



# wwPDB EM Validation Summary Report ⓘ

Jul 10, 2023 – 07:48 PM EDT

PDB ID : 8SEN  
EMDB ID : EMD-40422  
Title : Cryo-EM Structure of RyR1  
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 : 3.49 Å(reported)

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<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>.

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

EMDB validation analysis : 0.0.1.dev50  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.34

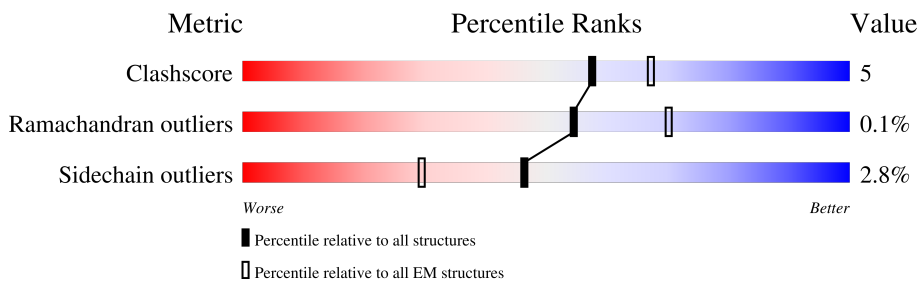
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.49 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  $\geq 3$ , 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 3 unique types of molecules in this entry. The entry contains 142960 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	4378	Total	C	N	O	S	9	0
			34921	22217	6025	6443	236		
1	B	4378	Total	C	N	O	S	9	0
			34921	22217	6025	6443	236		
1	C	4378	Total	C	N	O	S	9	0
			34921	22217	6025	6443	236		
1	D	4378	Total	C	N	O	S	9	0
			34921	22217	6025	6443	236		

- 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	Total	C	N	O	S	0	0
			818	516	144	154	4		
2	F	107	Total	C	N	O	S	0	0
			818	516	144	154	4		
2	G	107	Total	C	N	O	S	0	0
			818	516	144	154	4		
2	H	107	Total	C	N	O	S	0	0
			818	516	144	154	4		

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

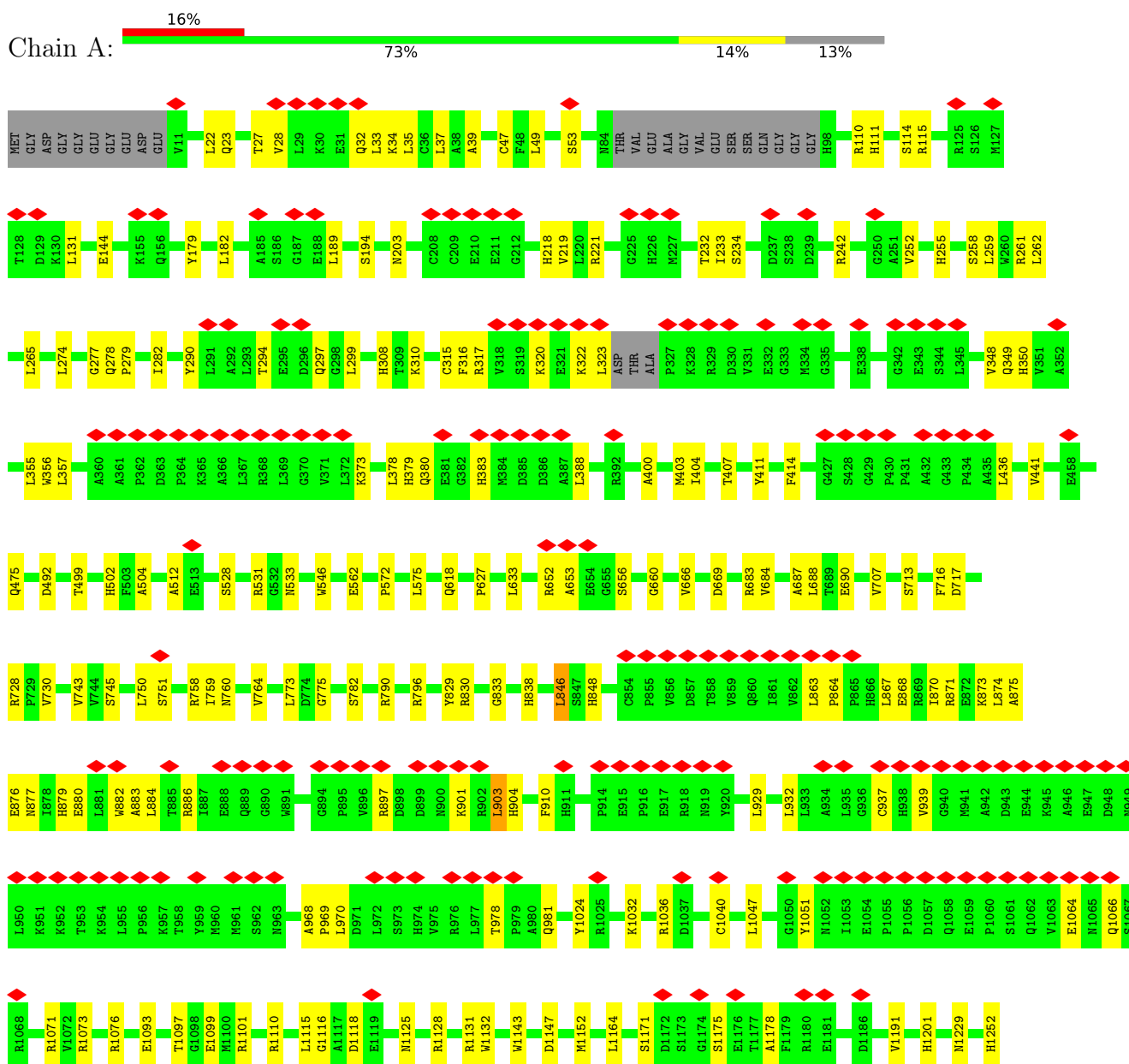
- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

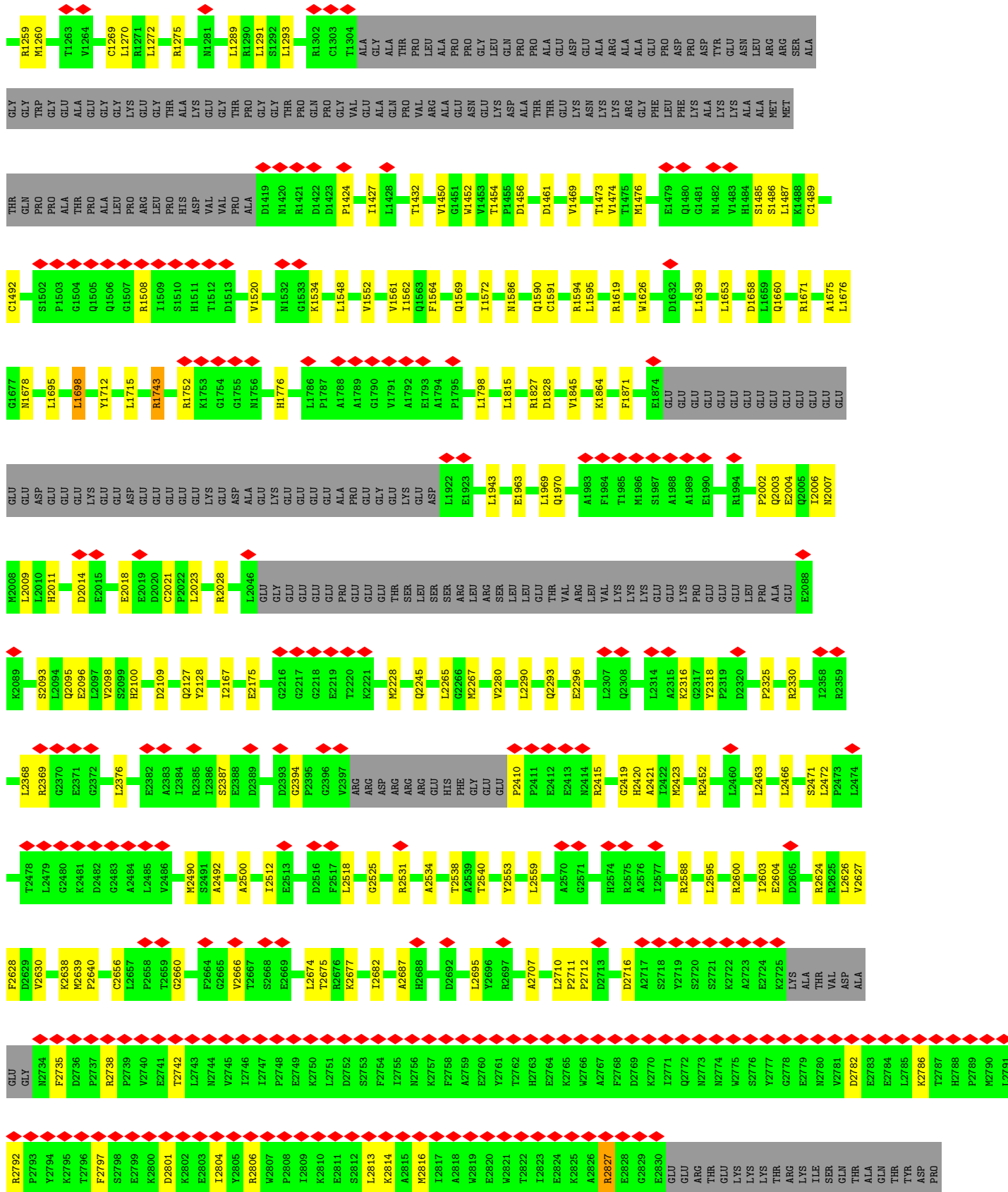
Mol	Chain	Residues	Atoms	AltConf
3	A	1	Total Zn 1 1	0
3	B	1	Total Zn 1 1	0
3	C	1	Total Zn 1 1	0
3	D	1	Total Zn 1 1	0

### 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.

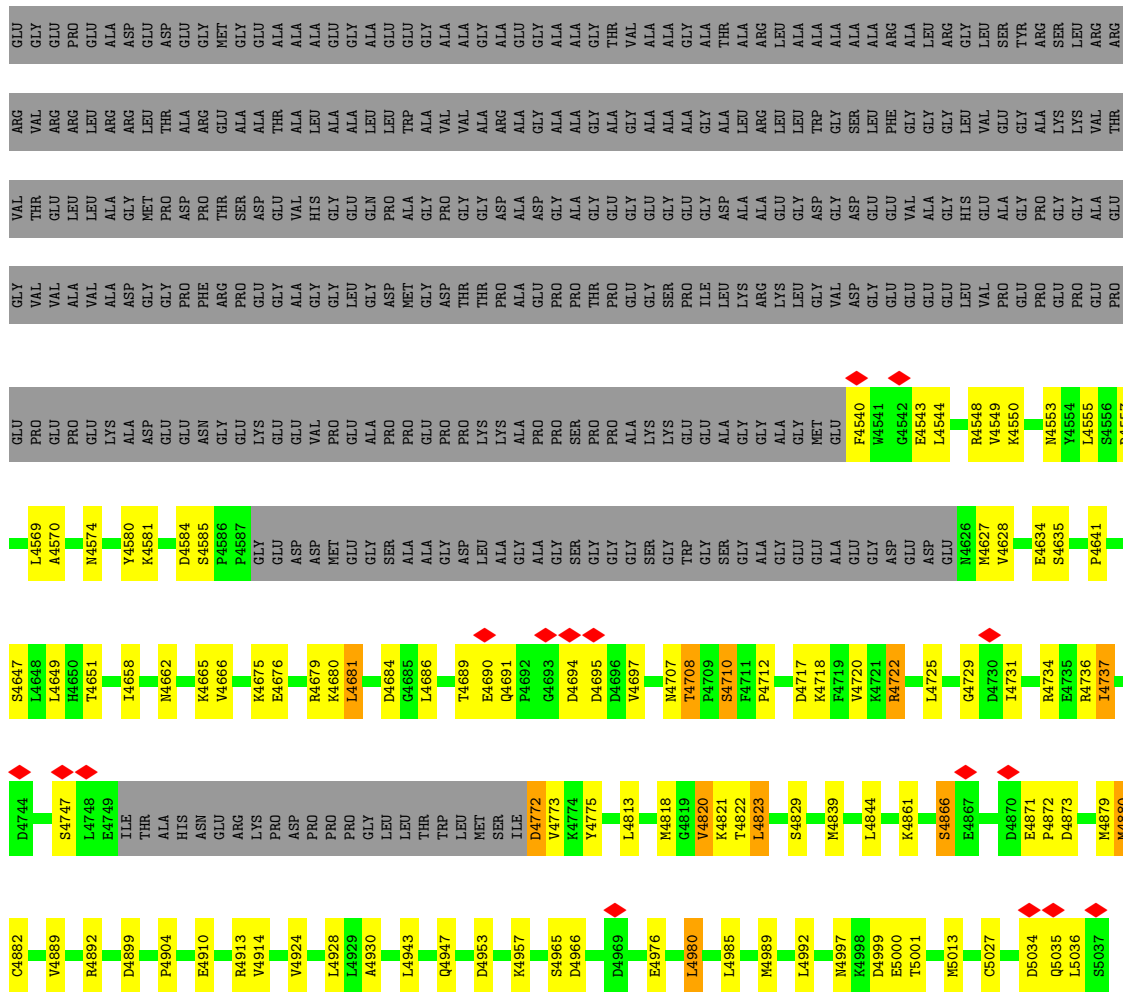
#### • Molecule 1: Ryanodine receptor 1



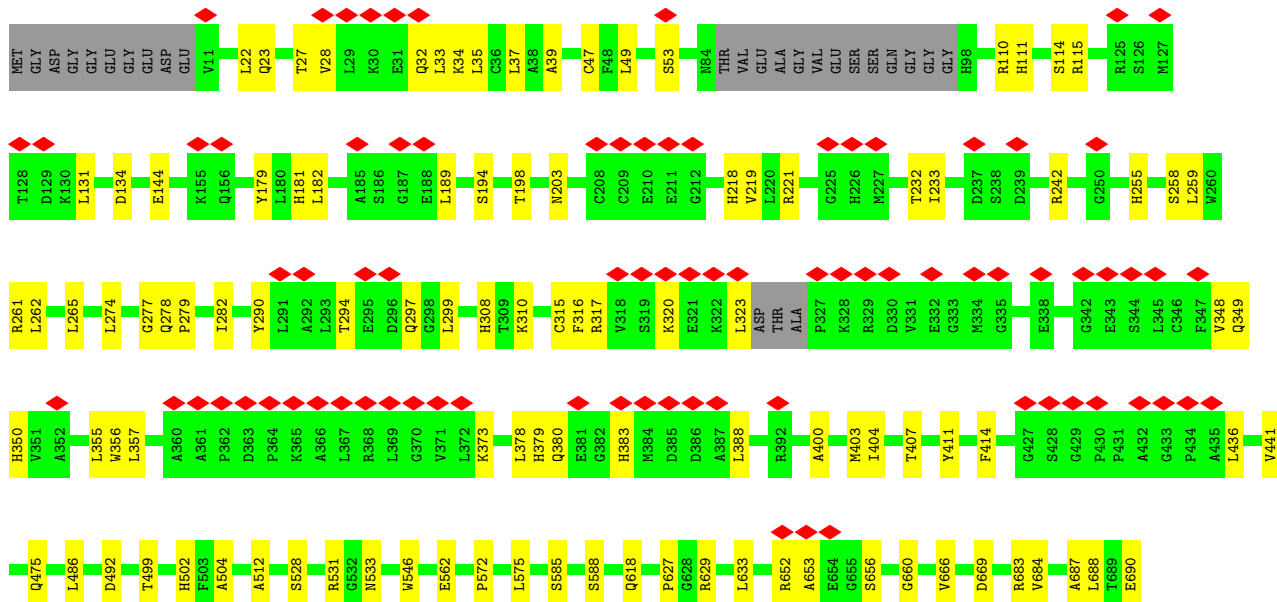


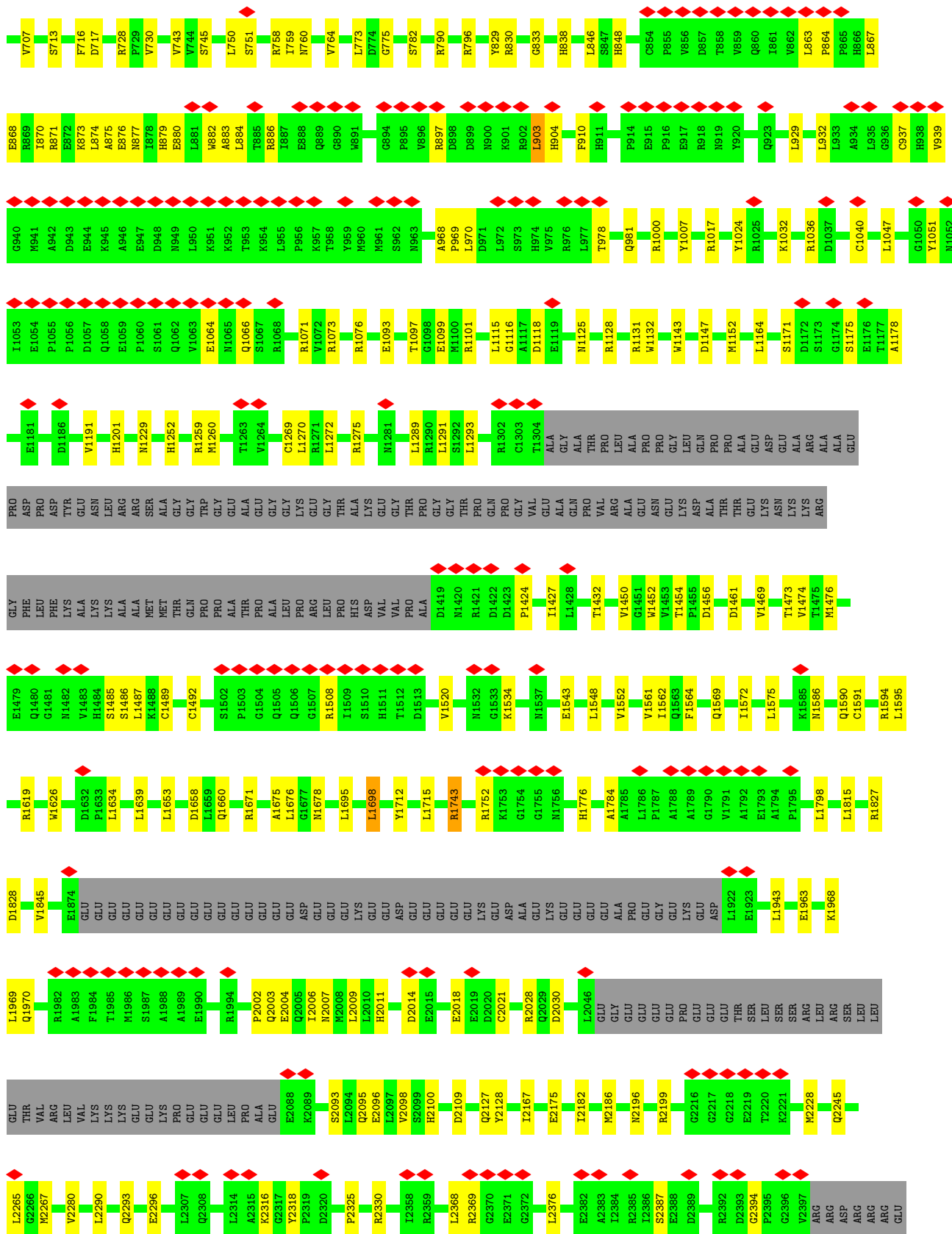


ARG	GLU	GLY	V2855	V2856	P2857	Q2858	Q2859	P2860	D2861	L2862	S2863	V2865	T2866	S2868	R2869	E2870	L2871	Q2872	A2873	A2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	V2882	H2883	H2884	T2885	A2886	Q2887	R2888	K2889	K2890	K2891	Q2892	E2893	L2894	E2895	A2896	K2897	Q2898	G2899	G2900	T2901	H2902	P2903	L2904	L2905	V2906	P2907	V2908	D2909	L2910	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	ASP	GLU	L2946	D2947	T2948	R2949	S2950	I2951	E2952	A2956	L2960	Q2961	L3049	V3050	R3051	H3052	R3053	V3054	S3055	L3056	T3059	F2973	L2974	A2975	L2977	
E2978	A2979	V2980	V2981	S2982	S2983	G2984	R2985	V2986	E2987	K2988	S2989	P2990	H2991	F2992	Q2993	F2997	F2998	I3001	L3002	I3006	Y3009	F3010	F3017	A3022	K3023	V3024	L3025	G3026	S3027	G3028	G3029	H3030	K3034	E3035	K3036	E3037	K3045	A3048	L3049	V3050	R3051	H3052	R3053	V3054	S3055	L3056	T3059	F3062									
V3065	D3076	A3077	V3080	K3081	K3082	S3083	G3084	P3085	E3086	K3087	V3088	E3089	S3088	A3099	V3107	L3110	R3111	L3112	G3113	K3114	V3115	S3116	ALA	ARG	THR	GLN	VAL	K3123	G3124	V3125	T3132	T3133	V3134	A3135	L3136	Q3145	Q3149	H3150	Q3151	D3154	D3155	V3156	R3157	L3158	D3159	S3164											
R3167	T3168	L3169	S3170	S3171	L3172	Y3173	S3174	L3175	G3176	T3177	T3178	K3179	N3180	T3181	Y3182	V3183	E3184	L3194	A3195	R3196	L3206	E3212	Y3213	N3214	A3215	C3216	S3217	V3218	Y3219	T3220	T3221	K3222	S3223	P3224	R3225	R3227	A3228	L3229	L3230	G3231	V3245	L3246	D3247	R3248	L3249	L3256	T3264	E3265	M3266								
P3267	H3268	L3272	L3277	W3284	W3285	E3286	R3287	E3290	A3291	P3292	P3293	P3294	A3295	L3296	P3297	A3298	G3299	A3300	P3301	P3302	P3303	C3304	T3305	L3316	T3322	T3323	V3324	N3325	N3326	D3330	E3331	H3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	P3344	T3345	S3346	S3347	L3354	F3358	L3359	P3360	T3361									
R3364	L3365	K3371	A3374	E3375	Q3376	L3379	R3380	L3381	E3382	A3383	K3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	D3396	R3403	L3408	R3414	D3417	R3420	L3424	N3430	F3435	F3442	H3449	N3450	R3453	V3459	V3460	Q3461	N3462	R3463	D3464	T3465	N3466														
M3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	R3475	S3476	K3477	M3478	A3479	LYS	ALA	GLY	ASP	ALA	GLN	SER	GLY	GLY	SER	ASP	GLN	GLU	GLU	ARG	D3501	R3502	Y3503	S3504	V3505	Q3506	T3507	V3511	L3520	M3524	T3533	H3534	K3537	A3541	L3542	R3543	D3544	T3545	E3548											
N3555	N3556	L3557	H3558	L3559	Q3560	G3561	K3562	V3563	E3564	G3565	L3579	P3580	G3581	R3582	E3583	E3584	D3585	A3586	D3587	L3592	V3593	R3594	S3595	V3596	H3605	E3610	H3611	P3612	Y3613	K3614	S3615	K3616	K3617	A3618	V3619	N3620	H3621	K3622	L3623	L3624	S3625	K3626	Q3627	R3628	R3629	R3630	A3631	V3632	V3633	C3634	C3635	R3637	N3638				
Y3642	R3648	M3652	E3655	A3659	L3663	D3676	G3681	E3682	Q3683	E3684	E3685	E3686	E3687	E3688	E3689	V3690	E3691	E3692	K3693	K3694	P3695	H3699	F3705	T3708	E3736	GLU	GLY	GLY	GLY	ASN	GLY	GLU	ALA	GLU	GLU	GLU	V3749	E3750	F3753	E3754	E3757	S3768	R3769														
L3770	H3771	T3772	R3773	G3801	L3805	L3817	K3821	D3822	K3823	L3835	S3840	V3841	L3842	K3852	G3857	M3858	V3859	N3860	E3861	D3862	G3863	K3864	P3865	L3866	N3867	R3868	Q3869	N3870	G3871	E3872	K3873	D3877	F3880	L3891	F3899	Q3900	N3901	R3904	S3929	Y3937	S3938	D3941	E3945														
E3945	K3948	R3949	Y3968	N3976	K4002	D4006	L4017	K4067	L4068	K4069	D4070	I4071	V4072	G4073	S4074	E4075	A4076	D4079	Y4080	V4081	G3863	T4082	D4083	F4084	R4085	L4088	S4089	K4090	K4091	D4092	F4093	Q4094	K4095	A4096	M4097	D4098	Q4100	K4101	Q4102	F4103	T4104	G4105	P4106	E4107	I4108	F4110	L4111	L4112									
S4115	E4116	A4117	D4118	E4119	N4120	E4121	M4122	L4123	M4124	F4125	A4129	P4135	D4138	F4141	M4142	P4155	R4161	E4165	R4180	I4181	T4182	R4192	E4196	T4197	S4198	E4199	T4200	M4201	R4202	K4211	E4212	S4213	K4214	F4219	D4220	M4221	V4222	M4223	E4224	G4225	G4226	E4227	A4228	M4231	E4253	F4254											



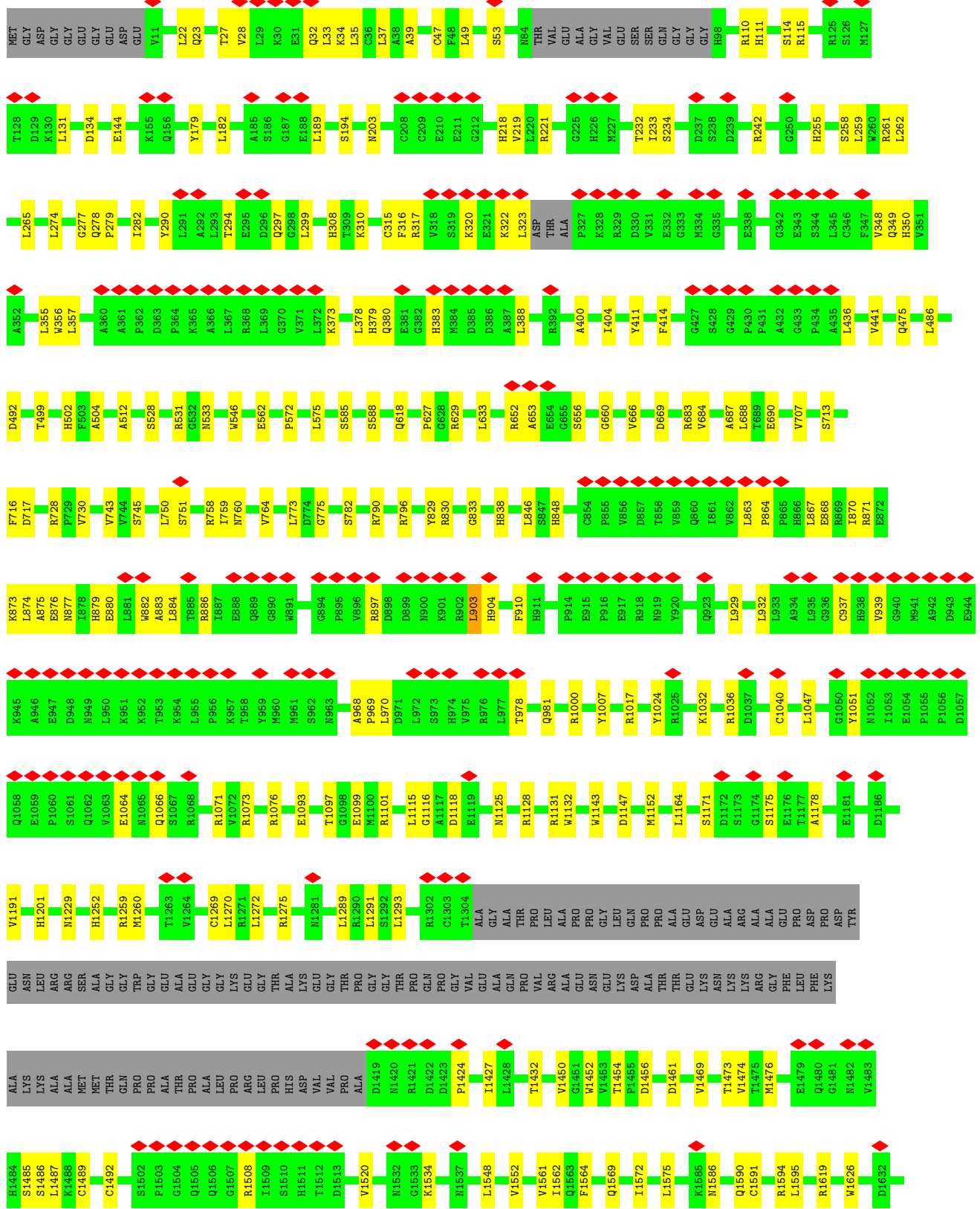
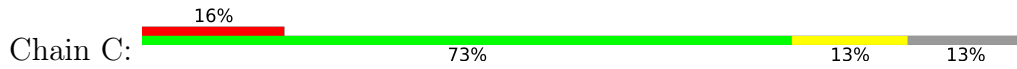
• Molecule 1: Ryanodine receptor 1

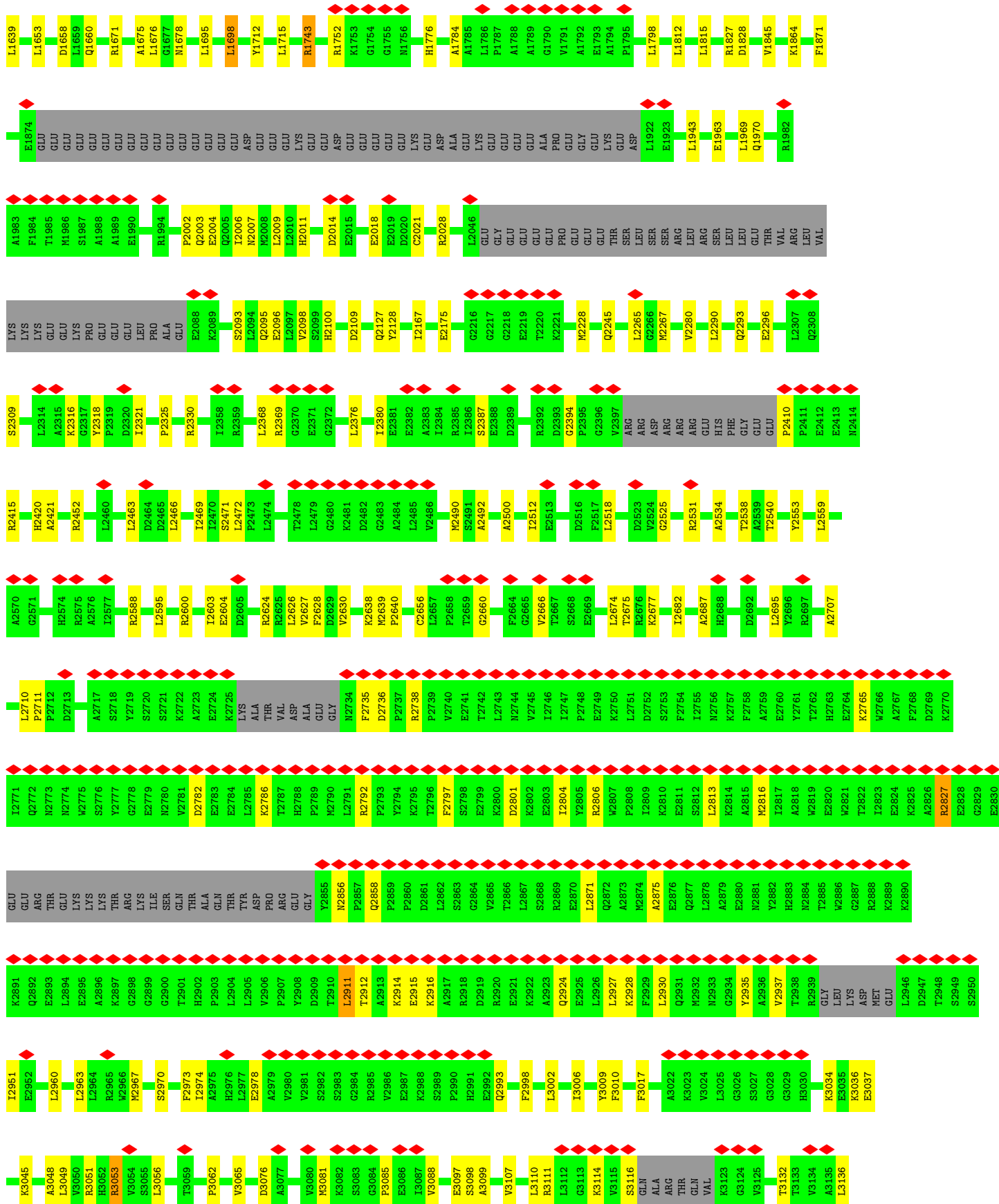




R3499	R3500	D3501	R3502	R3503	R3504	R3505	R3506	R3507	V3511	I3520	N3523	M3524	I3533	R3534	L3535	T3538	A3541	L3542	R3543	D3544	T3545	E3548	N3555	N3556	L3557	L3558	L3559	Q3560	G3561	V3563	E3564	G3565	L3579	F3580	G3581	R3582	E3583	E3584	D3585	A3586	D3587	I3592	V3593	R3594	R3595	V3596	H3605																																												
R3414	D3417	R3420	L3424	N3430	F3435	F3442	H3449	N3450	R3453	V3459	Q3461	N3462	I3463	N3464	N3466	M3467	S3468	F3469	L3470	T3471	A3472	S3473	S3474	S3475	Q3378	L3379	R3380	E3382	A3383	K3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	D3396	L3397	R3403	L3408																																														
I3322	I3323	V3324	N3325	R3326	D3330	E3331	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	Q3343	P3344	I3345	V3346	L3354	F3358	I3359	P3360	T3361	R3364	L3365	K3371	A3374	E3375	Q3378	L3379	R3380	E3382	A3383	K3384	A3385	E3386	A3387	E3388	E3389	G3390	E3391	L3392	L3393	V3394	R3395	D3396	L3397	R3403	L3408																																										
C3216	S3218	V3219	T3220	T3221	S3223	P3224	R3225	E3226	R3227	A3228	L3229	L3230	G3231	D3232	P3233	N3234	V3245	L3246	D3247	R3248	L3256	T3264	E3265	M3266	P3267	R3268	I3272	R3284	W3285	E3286	R3287	E3288	E3290	A3291	P3292	P3293	P3294	A3295	L3296	P3297	A3298	G3299	A3300	P3301	P3302	N3214	P3303	C3304	T3305	L3316																																									
G3026	S3027	G3028	G3029	H3030	K3034	E3035	K3036	E3037	K3045	A3048	L3049	F3050	R3051	H3052	R3053	V3054	S3055	L3056	T3059	P3062	V3065	D3076	A3077	V3080	M3081	K3082	S3083	G3084	P3085	E3086	L3087	V3088	E3097	S3098	A3099	V3107	L3110	R3111	L3112	G3113	K3114	V3115	S3116	G3123	G3124	V3125	T3132	T3133	V3134	A3135	L3136	Q3145	Q3149	H3150	Q3151	D3154	D3155	V3156	T3157	L3158	D3159	S3164	R3167	T3168	L3169	C3170	S3171	I3172	V3173	S3174	L3175	G3176	T3177	T3178	N3180	T3181	V3182	V3183	E3184	L3194	A3195	R3196	A3199	A3200	P3201	P3202	L3206	E3212	V3213	N3214	A3215
T2885	W2886	G2887	R2888	K2889	K2890	K2891	Q2892	E2893	L2894	E2895	A2896	R2897	G2898	G2899	G2900	H2901	P2903	L2904	L2905	V2906	P2907	V2908	D2909	T2910	L2911	T2912	A2913	K2914	E2915	G2916	A2917	R2918	D2919	R2920	E2921	L2922	A2923	Q2924	E2925	L2926	L2927	K2928	F2929	L2930	Q2931	M2932	N2933	G2934	V2935	A2936	V2937	T2938	R2939	GLY	LEU	LYS	ASP	MET																																	
K2825	A2826	R2827	E2828	G2829	GLU	GLU	ARG	THR	GLU	LYS	LYS	THR	ARG	LYS	ILE	SER	GLN	THR	ALA	GLN	TYR	ASP	PRO	ARG	GLY	Y2855	N2856	P2857	Q2858	P2859	P2860	D2861	L2862	S2863	G2864	V2865	T2866	L2867	S2868	R2869	E2870	L2871	Q2872	A2873	M2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884																																				
K2765	W2766	A2767	F2768	D2769	K2770	L2771	Q2772	M2773	N2774	W2775	S2776	G2777	G2778	E2779	M2780	V2781	D2782	E2783	E2784	L2785	K2786	T2787	H2788	P2789	M2790	L2791	R2792	F2793	V2794	K2795	T2796	F2797	S2798	E2799	K2800	D2801	K2802	E2803	L2804	Y2805	R2806	W2807	P2808	L2809	K2810	E2811	S2812	L2813	A2814	A2815	M2816	I2817	A2818	W2819	E2820	W2821	I2822	E2823																																	
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T2540	L2549	A2570	G2571	H2574	R2575	A2576	L2577	R2588	L2589	R2600	I2603	E2604	D2605	R2624	R2625	L2626	V2627	F2628	P2629	V2630	K2638	M2639	P2640	C2656	L2657	P2658	T2659	G2660	F2664	G2665	V2666	A2492	S2667	S2668	E2669	L2674	T2675	K2677	L2682	L2674	T2675	K2677	D2523	V2524	G2525	A2687	H2688	D2692	L2695																																										
HIS	PHE	GLY	GLU	P2410	P2411	E2412	E2413	N2414	R2415	H2420	A2421	R2452	L2460	L2463	D2464	D2465	L2466	S2471	L2472	P2473	L2474	T2478	L2479	G2480	K2481	D2482	G2483	A2484	L2485	V2486	H2490	S2491	A2492	I2512	E2513	D2516	F2517	L2518	D2523	V2524	G2525	R2531	A2534	T2538	A2539																																														







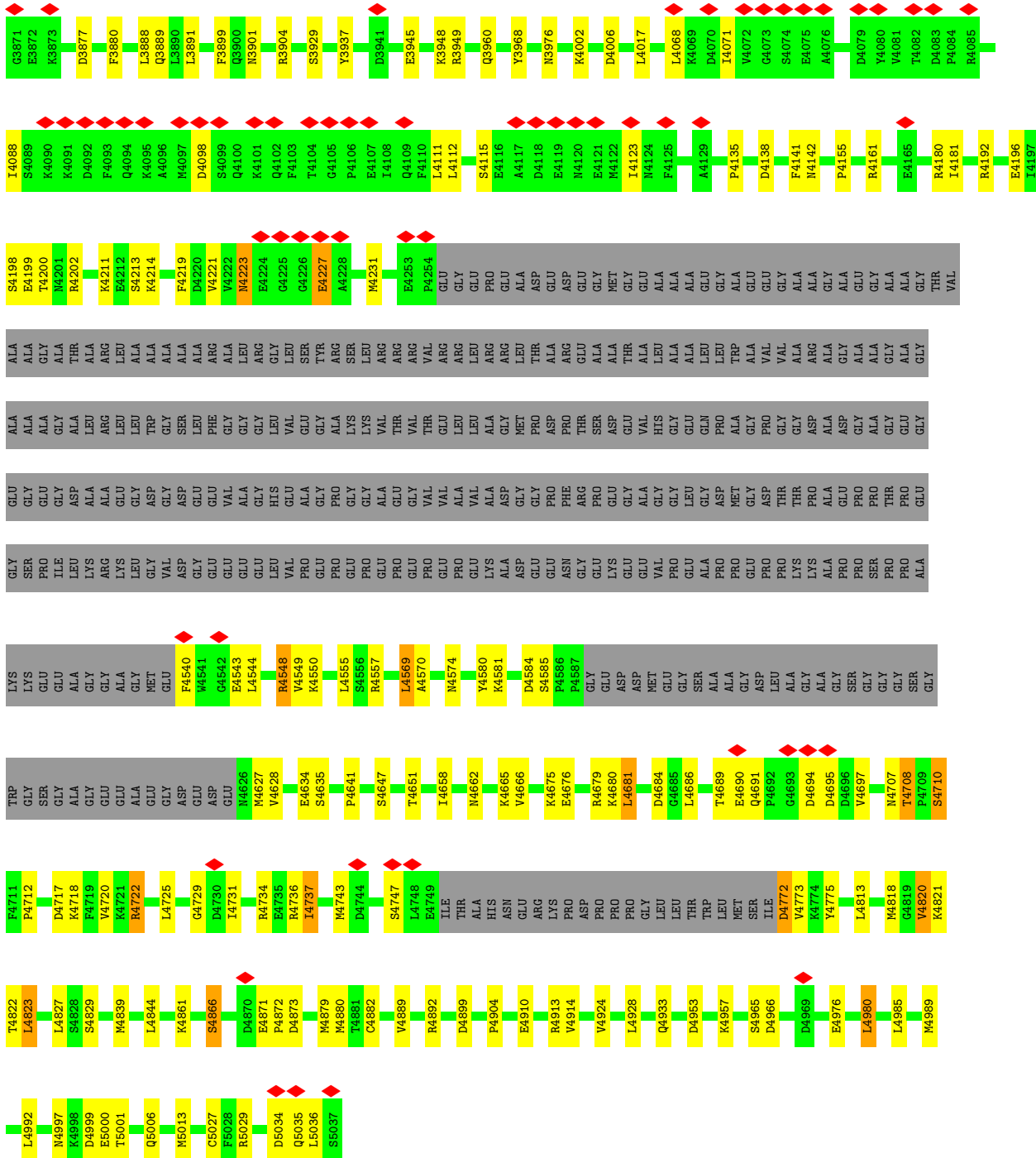








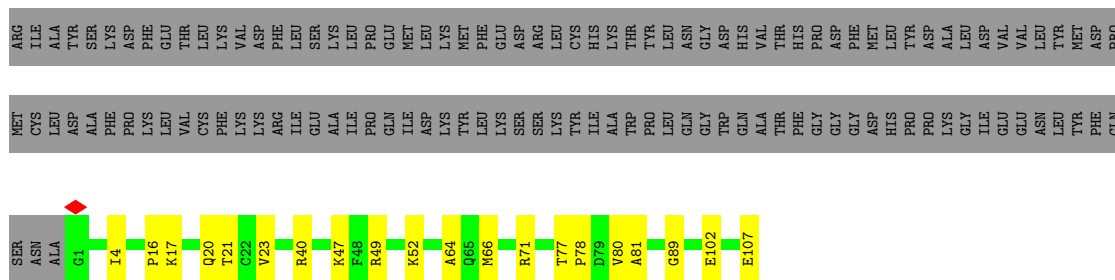
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E3736	L2771	Q2772	N2773	N2774	W2775	S2776	Y2777	G2778	E2779	N2780	V2781	D2782	E2783	E2784	L2785	K2786	H2788	P2789	M2790	L2791	R2792	P2793	Y2794	K2795	D2800	D2801	K2802	E2803	I2804	Y2805	R2806	W2807	P2808	I2809	K2810	E2811	S2812	L2813	K2814	A2815	M2816	I2817	A2818	W2819	E2820	W2821	T2822	I2823	E2824	K2825	R2827	E2828	G2829		
GLU	GLU	ARG	THR	GLU	LYS	LYS	THR	ARG	LYS	ILE	SER	GLN	THR	ALA	GLN	TVR	ASP	PRO	ARG	GLU	GLY	N2855	N2857	Q2858	P2859	D2861	L2862	S2863	S2864	V2865	T2866	L2867	S2868	R2869	E2870	L2871	Q2872	A2873	M2874	A2875	E2876	Q2877	L2878	A2879	E2880	N2881	Y2882	H2883	N2884	T2885	W2886	G2887	R2888	K2889	K2890
K2891	Q2892	E2893	L2894	A2895	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	M2933	A2934	Y2935	A2936	V2937	T2938	R2939	GLY	L2946	D2947	T2948	S2949	S2950	
I2951	E2952	L2960	Q2961	L2963	L2964	R2965	W2966	M2967	S2970	F2973	L2974	H2976	L2977	E2978	A2979	V2980	V2981	S2982	S2983	Q2984	R2985	V2986	E2987	K2988	S2989	P2990	H2991	E2992	Q2993	F2997	F2998	I3001	L3002	I3006	Y3009	F3010	F3017	A3022	K3023	V3024	G3026	S3027	G3028	G3029	H3030	K3034									
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V3134	A3135	L3136	Q3145	Q3149	H3150	K3151	D3154	V3156	L3157	L3158	D3159	S3164	R3167	T3168	L3169	S3171	L3172	Y3173	S3174	L3175	G3176	T3177	Q3178	K3179	N3180	T3181	Y3182	V3183	E3184	L3194	A3195	R3196	A3199	L3206	E3212	Y3213	N3214	A3215	C3216	S3217	V3218	Y3219	T3220	T3221	K3222	S3223	P3224	R3225							
E3226	R3227	A3228	I3229	L3230	G3231	L3232	P3233	N3234	V3245	L3246	D3247	R3248	L3249	L3256	T3264	E3265	M3266	F3267	H3268	I3272	L3277	R3283	W3284	Y3285	Q3286	R3287	E3290	A3291	P3292	P3293	P3294	A3295	L3296	A3298	G3299	A3300	P3301	P3302	P3303	C3304	T3305	L3316	I3322	I3323	V3324	N3325	N3326	D3330							
E5331	M3335	K3336	R3337	L3338	A3339	V3340	F3341	A3342	Q3343	P3344	V3345	V3346	L3354	F3358	I3359	P3360	T3361	A3374	E3375	Q3378	L3379	R3380	L3381	E3382	A3383	K3384	A3385	E3386	A3387	E3388	G3389	E3391	L3392	L3393	V3394	R3395	D3396	R3403	L3408	R3414	R3414	D3417	R3420												
L3424	N3430	F3435	F3442	H3449	N3450	R3453	V3459	V3460	Q3461	N3462	E3463	I3464	N3465	N3466	M3467	S3468	F3469	L3470	T3471	A3472	D3473	S3474	K3475	S3476	K3477	M3478	A3479	LYS	ALA	GLY	ASP	ALA	GLN	SER	GLY	GLY	ASP	GLN	ARG	THR	LYS	LYS	R3498	R3499	G3500	D3501	R3502	P3503	S3504	V3505					
Q3506	T3507	E3508	L3509	V3510	A3511	T3513	L3520	M3524	L3533	M3534	A3541	L3542	K3543	D3544	T3545	E3548	N3555	N3556	L3557	H3558	L3559	Q3560	K3561	K3562	V3563	E3564	G3565	L3579	P3580	G3581	R3582	E3583	E3584	D3585	A3586	D3587	L3592	V3593	R3594	R3595	V3596	H3605	E3610	H3611	P3612	Y3613	K3614	S3615							
K3616	K3617	A3618	V3619	W3620	H3621	K3622	L3623	L3624	S3625	K3626	Q3627	R3628	R3629	R3630	A3631	V3632	V3633	A3634	C3635	F3636	R3637	M3638	Y3642	R3648	M3652	E3655	A3659	L3663	D3676	G3681	E3682	Q3683	E3684	E3685	E3686	E3687	E3688	E3689	V3690	E3691	E3692	K3693	K3694	P3695	H3699	F3705	T3708								
E3736	L3749	E3750	V3751	S3752	F3753	E3754	E3755	K3756	E3757	S3768	R3769	L3770	F3771	H3771	T3772	R3773	G3801	L3805	L3817	K3821	D3822	K3823	L3835	S3840	V3841	L3842	G3857	H3858	V3859	E3860	E3861	D3862	G3863	V3864	R3865	L3866	R3867	H3868	F3869	E3870	E3871	D3872	K3873	L3874	E3875	L3876	E3877	L3878	E3879	L3880					



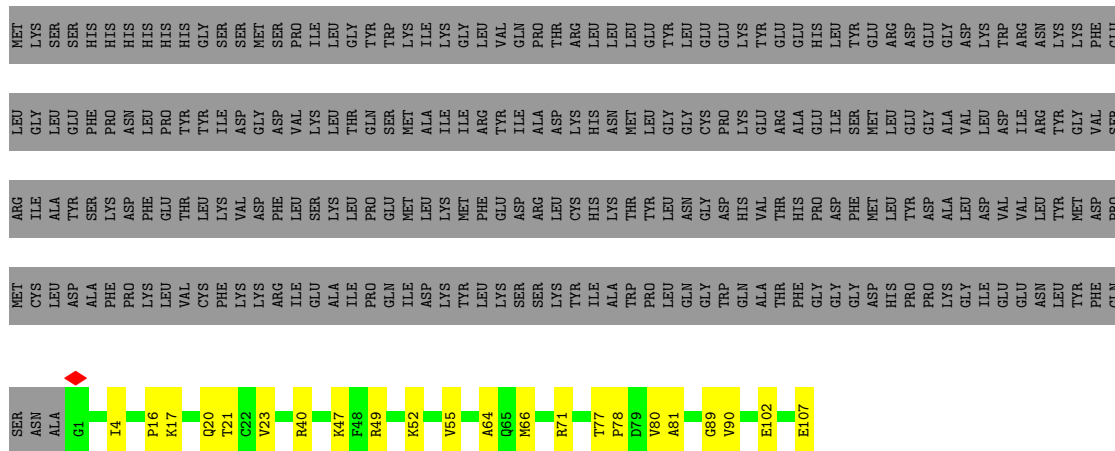
- Molecule 2: Glutathione S-transferase class-mu 26 kDa isozyme, Peptidyl-prolyl cis-trans isomerase FKBP1B



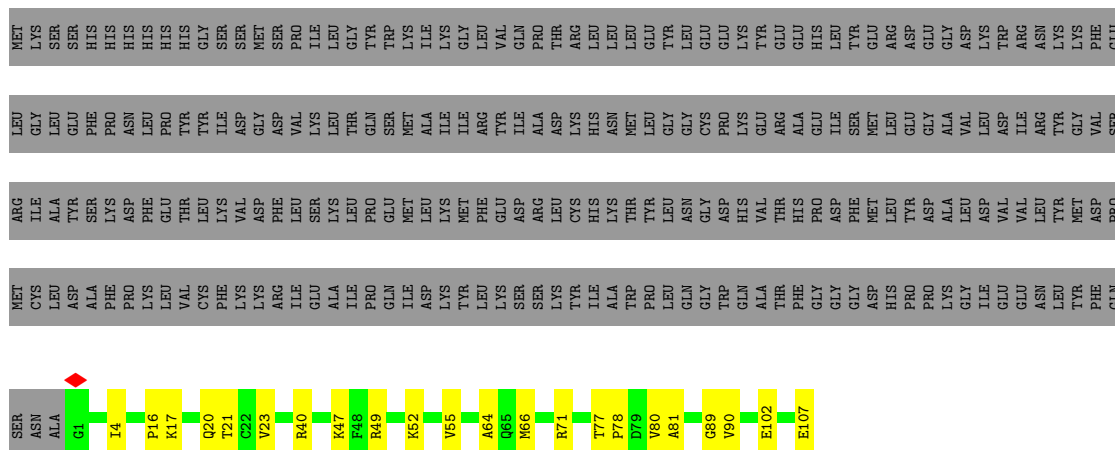
MET	LYS	SER	THR	HIS	HIS	HIS	HIS	THR	TYR	GLY	ASP	ASP	ASP	PRO	PRO	VAL	LEU	LEU	LEU	THR	GLN	SER	MET	LYS	ALA	ILE	LEU	ARG	TYR	ILE	ILE	GLN	ILE	VAL	LEU	THR	ASP	ASP	THR	THR	ASP	ASN	LEU	LEU	LEU	LEU	GLY	GLY	CYS	PRO	GLY	LYS	ARG	GLU	GLU	ALA	ILE	LEU	SER	TYR	MET	GLY	LEU	GLY	GLY	ASP	VAL	ALA	GLY	ASP	TRP	ASP	ILE	ARG	ASN	GLY	LYS	VAL	PHE	VAL	THR	GLY	SER
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- Molecule 2: Glutathione S-transferase class-mu 26 kDa isozyme,Peptidyl-prolyl cis-trans isomerase FKBP1B



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



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



SER	ASN	ALA	G1	I4	P16	K17	Q20	T21	C22	V23	R40	K47	F48	R49	K52	V55	A64	Q65	M66	R71	T77	P78	D79	V80	A81	G89	E102	E107																																	
ARG	ILE	ALA	TYR	SER	LYS	PHE	CYS	PHE	LYS	LYS	ARG	ILE	ALA	ILE	GLN	ILE	ASP	LYS	TYR	PHE	LEU	LYS	SER	SER	LYS	TYR	ILE	ALA	GLN	TRP	ALA	THR	PHE	GLY	GLY	ASP	PHE	MET	GLU	HIS	LEU	PRO	TYR	ASP	ALA	LYS	GLY	ILE	VAL	ASP	THR	VAL	GLU	ASN	LEU	TYR	MET	ASP	GLN		
MET	LYS	SER	LEU	GLU	PRO	HIS	HIS	GLY	SER	ASP	MET	SER	LEU	VAL	PRO	ILE	LEU	GLU	ALA	TYR	THR	LEU	TYR	LEU	GLY	CYS	PRO	GLU	GLU	LYS	GLU	THR	ARG	ALA	GLU	HIS	LEU	ASN	HIS	ASN	MET	LEU	GLU	TYR	GLY	PRO	VAL	LEU	ASP	ASP	GLY	THR	ILE	ARG	ASN	LYS	LYS	VAL	ASP	GLY	SER

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	45876	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	1.402	Depositor
Minimum map value	-0.437	Depositor
Average map value	-0.002	Depositor
Map value standard deviation	0.075	Depositor
Recommended contour level	0.428	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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section:  
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	0.32	0/35738	0.63	10/48398 (0.0%)
1	B	0.32	0/35738	0.63	10/48398 (0.0%)
1	C	0.32	0/35738	0.63	10/48398 (0.0%)
1	D	0.32	0/35738	0.63	10/48398 (0.0%)
2	E	0.32	0/834	0.62	0/1123
2	F	0.32	0/834	0.62	0/1123
2	G	0.32	0/834	0.62	0/1123
2	H	0.32	0/834	0.62	0/1123
All	All	0.32	0/146288	0.63	40/198084 (0.0%)

There are no bond length outliers.

The worst 5 of 40 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	3301	PRO	N-CD-CG	-7.38	92.12	103.20
1	B	3301	PRO	N-CD-CG	-7.38	92.13	103.20
1	C	3301	PRO	N-CD-CG	-7.38	92.13	103.20
1	D	3301	PRO	N-CD-CG	-7.38	92.13	103.20
1	A	3301	PRO	CA-N-CD	-6.90	101.85	111.50

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

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



Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	34921	0	34541	354	0
1	B	34921	0	34541	351	0
1	C	34921	0	34541	343	0
1	D	34921	0	34541	354	0
2	E	818	0	824	11	0
2	F	818	0	824	13	0
2	G	818	0	824	13	0
2	H	818	0	824	12	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
All	All	142960	0	141460	1433	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 5.

The worst 5 of 1433 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1561:VAL:HG12	1:A:1562:ILE:HG12	1.73	0.71
1:C:1561:VAL:HG12	1:C:1562:ILE:HG12	1.73	0.71
1:B:1561:VAL:HG12	1:B:1562:ILE:HG12	1.73	0.71
1:D:3114:LYS:HD3	1:D:3116:SER:H	1.56	0.70
1:D:1561:VAL:HG12	1:D:1562:ILE:HG12	1.73	0.70

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	4355/5037 (86%)	4230 (97%)	120 (3%)	5 (0%)	51 84

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	4355/5037 (86%)	4230 (97%)	120 (3%)	5 (0%)	51	84
1	C	4355/5037 (86%)	4230 (97%)	120 (3%)	5 (0%)	51	84
1	D	4355/5037 (86%)	4230 (97%)	120 (3%)	5 (0%)	51	84
2	E	105/350 (30%)	103 (98%)	2 (2%)	0	100	100
2	F	105/350 (30%)	103 (98%)	2 (2%)	0	100	100
2	G	105/350 (30%)	103 (98%)	2 (2%)	0	100	100
2	H	105/350 (30%)	103 (98%)	2 (2%)	0	100	100
All	All	17840/21548 (83%)	17332 (97%)	488 (3%)	20 (0%)	54	84

5 of 20 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	3615	SER
1	B	3615	SER
1	C	3615	SER
1	D	3615	SER
1	A	3616	LYS

### 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	3807/4276 (89%)	3695 (97%)	112 (3%)	42	71
1	B	3807/4276 (89%)	3695 (97%)	112 (3%)	42	71
1	C	3807/4276 (89%)	3695 (97%)	112 (3%)	42	71
1	D	3807/4276 (89%)	3695 (97%)	112 (3%)	42	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
All	All	15580/18320 (85%)	15132 (97%)	448 (3%)	46	71

5 of 448 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	1743[B]	ARG
1	D	5001	THR
1	C	4684	ASP
1	D	4989	MET
1	D	4694	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 63 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	3766	GLN
1	D	2003	GLN
1	C	877	ASN
1	D	1590	GLN
1	D	3683	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 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

## 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.

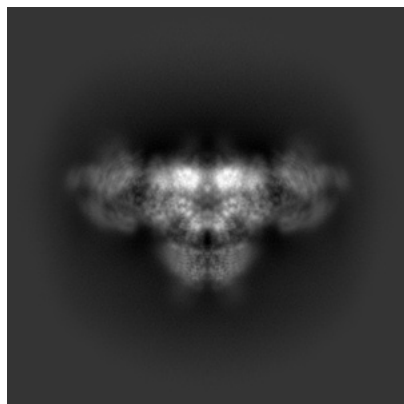
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-40422. These allow visual inspection of the internal detail of the map and identification of artifacts.

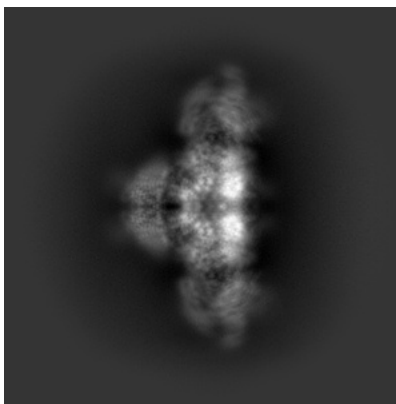
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

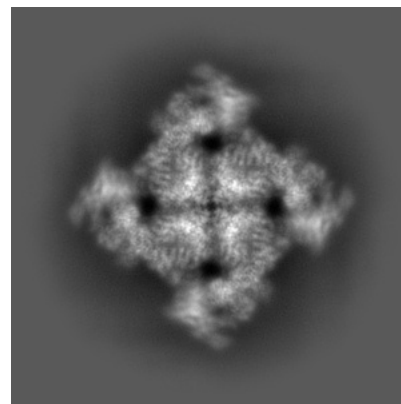
#### 6.1.1 Primary map



X

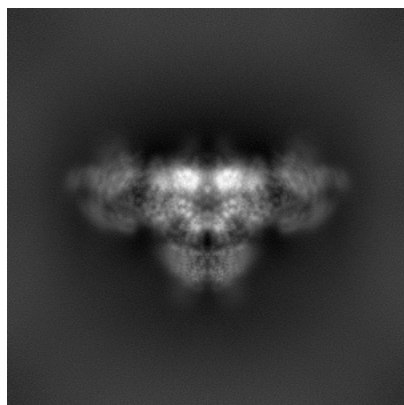


Y

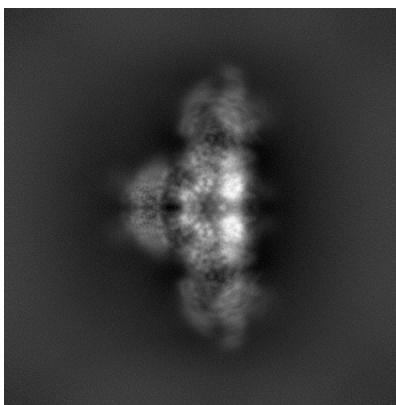


Z

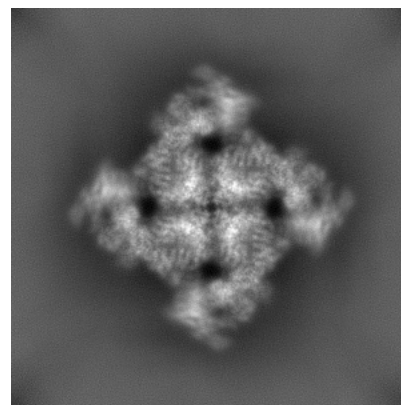
#### 6.1.2 Raw map



X



Y

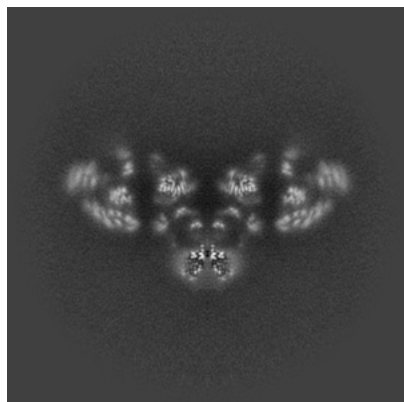


Z

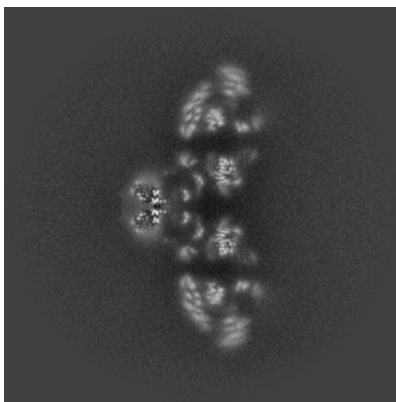
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

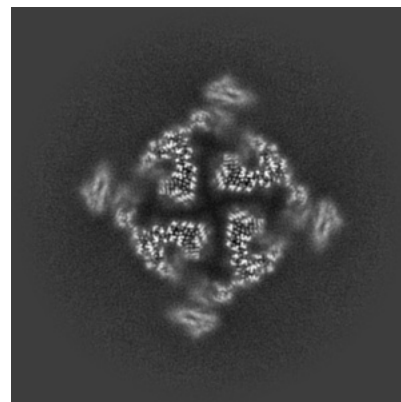
### 6.2.1 Primary map



X Index: 200

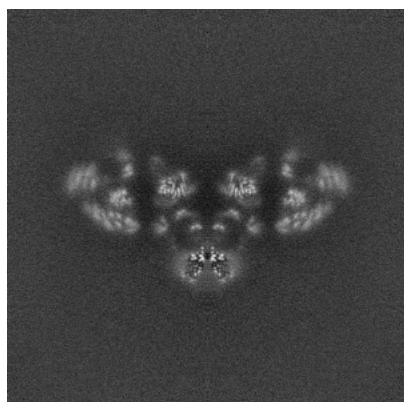


Y Index: 200

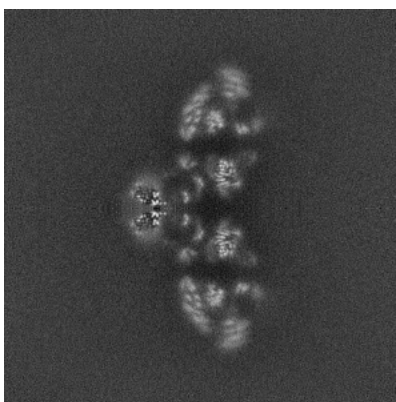


Z Index: 200

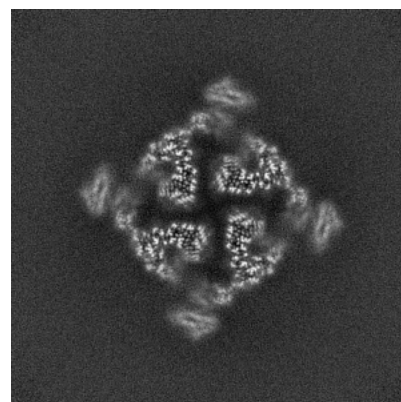
### 6.2.2 Raw map



X Index: 200



Y Index: 200

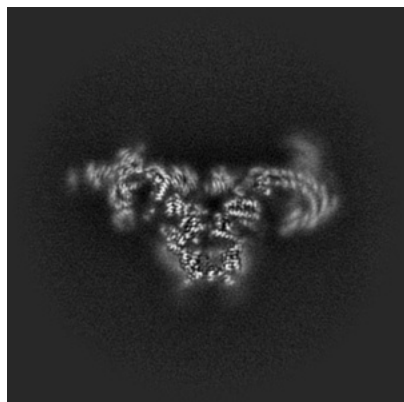


Z Index: 200

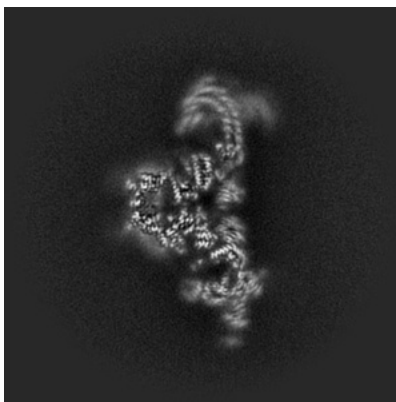
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

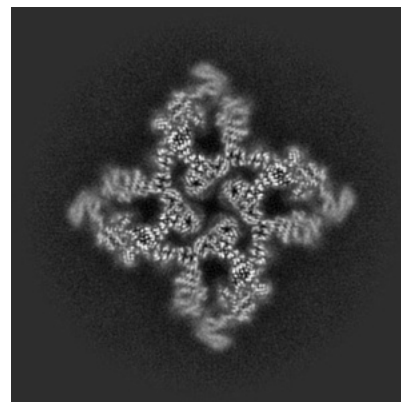
### 6.3.1 Primary map



X Index: 218

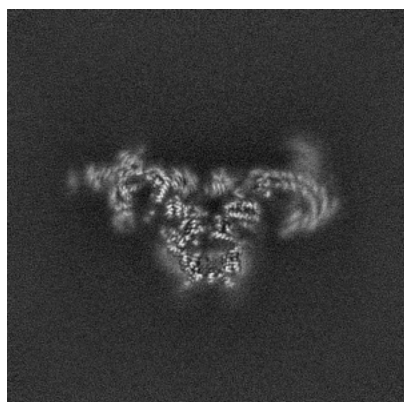


Y Index: 182

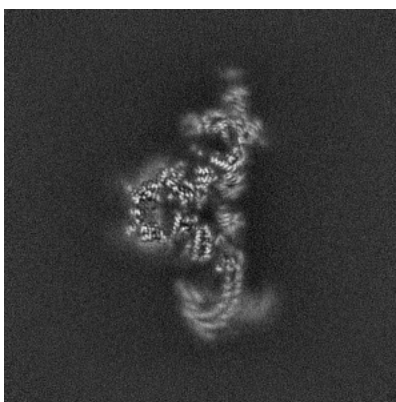


Z Index: 225

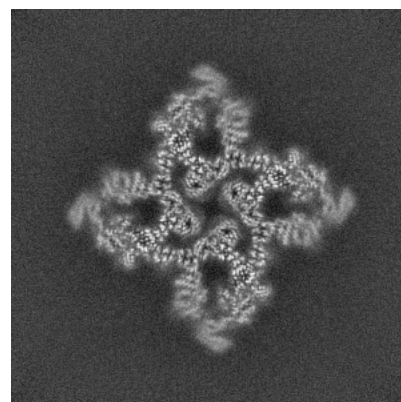
### 6.3.2 Raw map



X Index: 218



Y Index: 218

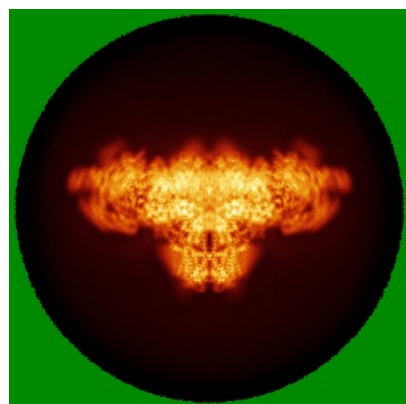


Z Index: 225

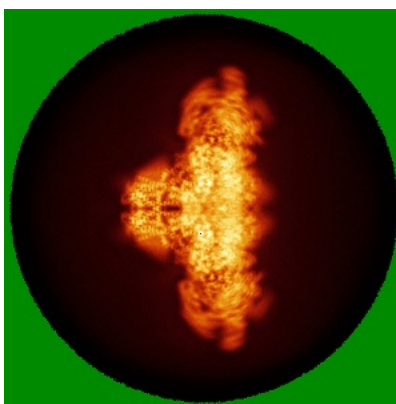
The images above show the largest variance slices of the map in three orthogonal directions.

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

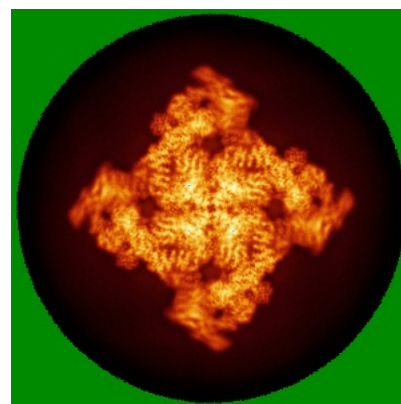
### 6.4.1 Primary map



X

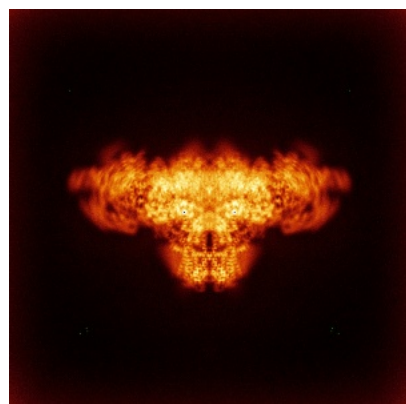


Y

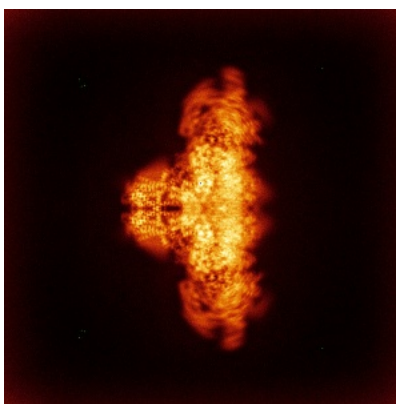


Z

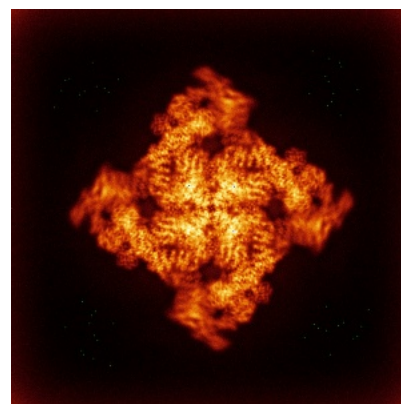
### 6.4.2 Raw map



X



Y



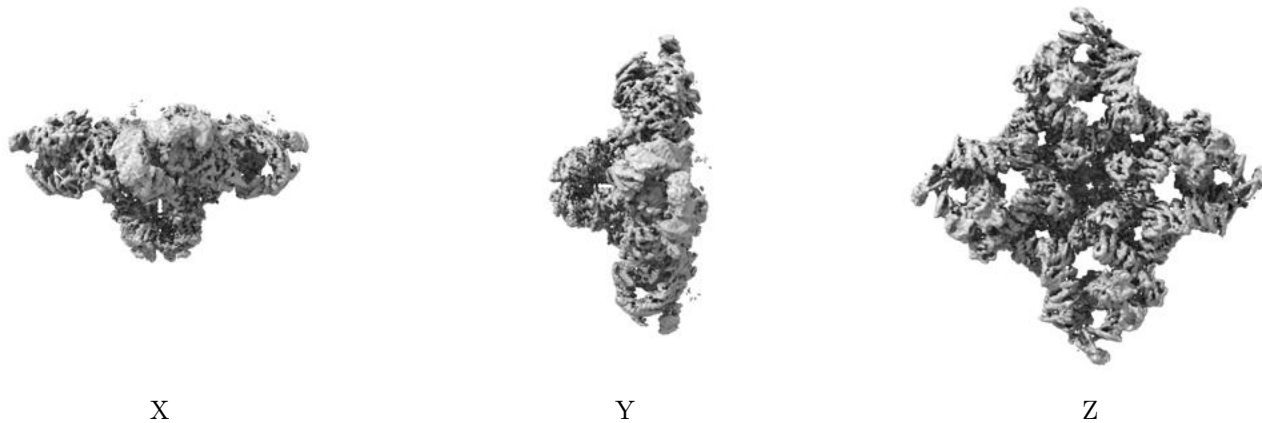
Z

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.



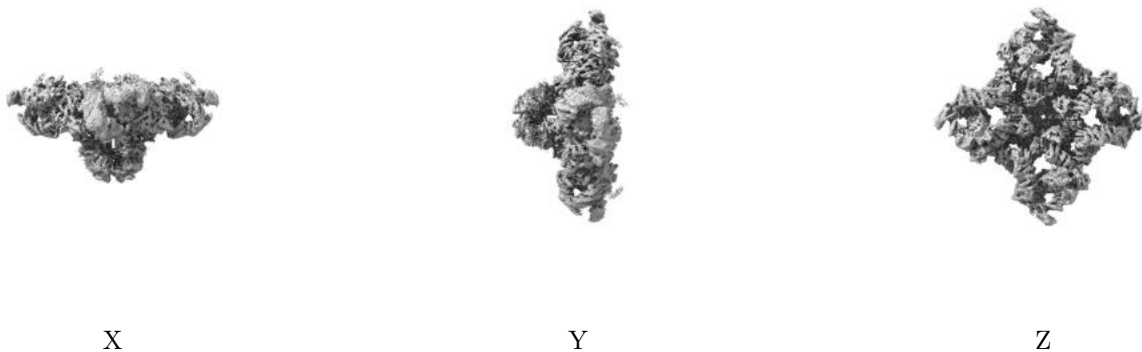
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.428. 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.

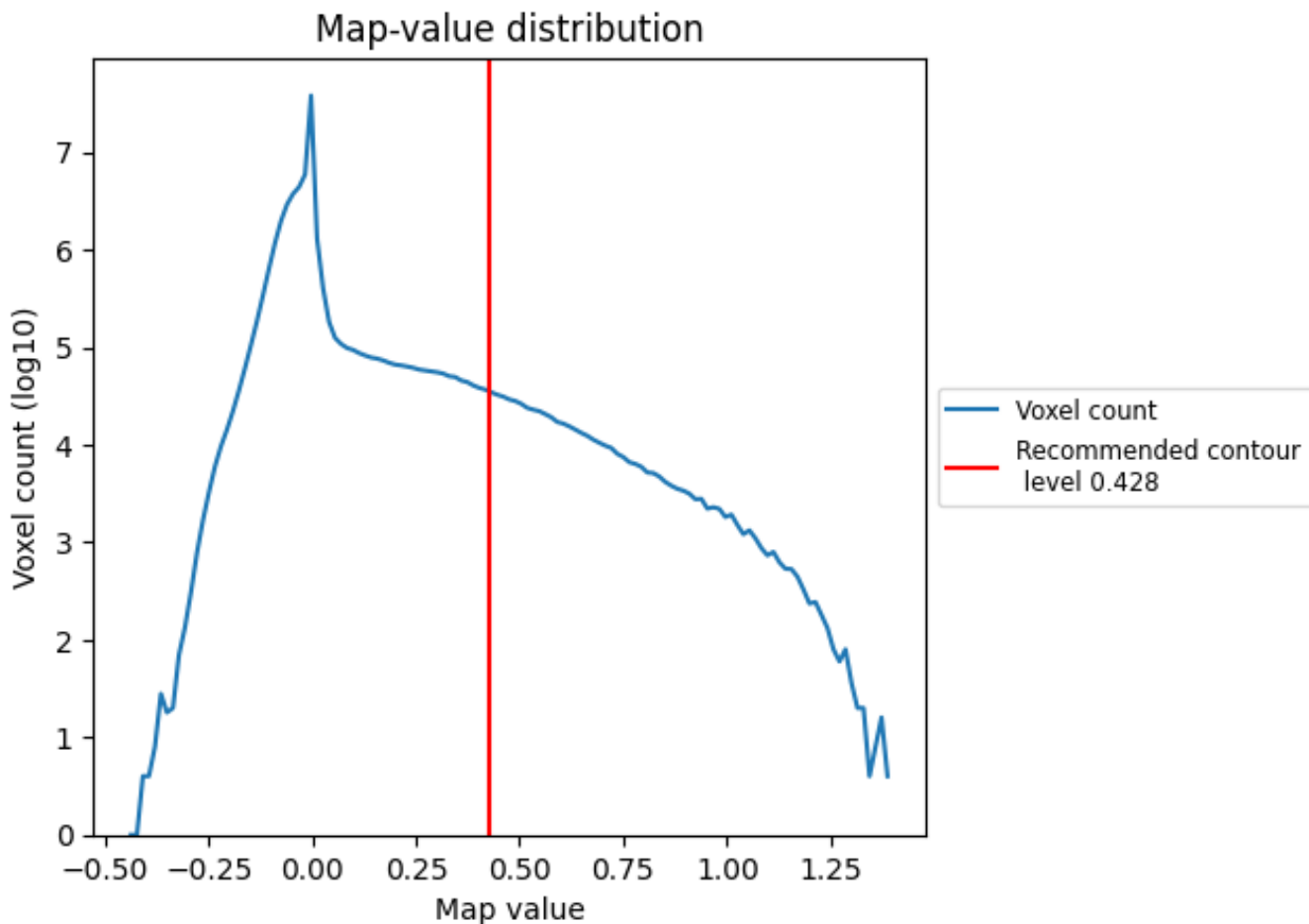
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

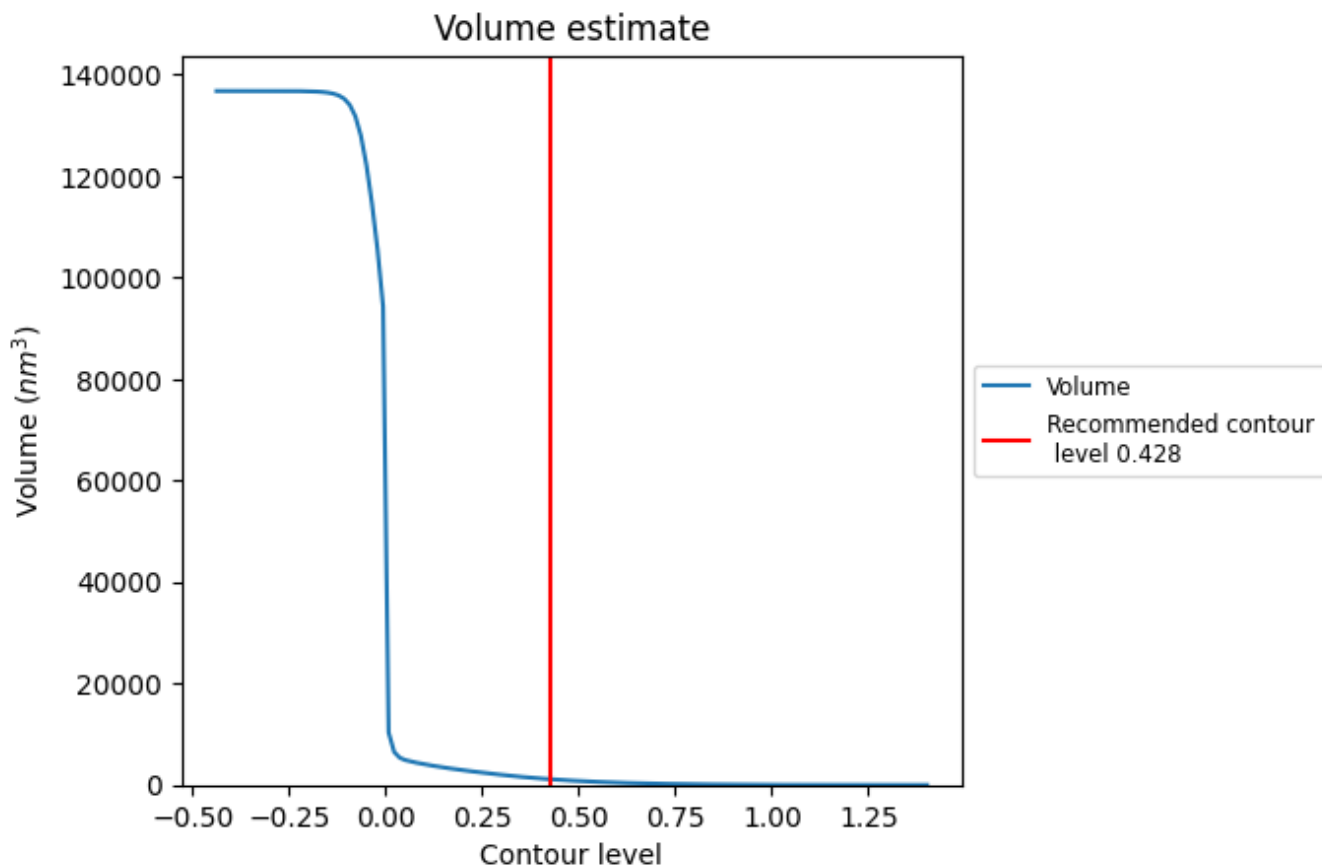
This section contains the results of statistical analysis of the map.

### 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.

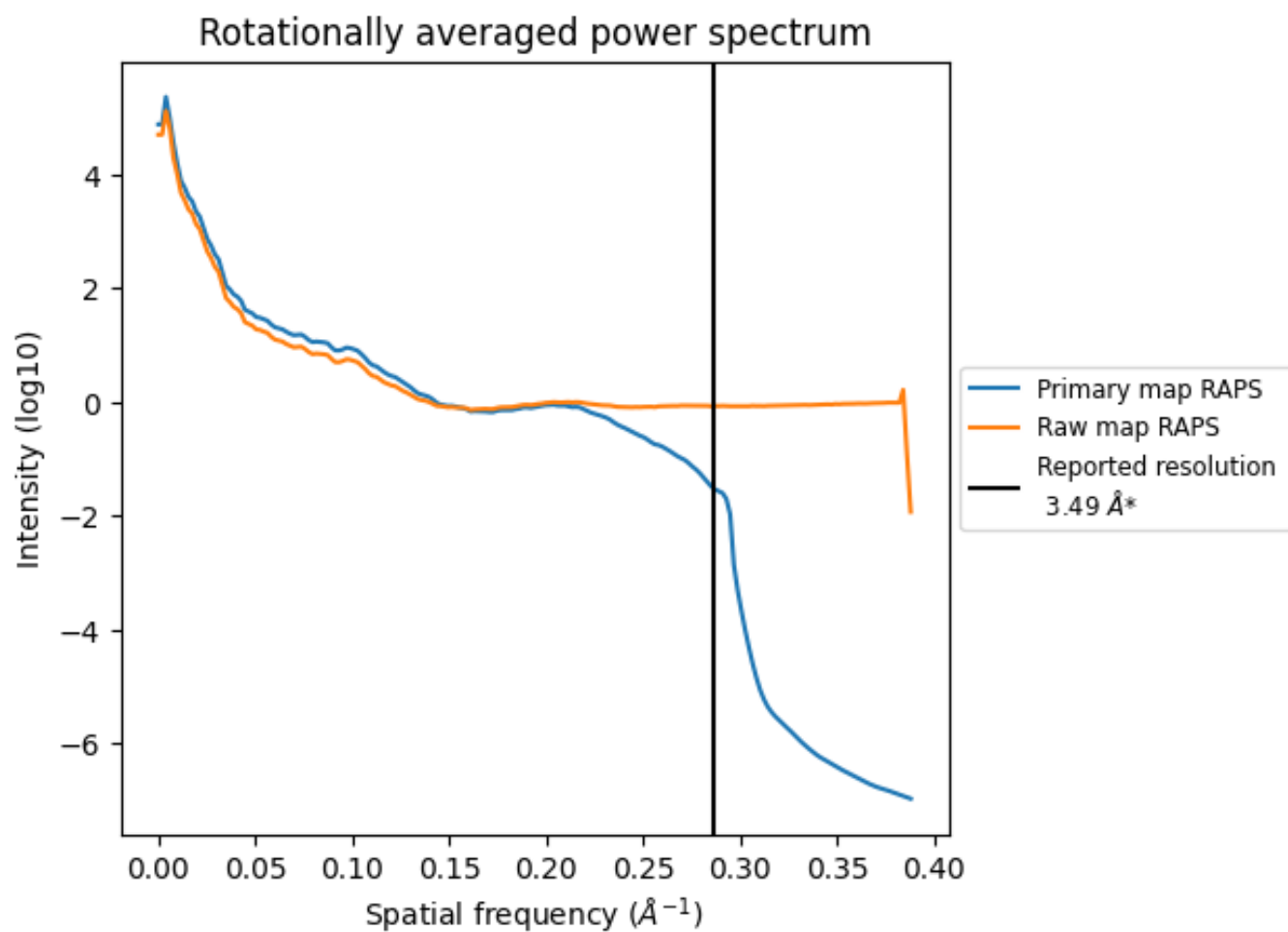
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1121 nm<sup>3</sup>; this corresponds to an approximate mass of 1013 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

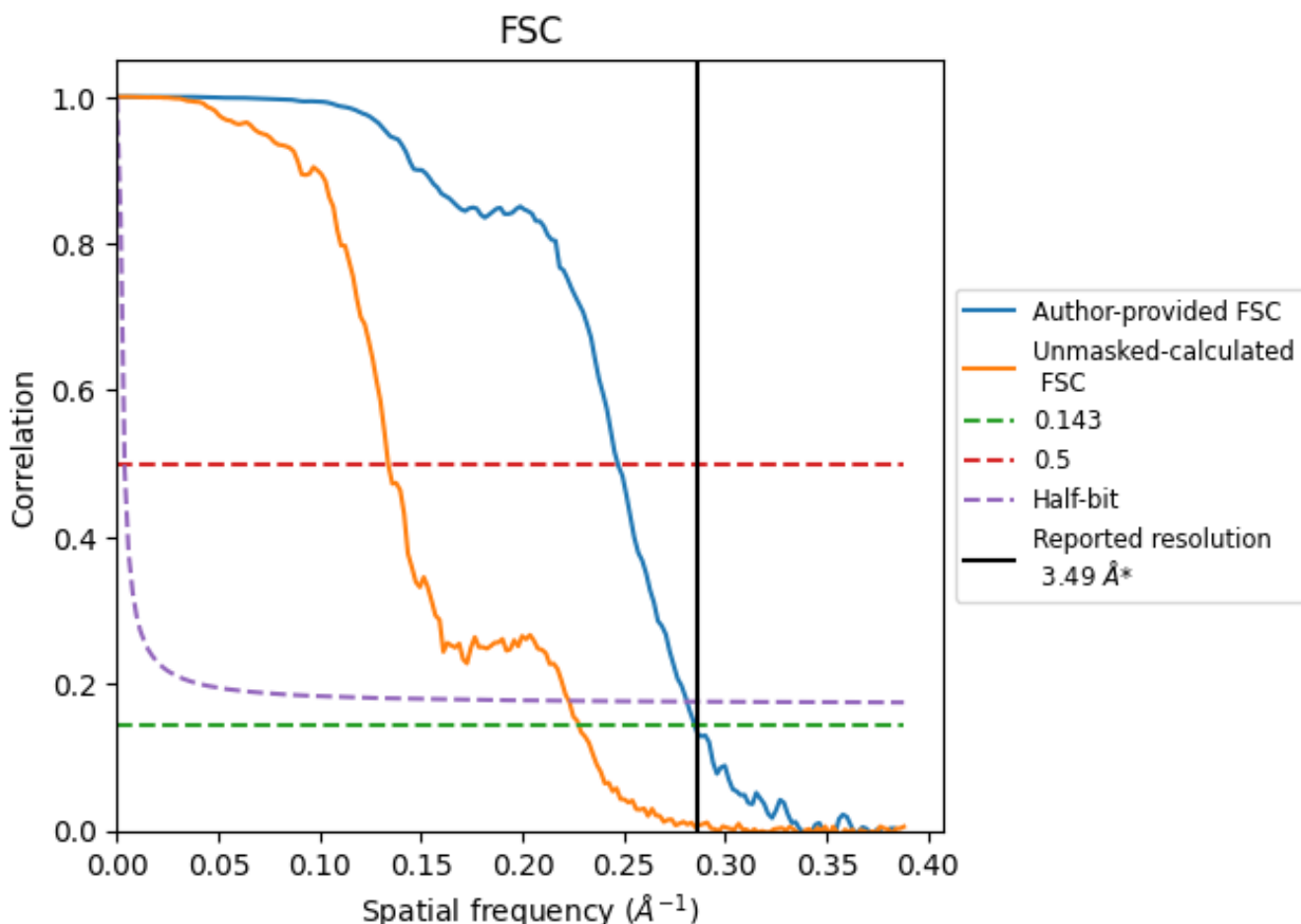


\*Reported resolution corresponds to spatial frequency of  $0.287 \text{ \AA}^{-1}$

## 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 0.287 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

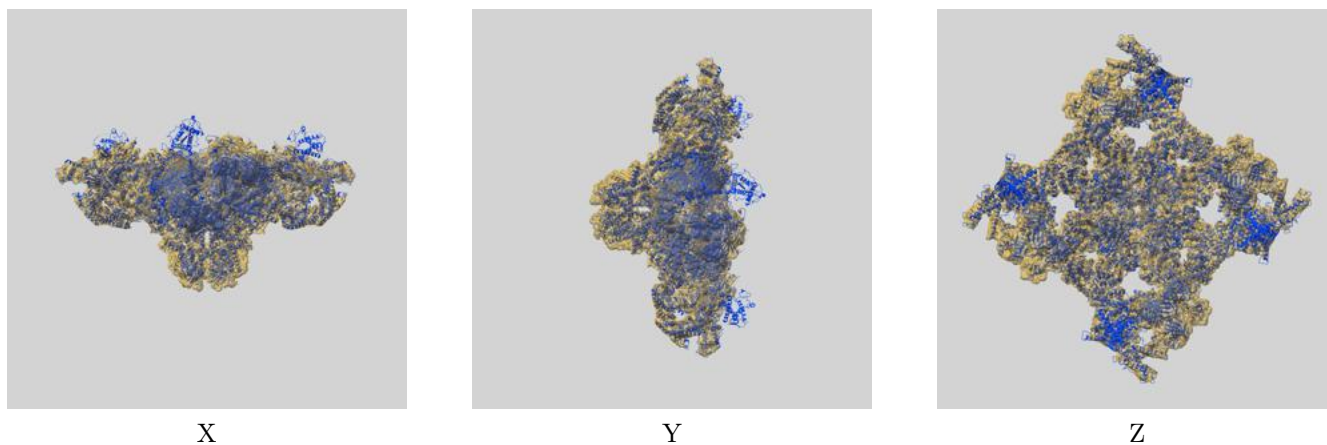
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.49	-	-
Author-provided FSC curve	3.51	4.05	3.56
Unmasked-calculated*	4.39	7.47	4.48

\*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.39 differs from the reported value 3.49 by more than 10 %

## 9 Map-model fit [i](#)

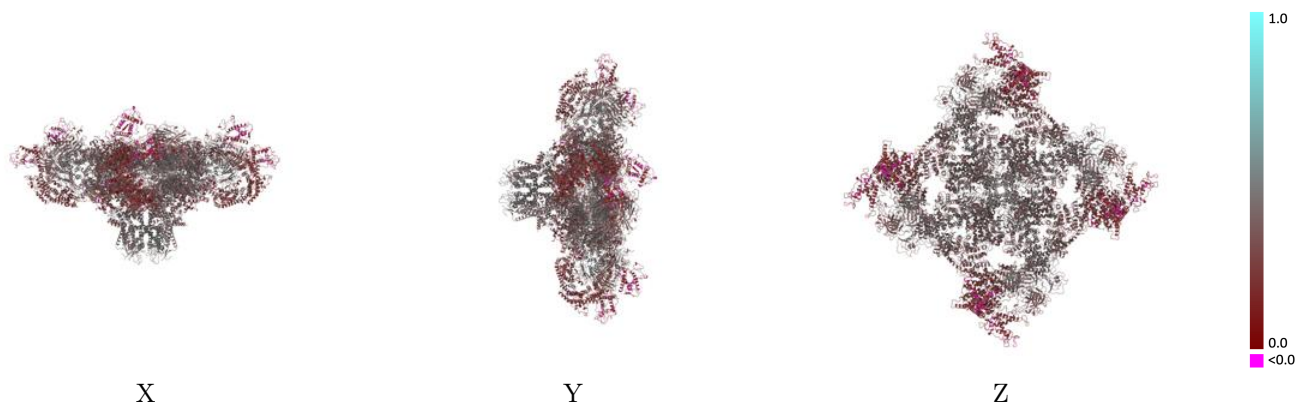
This section contains information regarding the fit between EMDB map EMD-40422 and PDB model 8SEN. Per-residue inclusion information can be found in section 3 on page 7.

### 9.1 Map-model overlay [i](#)



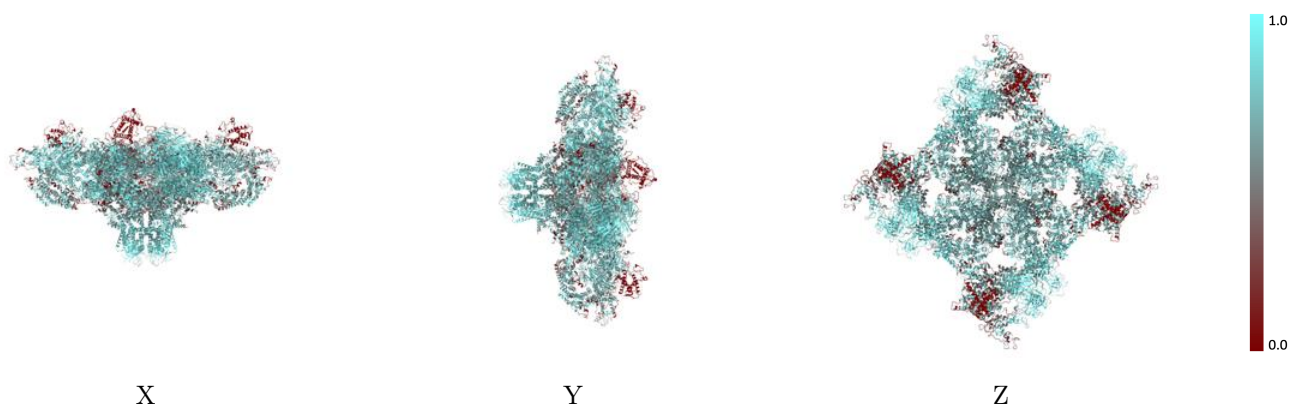
The images above show the 3D surface view of the map at the recommended contour level 0.428 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 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.

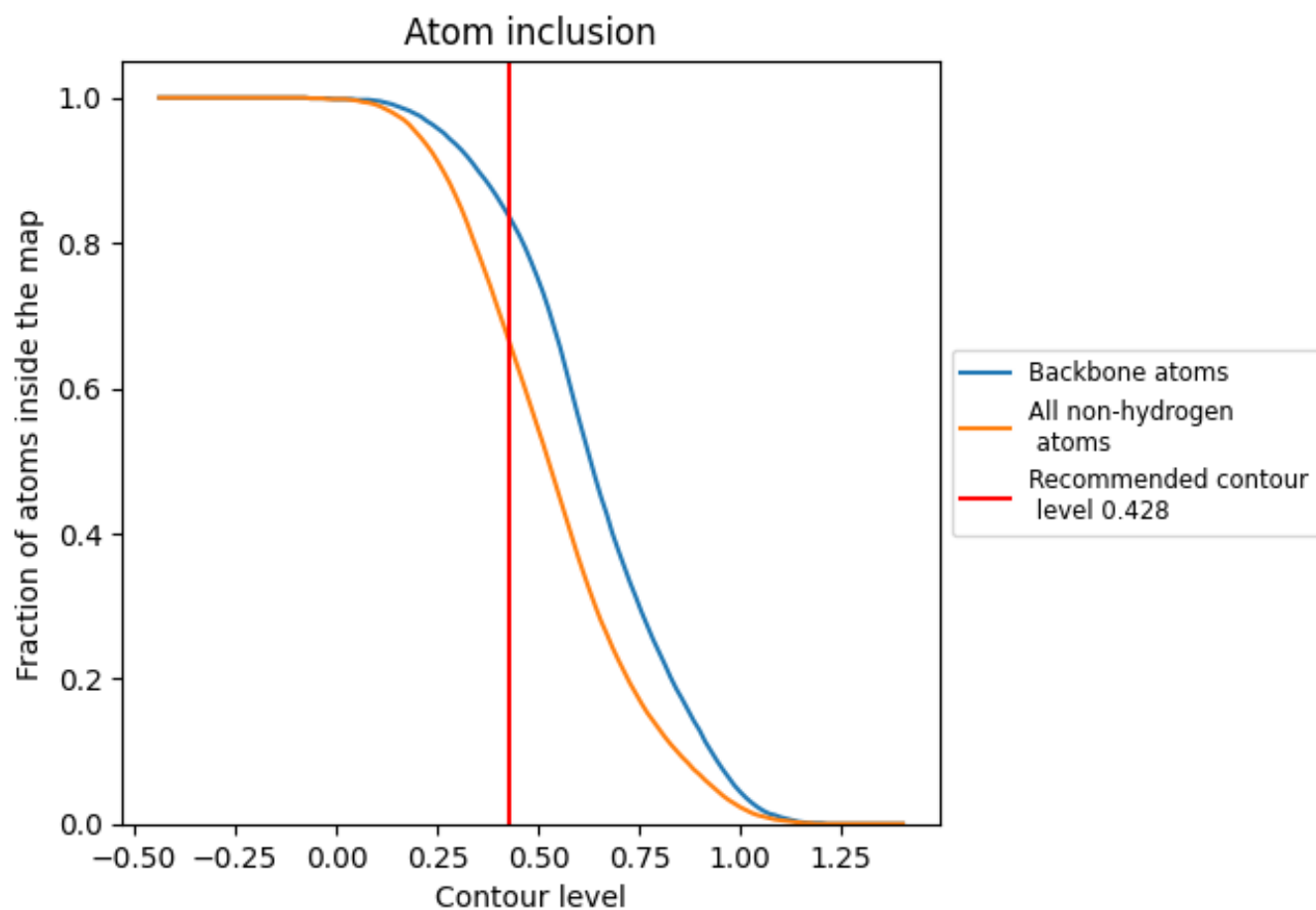
## 9.3 Atom inclusion mapped to coordinate model [\(i\)](#)



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 (0.428).





















## 9.4 Atom inclusion [i](#)



At the recommended contour level, 84% of all backbone atoms, 66% 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 (0.428) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6640	 0.3380
A	 0.6600	 0.3370
B	 0.6600	 0.3360
C	 0.6600	 0.3360
D	 0.6600	 0.3370
E	 0.8210	 0.4140
F	 0.8210	 0.4130
G	 0.8210	 0.4130
H	 0.8210	 0.4160

