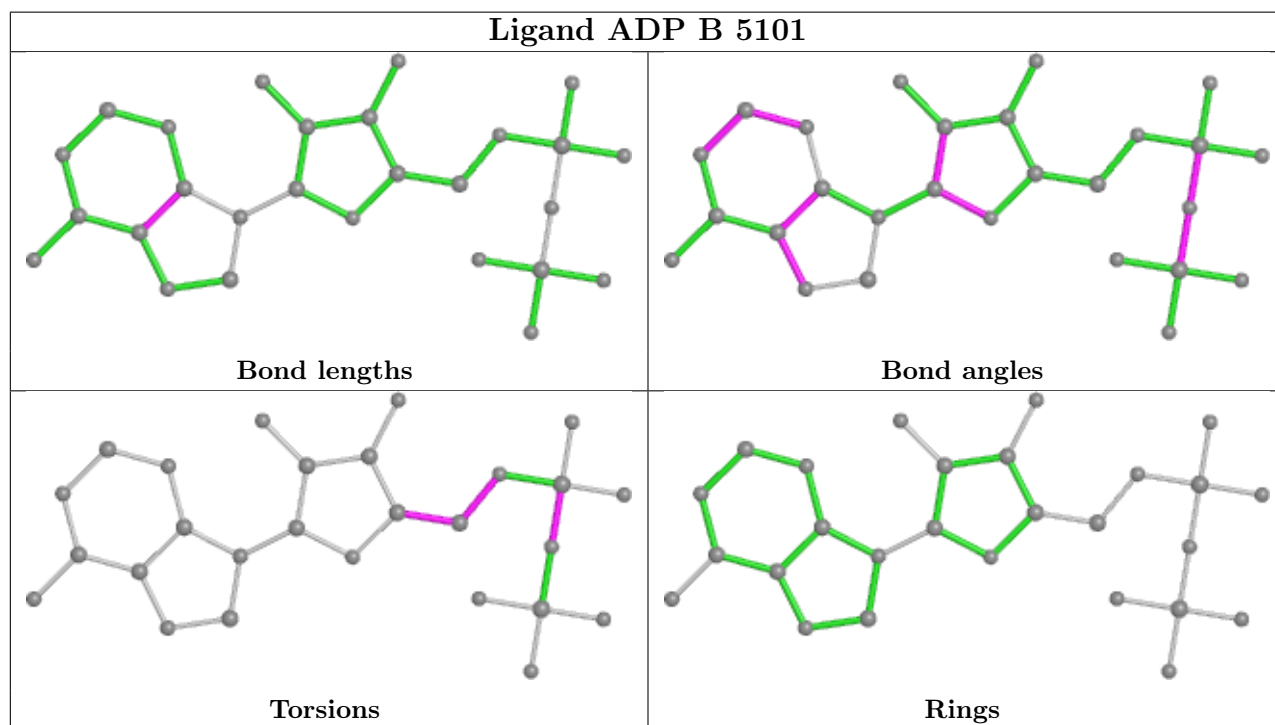
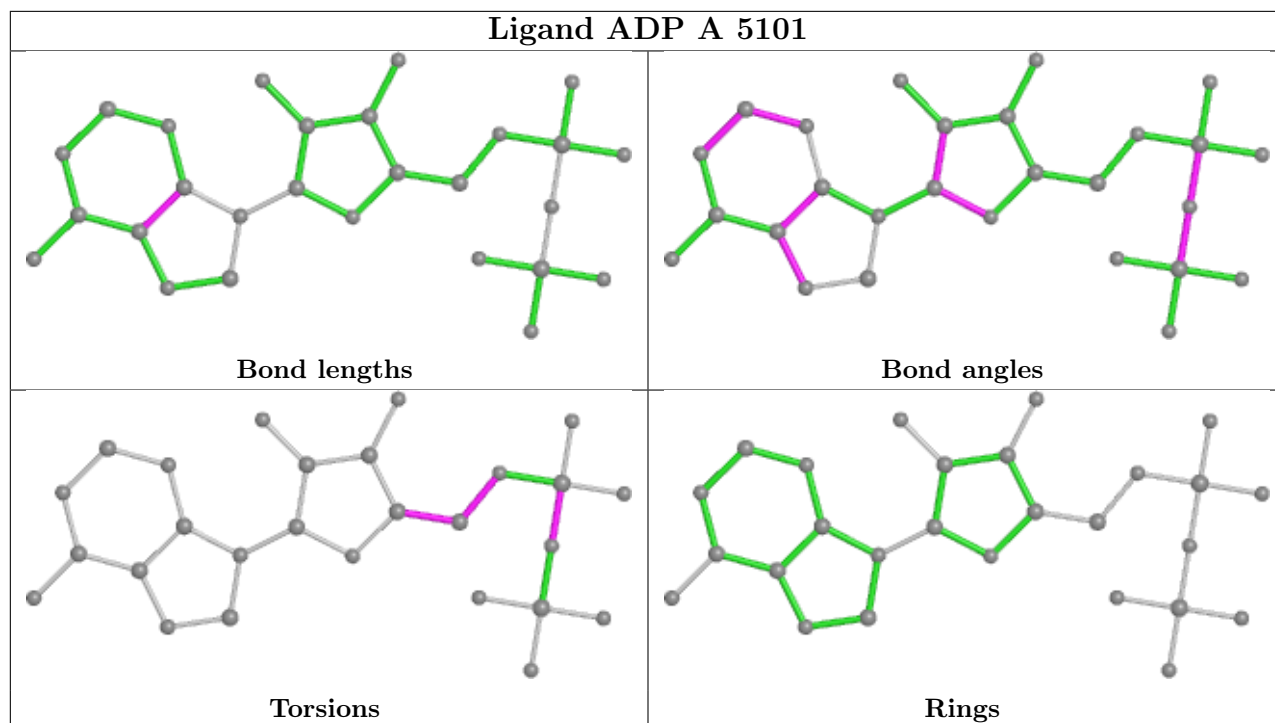
Mol	Chain	Res	Type	Atoms
3	A	5101	ADP	PB-O3A-PA-O5'
3	B	5101	ADP	PB-O3A-PA-O5'
3	C	5101	ADP	PB-O3A-PA-O5'
3	D	5101	ADP	PB-O3A-PA-O5'
3	A	5101	ADP	O4'-C4'-C5'-O5'

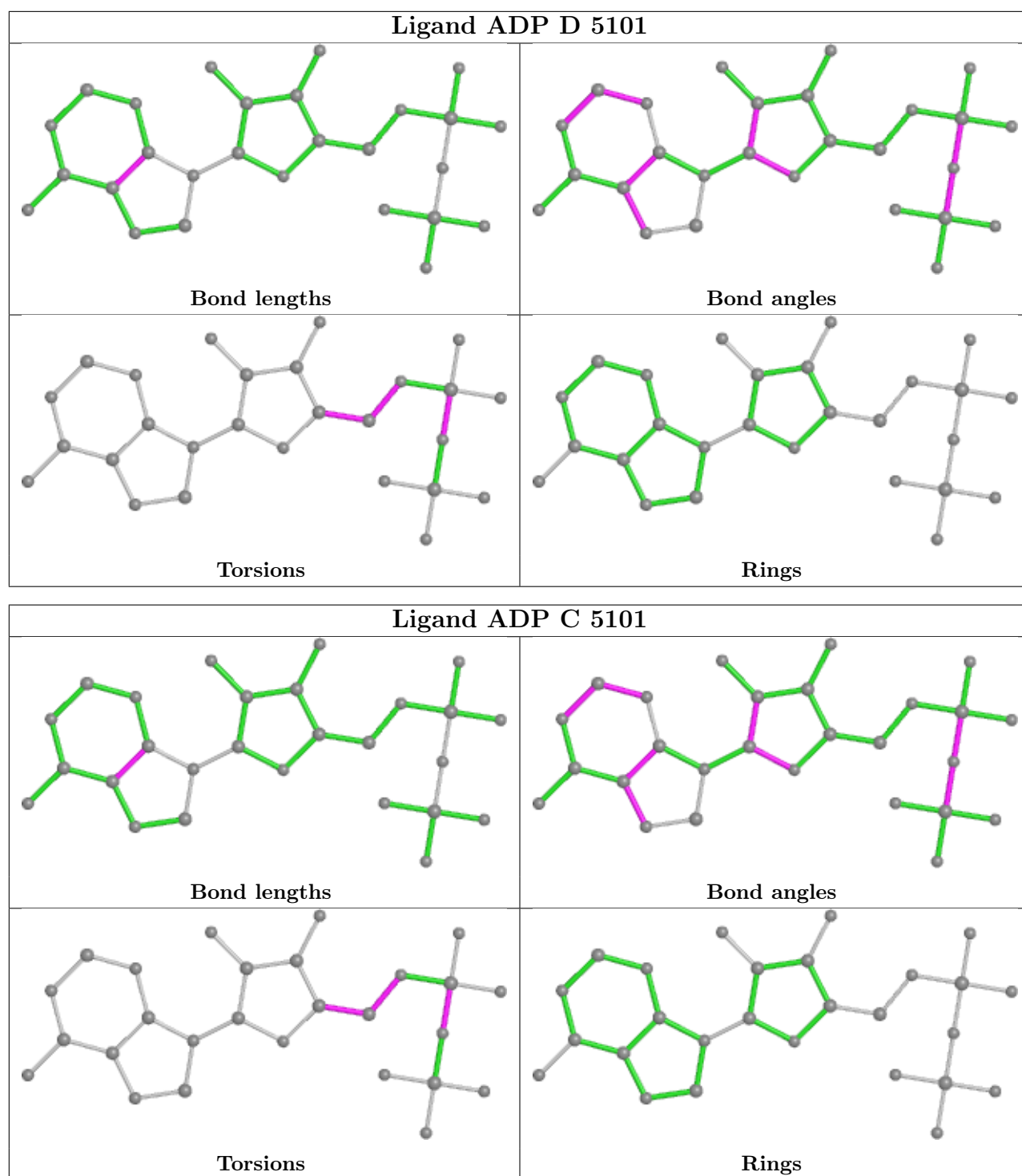
There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	5101	ADP	1	0
3	B	5101	ADP	1	0
3	D	5101	ADP	1	0
3	C	5101	ADP	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 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.





5.7 Other polymers [\(i\)](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

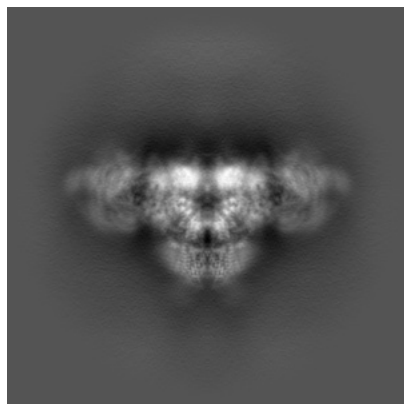
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-40424. These allow visual inspection of the internal detail of the map and identification of artifacts.

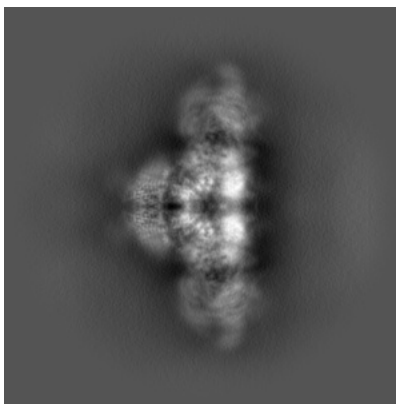
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

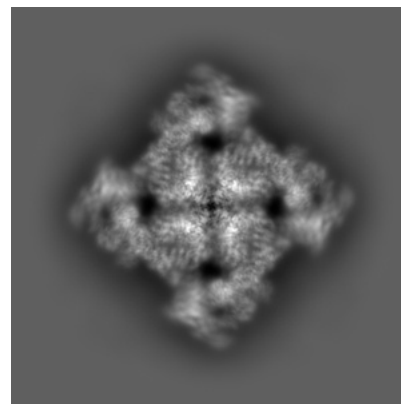
6.1.1 Primary map



X

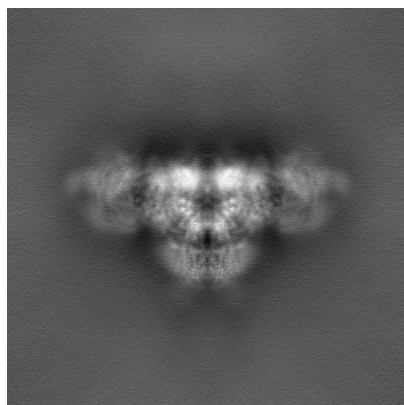


Y

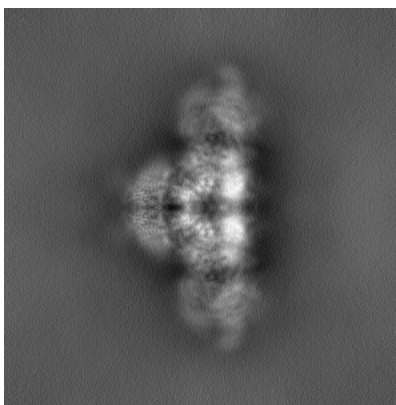


Z

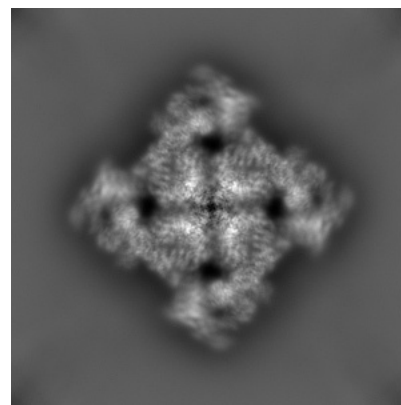
6.1.2 Raw map



X



Y

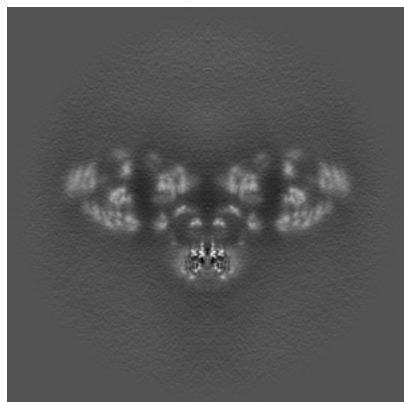


Z

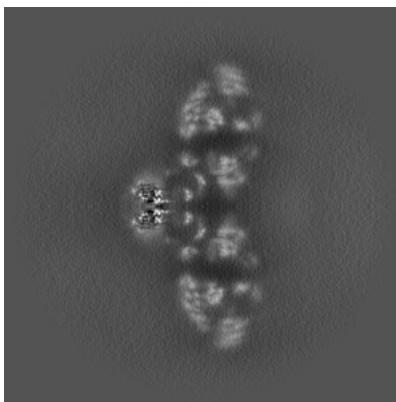
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

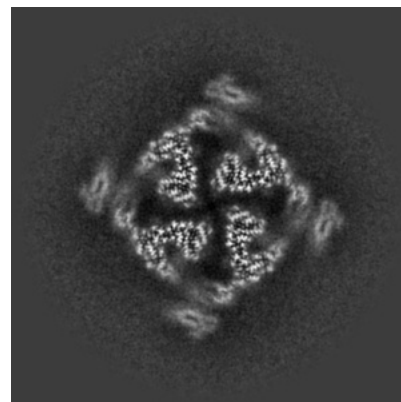
6.2.1 Primary map



X Index: 200

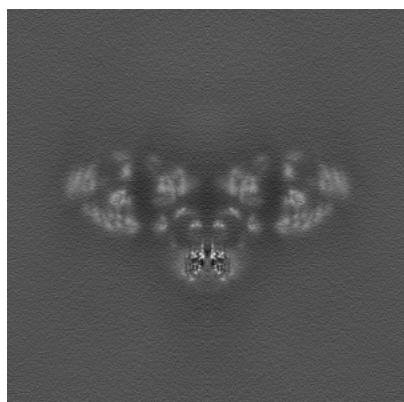


Y Index: 200

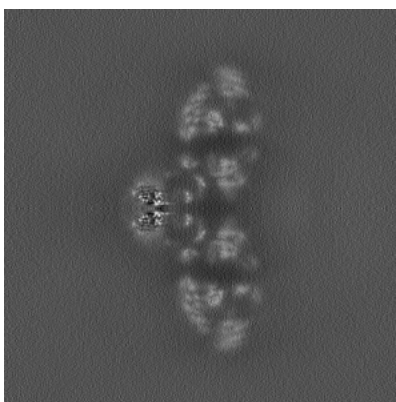


Z Index: 200

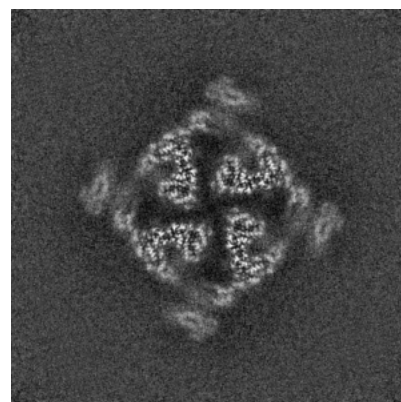
6.2.2 Raw map



X Index: 200



Y Index: 200

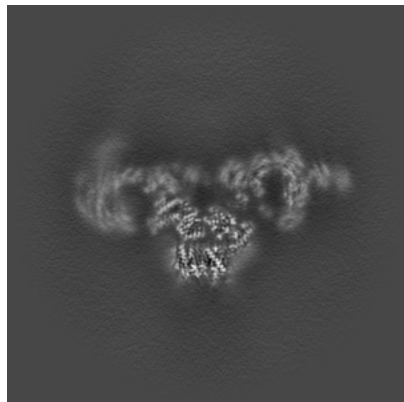


Z Index: 200

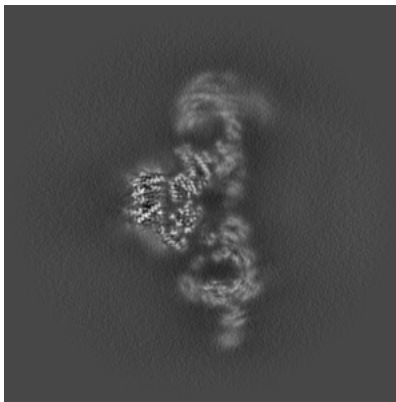
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

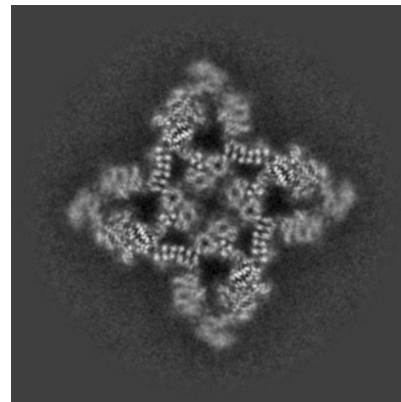
6.3.1 Primary map



X Index: 186

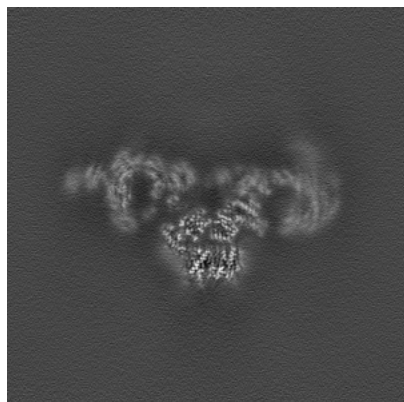


Y Index: 186

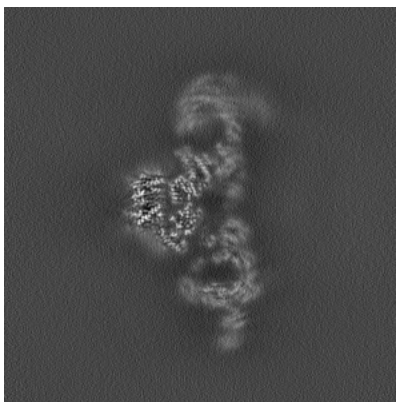


Z Index: 223

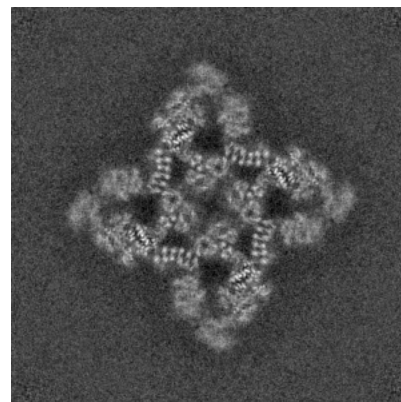
6.3.2 Raw map



X Index: 214



Y Index: 186

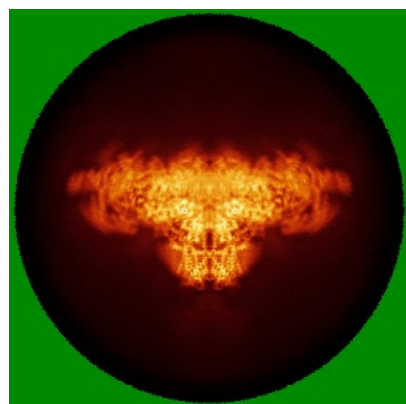


Z Index: 223

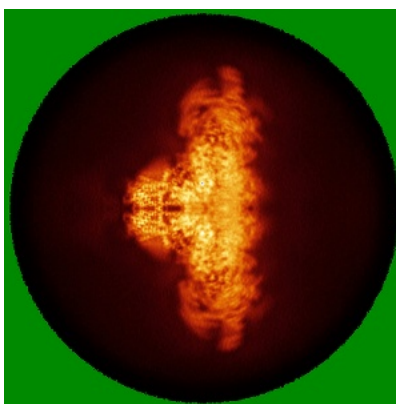
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

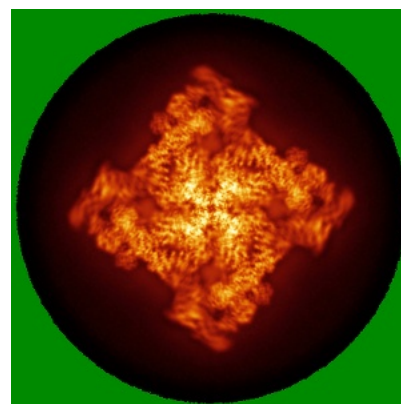
6.4.1 Primary map



X

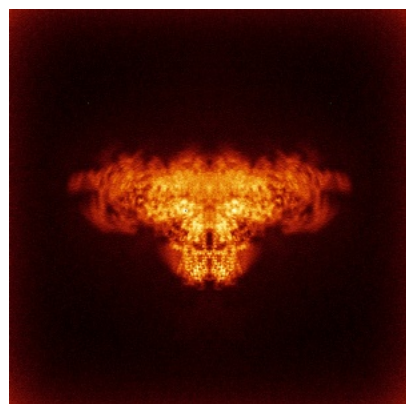


Y

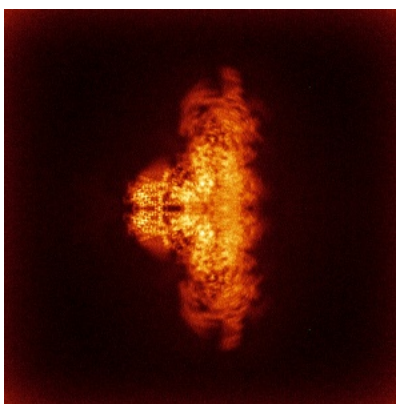


Z

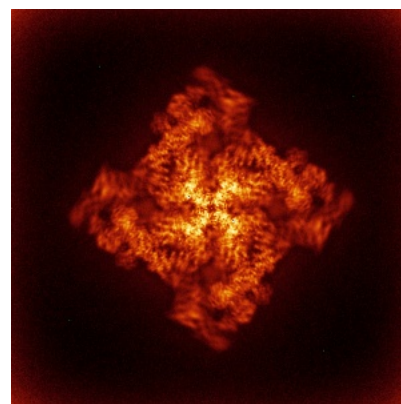
6.4.2 Raw map



X



Y

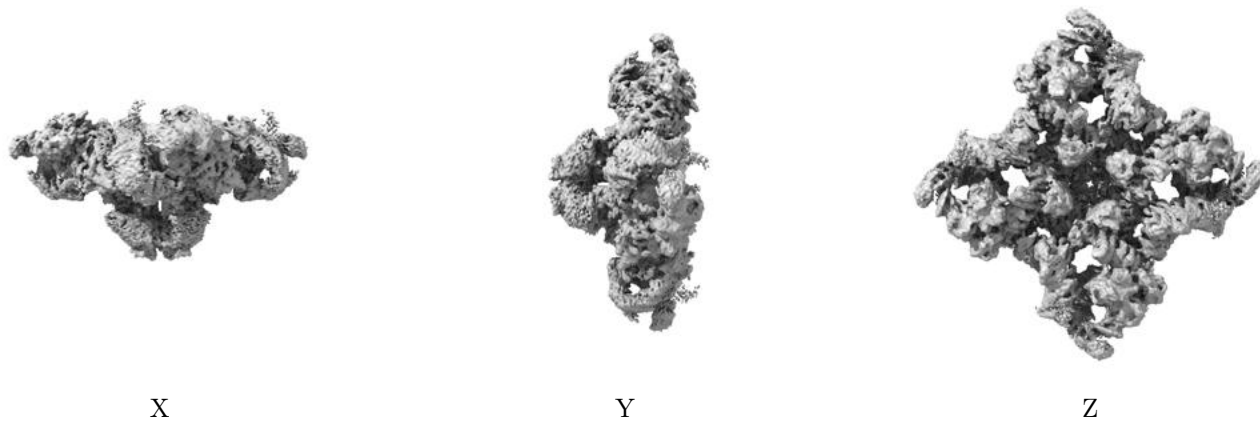


Z

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.

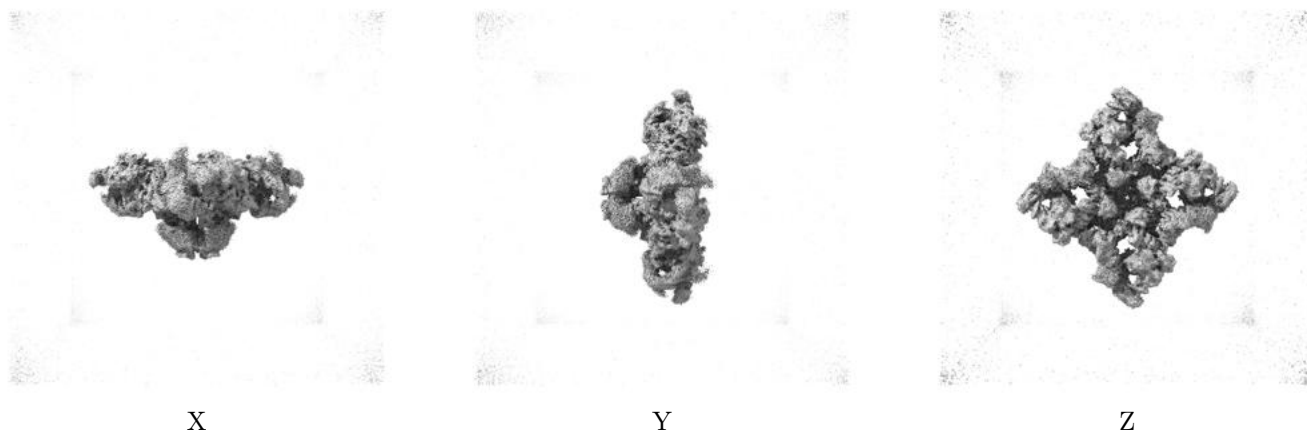
6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.263. 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



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.

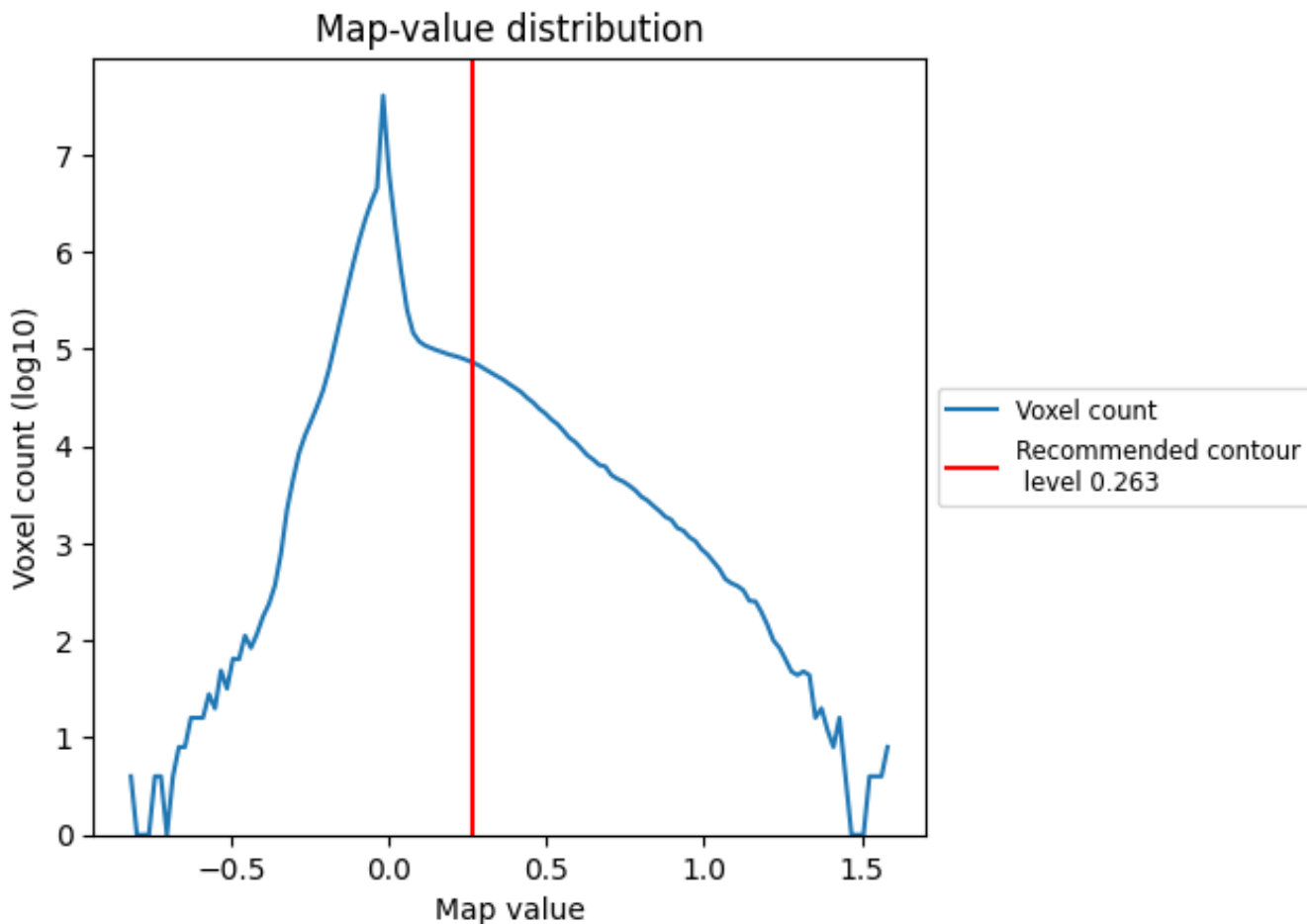
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

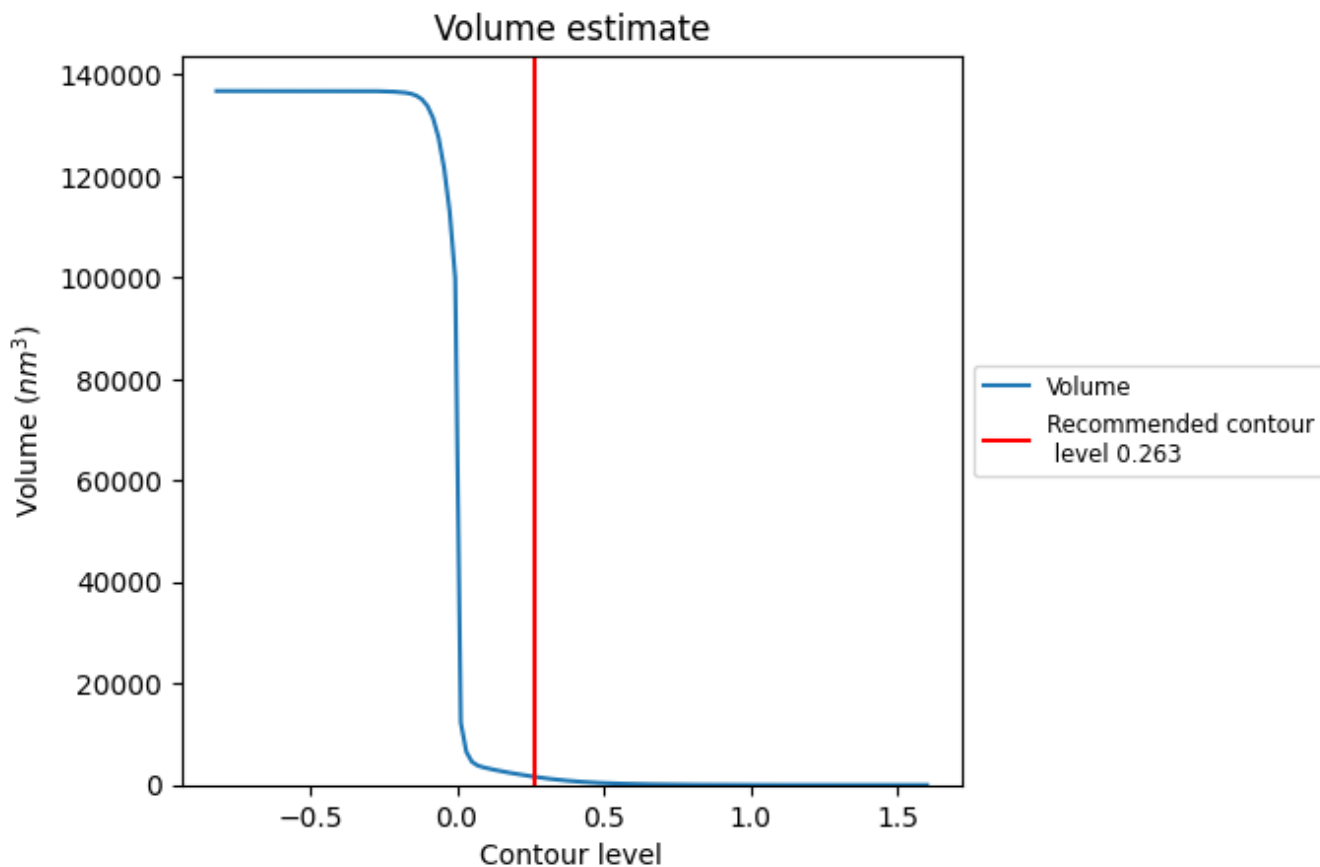
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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.

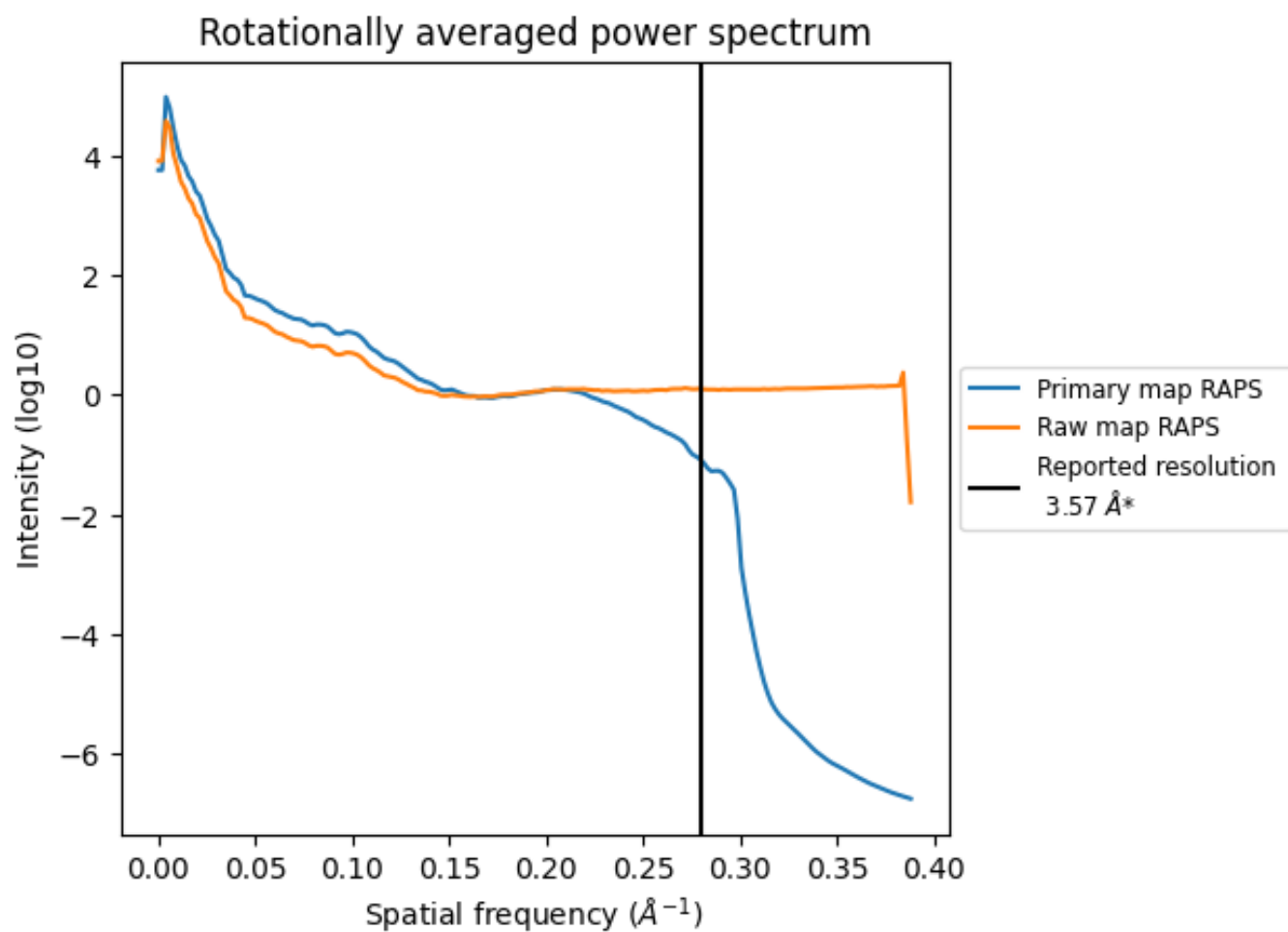
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1622 nm³; this corresponds to an approximate mass of 1465 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

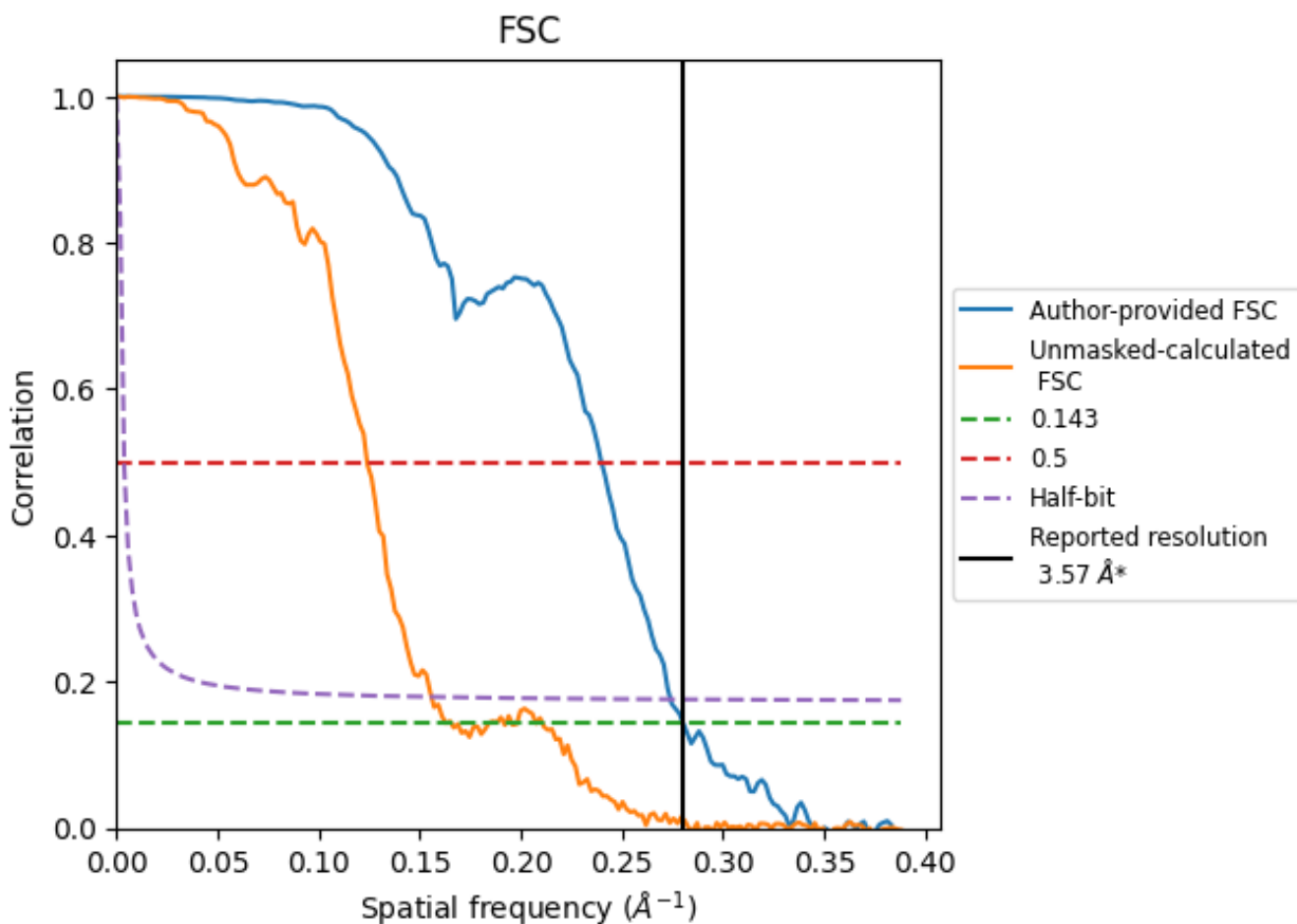


*Reported resolution corresponds to spatial frequency of 0.280 Å⁻¹

8 Fourier-Shell correlation [i](#)

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 [i](#)



*Reported resolution corresponds to spatial frequency of 0.280 \AA^{-1}

8.2 Resolution estimates [i](#)

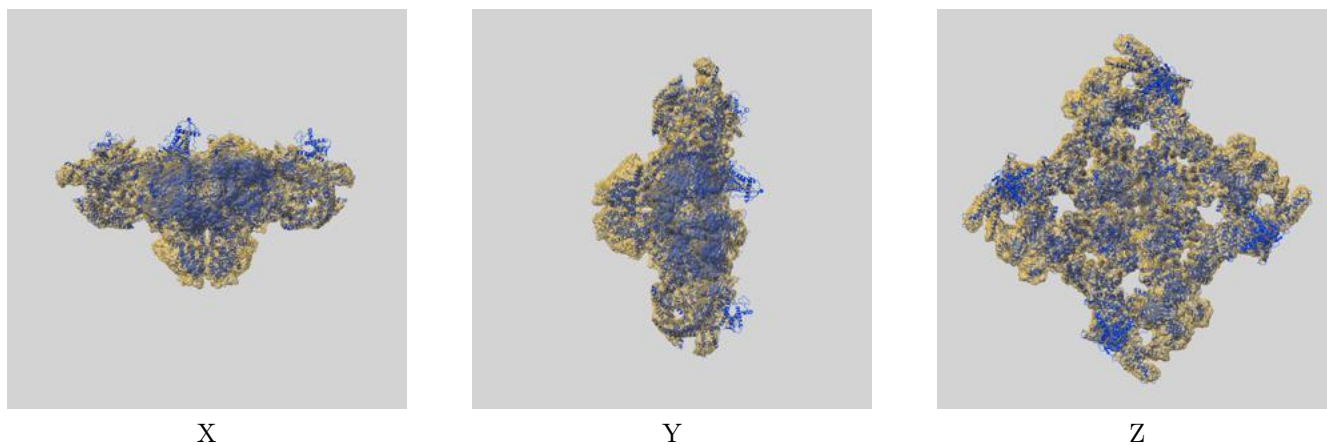
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.57	-	-
Author-provided FSC curve	3.57	4.17	3.65
Unmasked-calculated*	6.04	8.06	6.41

*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 6.04 differs from the reported value 3.57 by more than 10 %

9 Map-model fit [i](#)

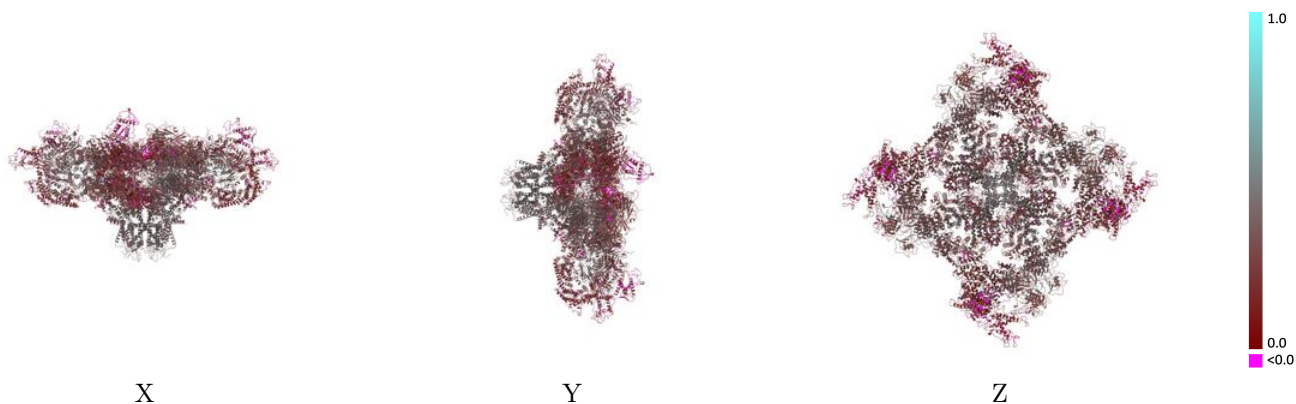
This section contains information regarding the fit between EMDB map EMD-40424 and PDB model 8SEP. Per-residue inclusion information can be found in section 3 on page 8.

9.1 Map-model overlay [i](#)



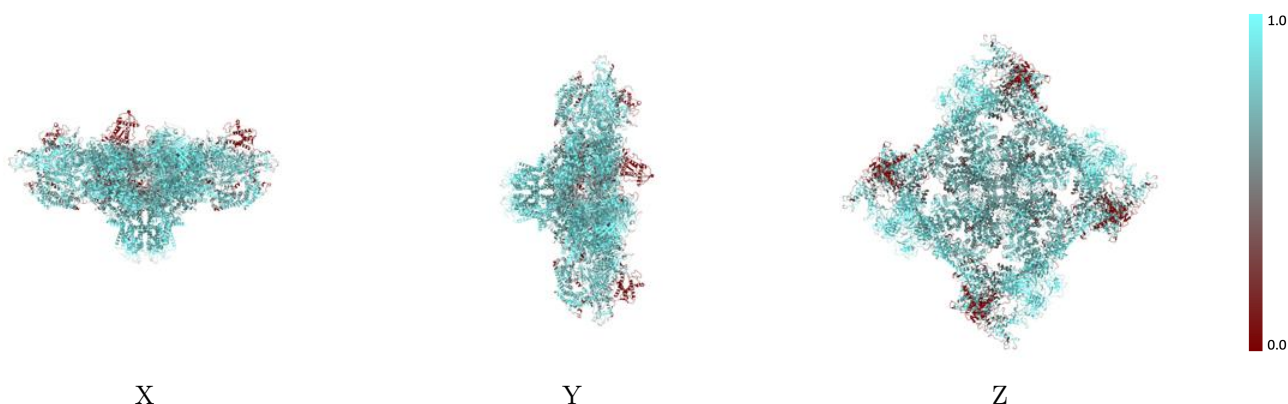
The images above show the 3D surface view of the map at the recommended contour level 0.263 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



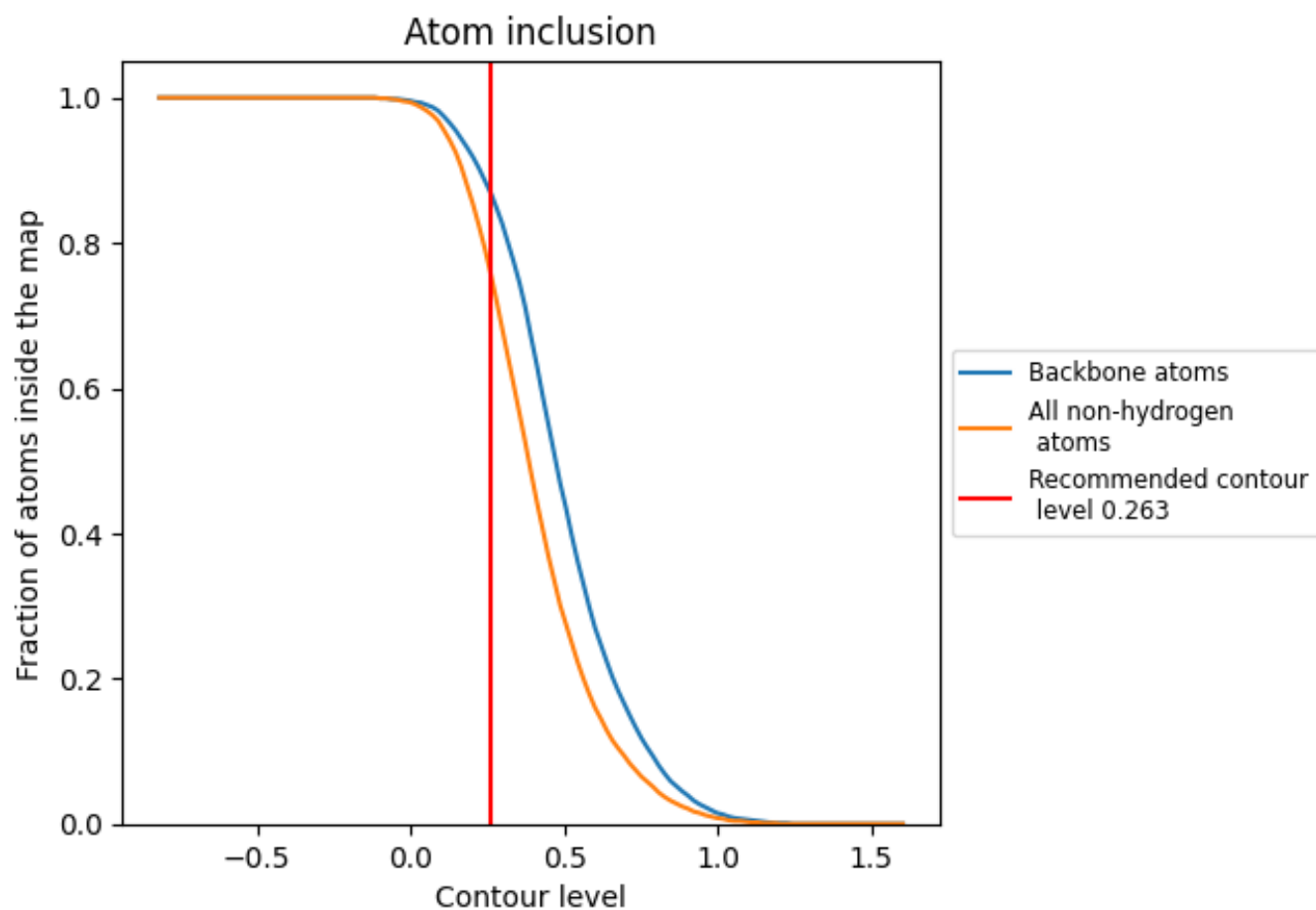
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



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 (0.263).



















9.4 Atom inclusion [i](#)



At the recommended contour level, 87% of all backbone atoms, 75% 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 (0.263) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7520	 0.2890
A	 0.7480	 0.2870
B	 0.7490	 0.2880
C	 0.7490	 0.2880
D	 0.7490	 0.2880
E	 0.9160	 0.3620
F	 0.9160	 0.3620
G	 0.9160	 0.3620
H	 0.9160	 0.3620

