



wwPDB EM Validation Summary Report ⓘ

Mar 4, 2023 – 01:30 PM EST

PDB ID : 8FNW
EMDB ID : EMD-29328
Title : Structure of RdrA-RdrB complex from Escherichia coli RADAR defense system
Authors : Duncan-Lowey, B.; Johnson, A.G.; Rawson, S.; Mayer, M.L.; Kranzusch, P.J.
Deposited on : 2022-12-28
Resolution : 6.73 Å(reported)

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:

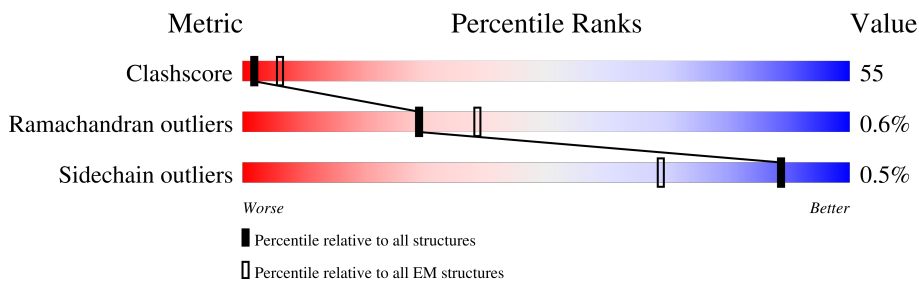
EMDB validation analysis : 0.0.1.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.32.1

1 Overall quality at a glance i

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

The reported resolution of this entry is 6.73 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	799	62% 56% 39% ..
1	B	799	58% 55% 40% ..
1	C	799	21% 52% 43% ..
1	D	799	22% 48% 46% ..
1	E	799	48% 52% 42% ..
1	F	799	44% 55% 40% ..
1	G	799	45% 53% 42% ..
1	H	799	37% 55% 40% ..

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Mol	Chain	Length	Quality of chain
1	I	799	
1	J	799	
1	K	799	
1	L	799	
2	M	947	
2	N	947	
2	O	947	
2	P	947	
2	Q	947	
2	R	947	
2	S	947	

2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 118867 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 Adenosine deaminase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	770	6245	4002	1082	1127	34	0	0
1	B	770	6245	4002	1082	1127	34	0	0
1	C	770	6245	4002	1082	1127	34	0	0
1	D	767	6221	3989	1078	1120	34	0	0
1	E	770	6245	4002	1082	1127	34	0	0
1	F	770	6245	4002	1082	1127	34	0	0
1	G	770	6245	4002	1082	1127	34	0	0
1	H	770	6245	4002	1082	1127	34	0	0
1	I	770	6245	4002	1082	1127	34	0	0
1	J	770	6245	4002	1082	1127	34	0	0
1	K	770	6245	4002	1082	1127	34	0	0
1	L	770	6245	4002	1082	1127	34	0	0

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	274	THR	ILE	conflict	UNP A0A8E2SFD7
B	274	THR	ILE	conflict	UNP A0A8E2SFD7
C	274	THR	ILE	conflict	UNP A0A8E2SFD7
D	274	THR	ILE	conflict	UNP A0A8E2SFD7
E	274	THR	ILE	conflict	UNP A0A8E2SFD7
F	274	THR	ILE	conflict	UNP A0A8E2SFD7

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Chain	Residue	Modelled	Actual	Comment	Reference
G	274	THR	ILE	conflict	UNP A0A8E2SFD7
H	274	THR	ILE	conflict	UNP A0A8E2SFD7
I	274	THR	ILE	conflict	UNP A0A8E2SFD7
J	274	THR	ILE	conflict	UNP A0A8E2SFD7
K	274	THR	ILE	conflict	UNP A0A8E2SFD7
L	274	THR	ILE	conflict	UNP A0A8E2SFD7

- Molecule 2 is a protein called Archaeal ATPase.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	M	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		
2	N	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		
2	O	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		
2	P	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		
2	Q	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		
2	R	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		
2	S	786	Total	C	N	O	S	0	0
			6277	3985	1085	1176	31		

There are 70 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
M	11	LYS	GLU	conflict	UNP A0A8H9B1T2
M	24	SER	PRO	conflict	UNP A0A8H9B1T2
M	67	PRO	SER	conflict	UNP A0A8H9B1T2
M	335	SER	GLY	conflict	UNP A0A8H9B1T2
M	409	ASP	ASN	conflict	UNP A0A8H9B1T2
M	428	ASN	SER	conflict	UNP A0A8H9B1T2
M	583	ASN	HIS	conflict	UNP A0A8H9B1T2
M	586	GLU	GLY	conflict	UNP A0A8H9B1T2
M	636	ARG	LEU	conflict	UNP A0A8H9B1T2
M	858	ILE	VAL	conflict	UNP A0A8H9B1T2
N	11	LYS	GLU	conflict	UNP A0A8H9B1T2
N	24	SER	PRO	conflict	UNP A0A8H9B1T2
N	67	PRO	SER	conflict	UNP A0A8H9B1T2
N	335	SER	GLY	conflict	UNP A0A8H9B1T2

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Chain	Residue	Modelled	Actual	Comment	Reference
N	409	ASP	ASN	conflict	UNP A0A8H9B1T2
N	428	ASN	SER	conflict	UNP A0A8H9B1T2
N	583	ASN	HIS	conflict	UNP A0A8H9B1T2
N	586	GLU	GLY	conflict	UNP A0A8H9B1T2
N	636	ARG	LEU	conflict	UNP A0A8H9B1T2
N	858	ILE	VAL	conflict	UNP A0A8H9B1T2
O	11	LYS	GLU	conflict	UNP A0A8H9B1T2
O	24	SER	PRO	conflict	UNP A0A8H9B1T2
O	67	PRO	SER	conflict	UNP A0A8H9B1T2
O	335	SER	GLY	conflict	UNP A0A8H9B1T2
O	409	ASP	ASN	conflict	UNP A0A8H9B1T2
O	428	ASN	SER	conflict	UNP A0A8H9B1T2
O	583	ASN	HIS	conflict	UNP A0A8H9B1T2
O	586	GLU	GLY	conflict	UNP A0A8H9B1T2
O	636	ARG	LEU	conflict	UNP A0A8H9B1T2
O	858	ILE	VAL	conflict	UNP A0A8H9B1T2
P	11	LYS	GLU	conflict	UNP A0A8H9B1T2
P	24	SER	PRO	conflict	UNP A0A8H9B1T2
P	67	PRO	SER	conflict	UNP A0A8H9B1T2
P	335	SER	GLY	conflict	UNP A0A8H9B1T2
P	409	ASP	ASN	conflict	UNP A0A8H9B1T2
P	428	ASN	SER	conflict	UNP A0A8H9B1T2
P	583	ASN	HIS	conflict	UNP A0A8H9B1T2
P	586	GLU	GLY	conflict	UNP A0A8H9B1T2
P	636	ARG	LEU	conflict	UNP A0A8H9B1T2
P	858	ILE	VAL	conflict	UNP A0A8H9B1T2
Q	11	LYS	GLU	conflict	UNP A0A8H9B1T2
Q	24	SER	PRO	conflict	UNP A0A8H9B1T2
Q	67	PRO	SER	conflict	UNP A0A8H9B1T2
Q	335	SER	GLY	conflict	UNP A0A8H9B1T2
Q	409	ASP	ASN	conflict	UNP A0A8H9B1T2
Q	428	ASN	SER	conflict	UNP A0A8H9B1T2
Q	583	ASN	HIS	conflict	UNP A0A8H9B1T2
Q	586	GLU	GLY	conflict	UNP A0A8H9B1T2
Q	636	ARG	LEU	conflict	UNP A0A8H9B1T2
Q	858	ILE	VAL	conflict	UNP A0A8H9B1T2
R	11	LYS	GLU	conflict	UNP A0A8H9B1T2
R	24	SER	PRO	conflict	UNP A0A8H9B1T2
R	67	PRO	SER	conflict	UNP A0A8H9B1T2
R	335	SER	GLY	conflict	UNP A0A8H9B1T2
R	409	ASP	ASN	conflict	UNP A0A8H9B1T2
R	428	ASN	SER	conflict	UNP A0A8H9B1T2

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Chain	Residue	Modelled	Actual	Comment	Reference
R	583	ASN	HIS	conflict	UNP A0A8H9B1T2
R	586	GLU	GLY	conflict	UNP A0A8H9B1T2
R	636	ARG	LEU	conflict	UNP A0A8H9B1T2
R	858	ILE	VAL	conflict	UNP A0A8H9B1T2
S	11	LYS	GLU	conflict	UNP A0A8H9B1T2
S	24	SER	PRO	conflict	UNP A0A8H9B1T2
S	67	PRO	SER	conflict	UNP A0A8H9B1T2
S	335	SER	GLY	conflict	UNP A0A8H9B1T2
S	409	ASP	ASN	conflict	UNP A0A8H9B1T2
S	428	ASN	SER	conflict	UNP A0A8H9B1T2
S	583	ASN	HIS	conflict	UNP A0A8H9B1T2
S	586	GLU	GLY	conflict	UNP A0A8H9B1T2
S	636	ARG	LEU	conflict	UNP A0A8H9B1T2
S	858	ILE	VAL	conflict	UNP A0A8H9B1T2

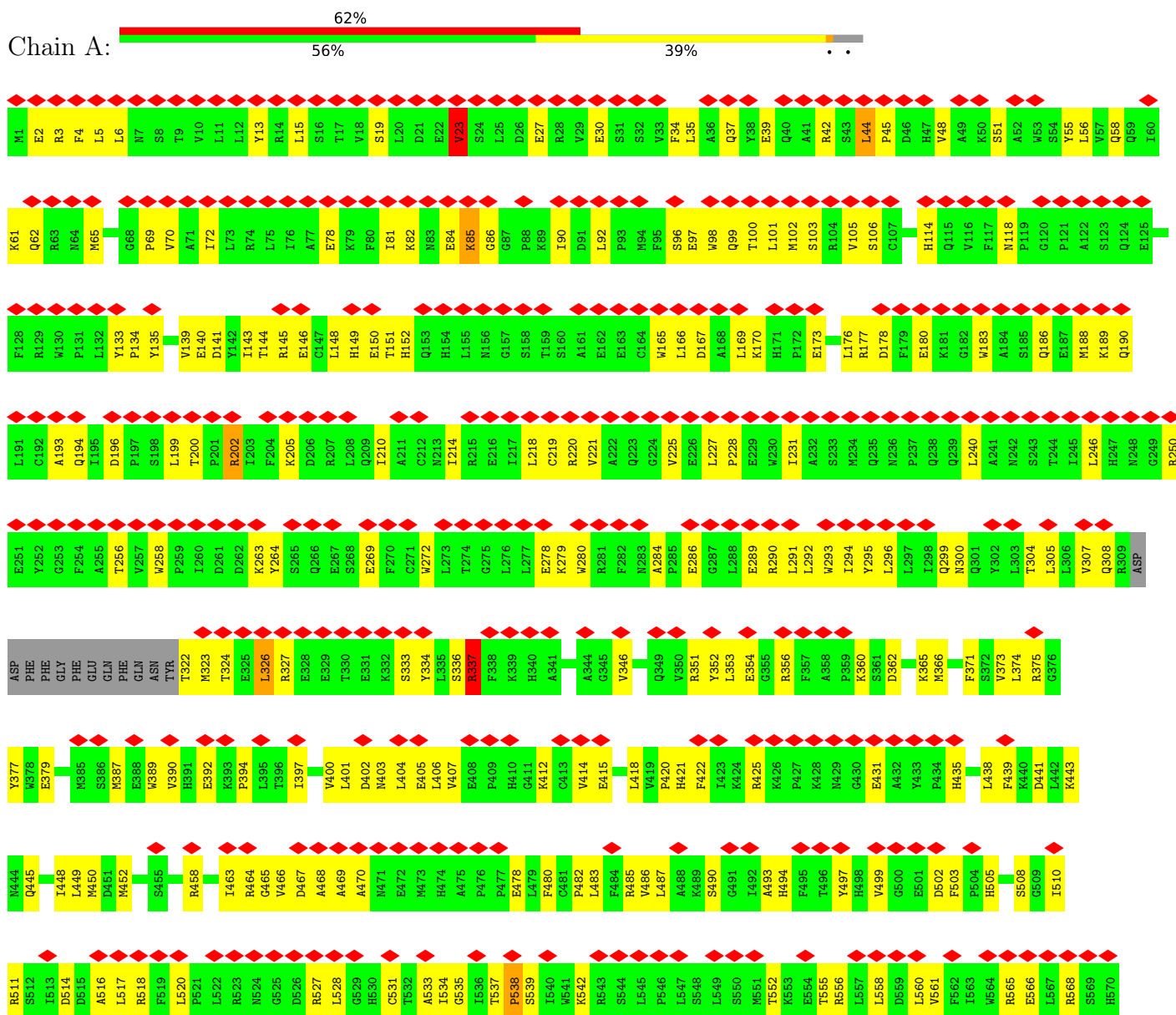
- Molecule 3 is ZINC ION (three-letter code: ZN) (formula: Zn).

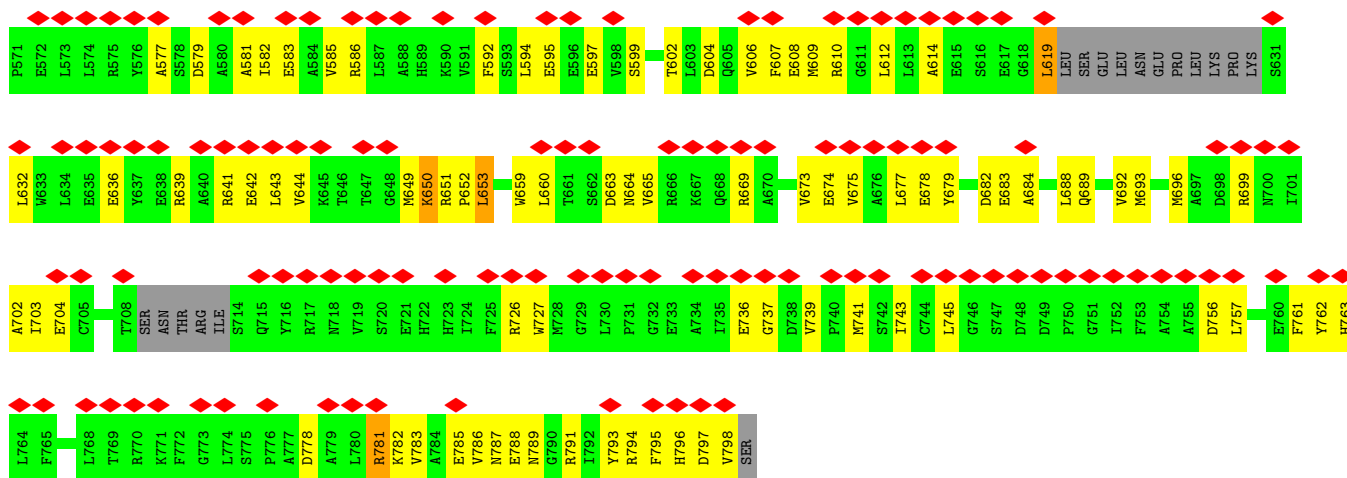
Mol	Chain	Residues	Atoms	AltConf
3	A	1	Total Zn 1 1	0
3	B	1	Total Zn 1 1	0
3	C	1	Total Zn 1 1	0
3	D	1	Total Zn 1 1	0
3	E	1	Total Zn 1 1	0
3	F	1	Total Zn 1 1	0
3	G	1	Total Zn 1 1	0
3	H	1	Total Zn 1 1	0
3	I	1	Total Zn 1 1	0
3	J	1	Total Zn 1 1	0
3	K	1	Total Zn 1 1	0
3	L	1	Total Zn 1 1	0

3 Residue-property plots

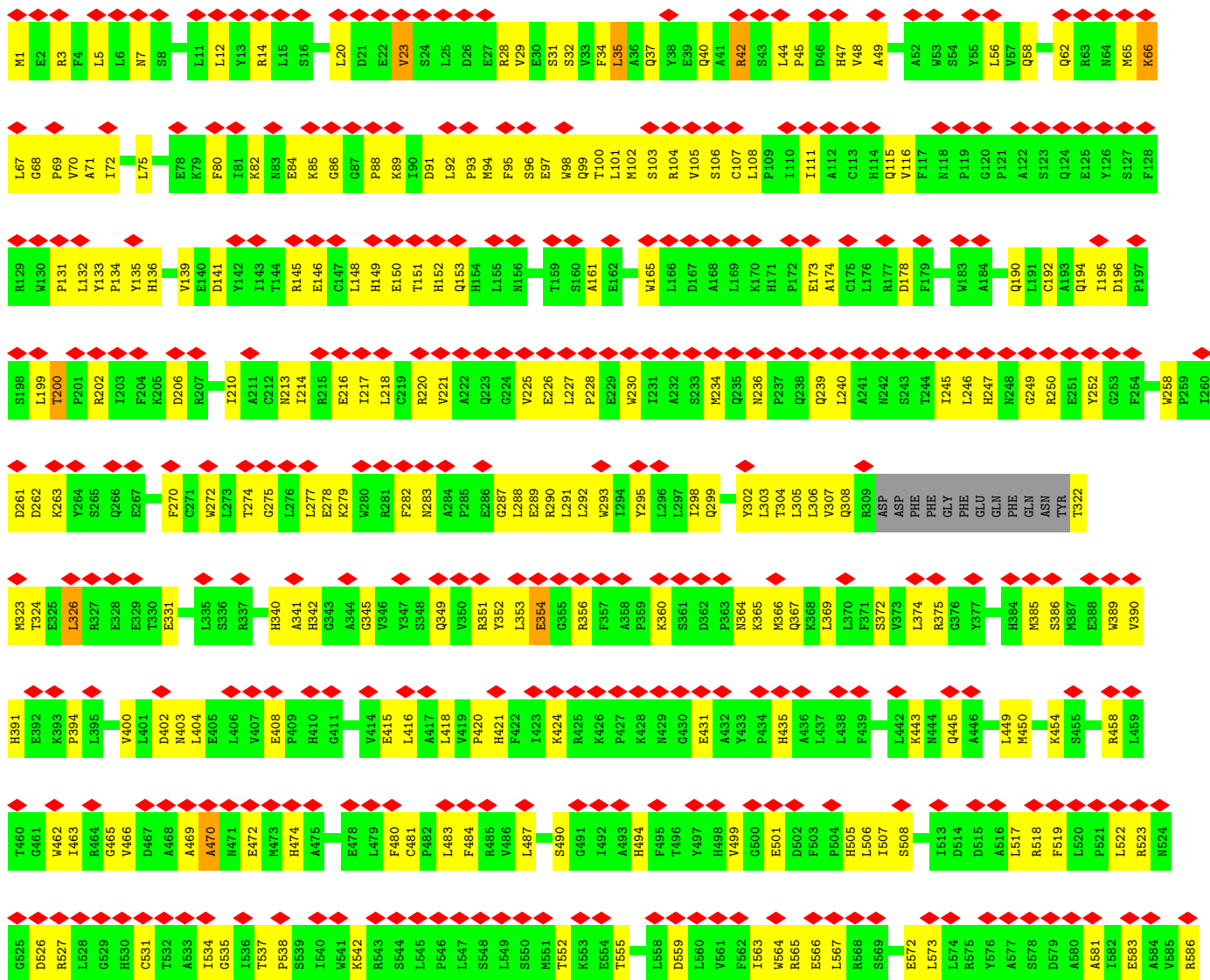
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion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

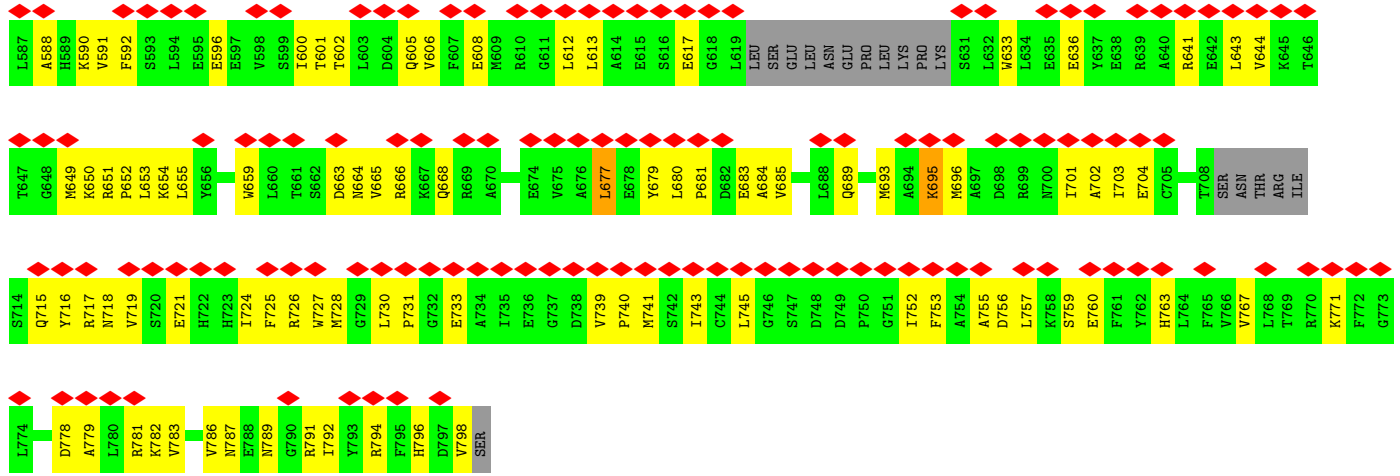
- Molecule 1: Adenosine deaminase



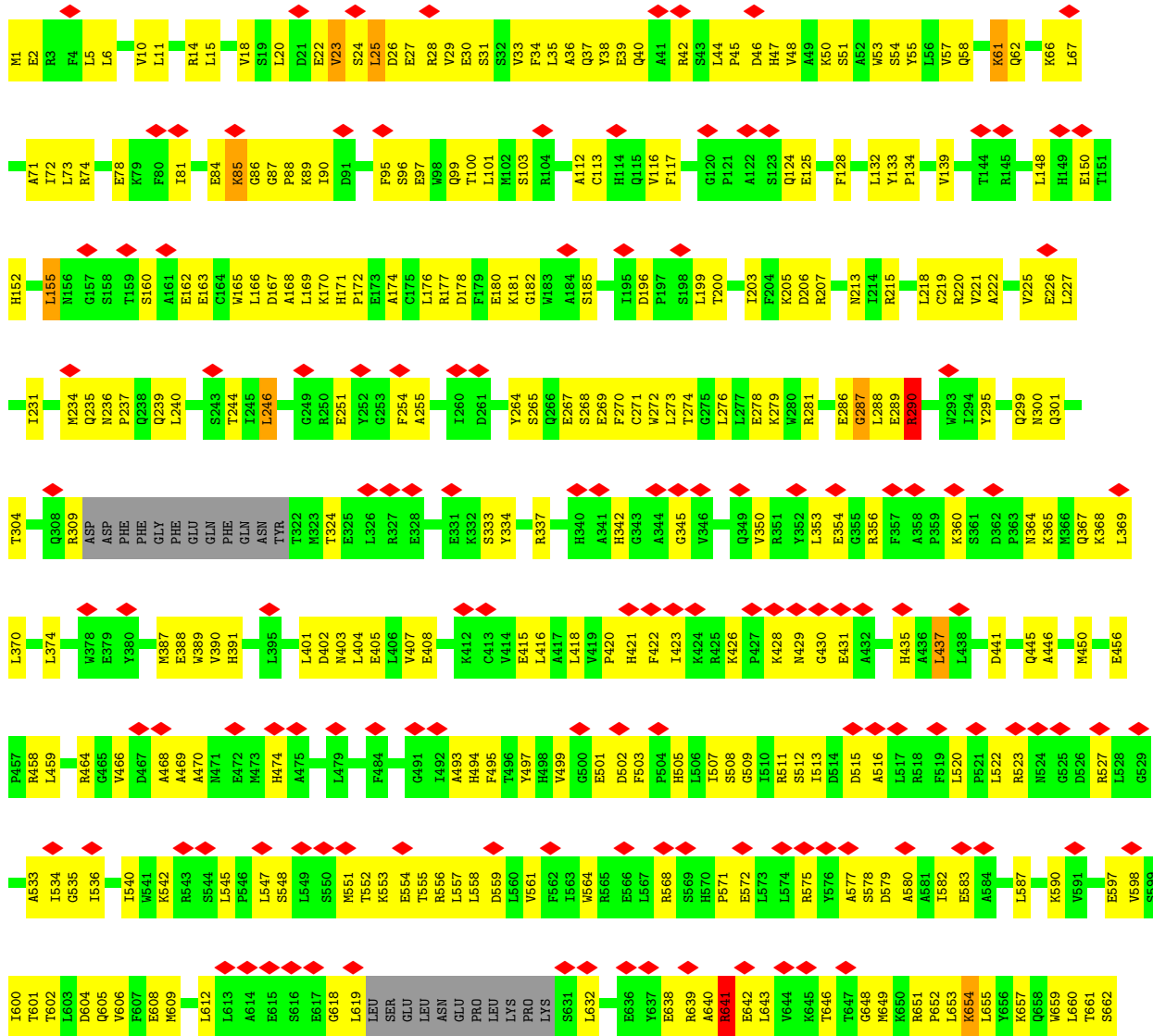


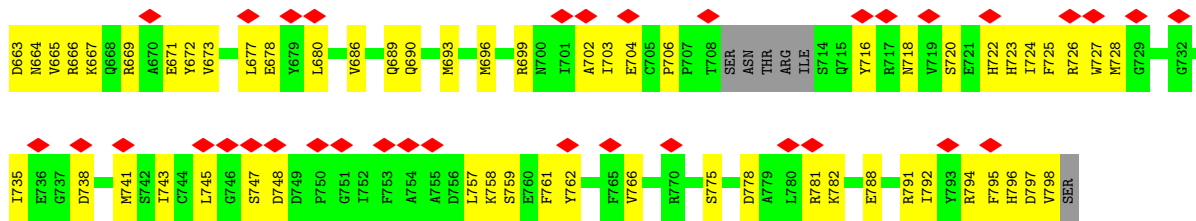
● Molecule 1: Adenosine deaminase





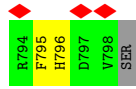
● Molecule 1: Adenosine deaminase



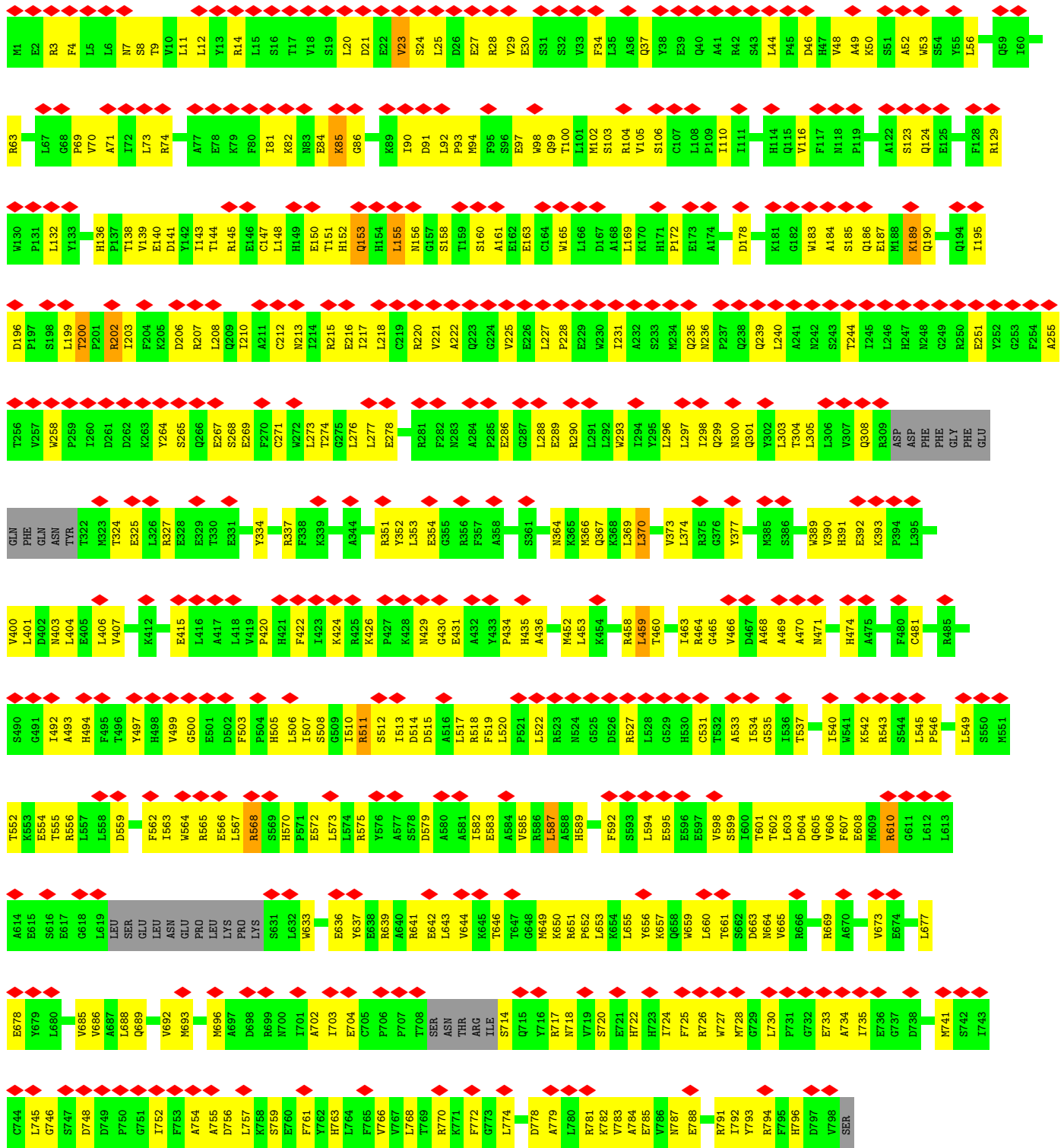


• Molecule 1: Adenosine deaminase

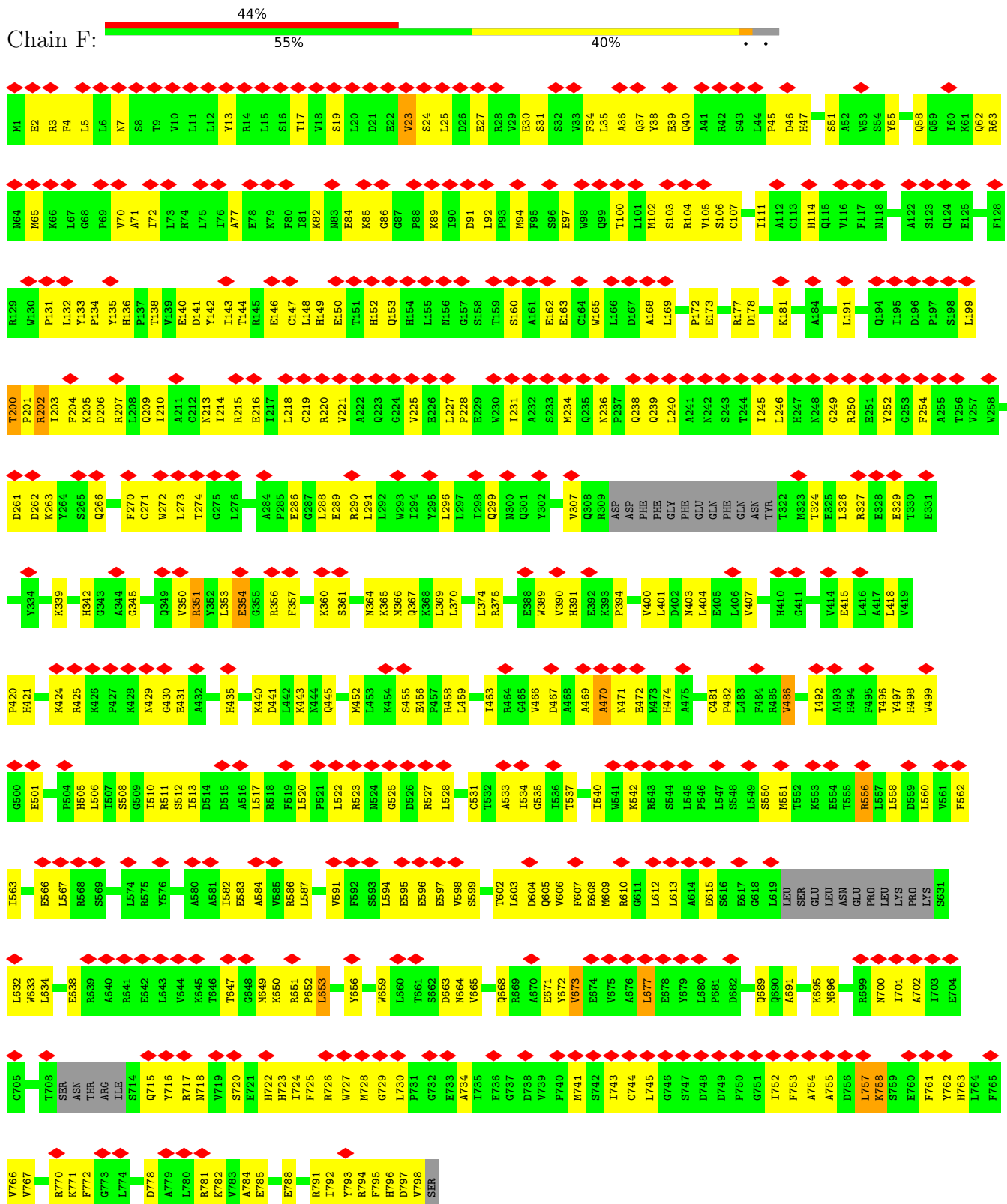




• Molecule 1: Adenosine deaminase

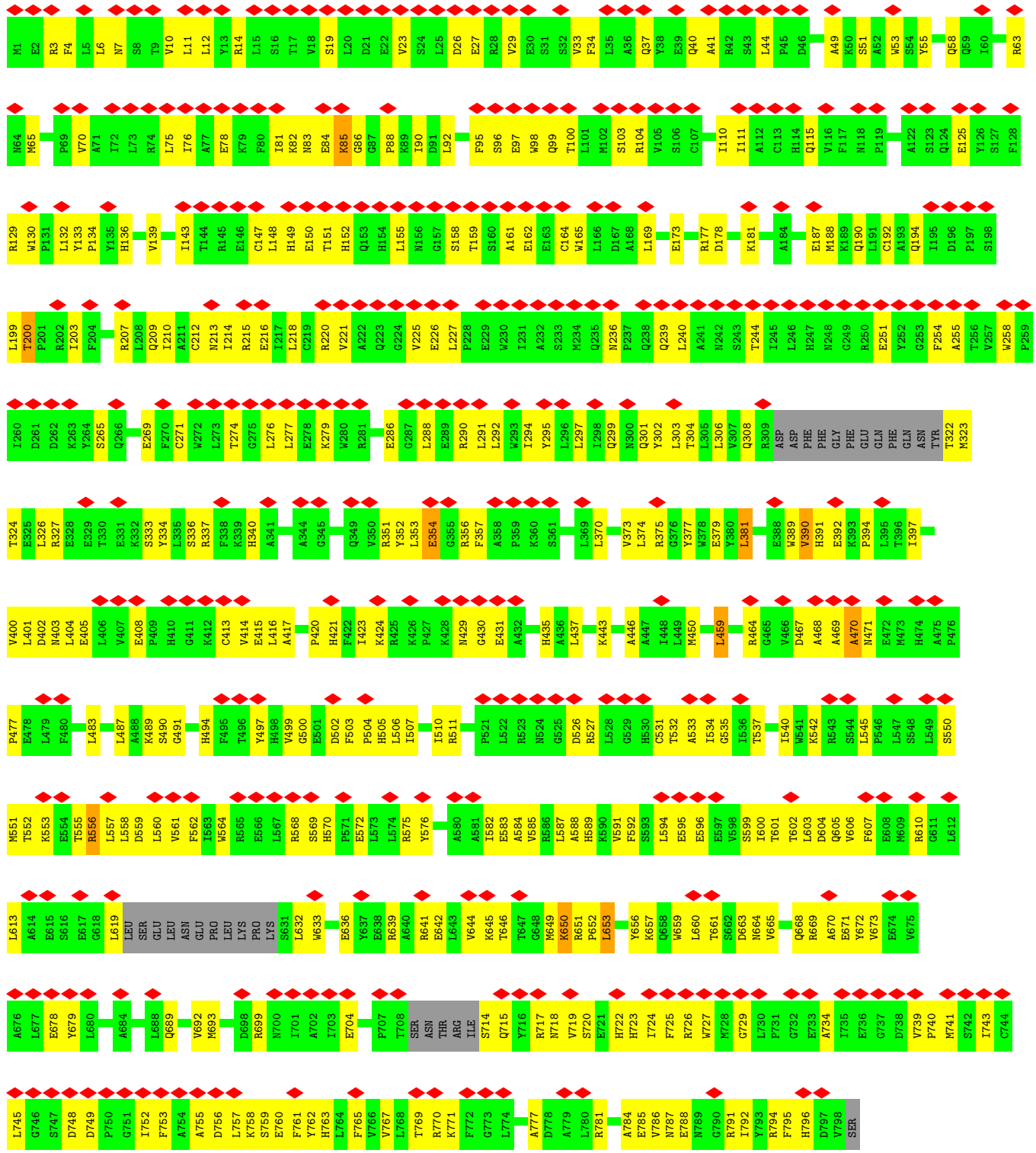


● Molecule 1: Adenosine deaminase

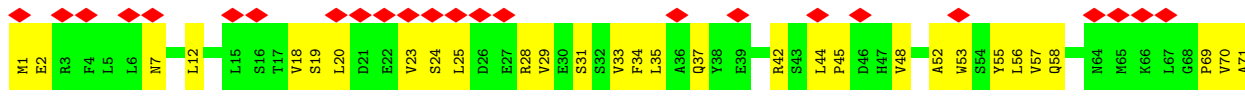


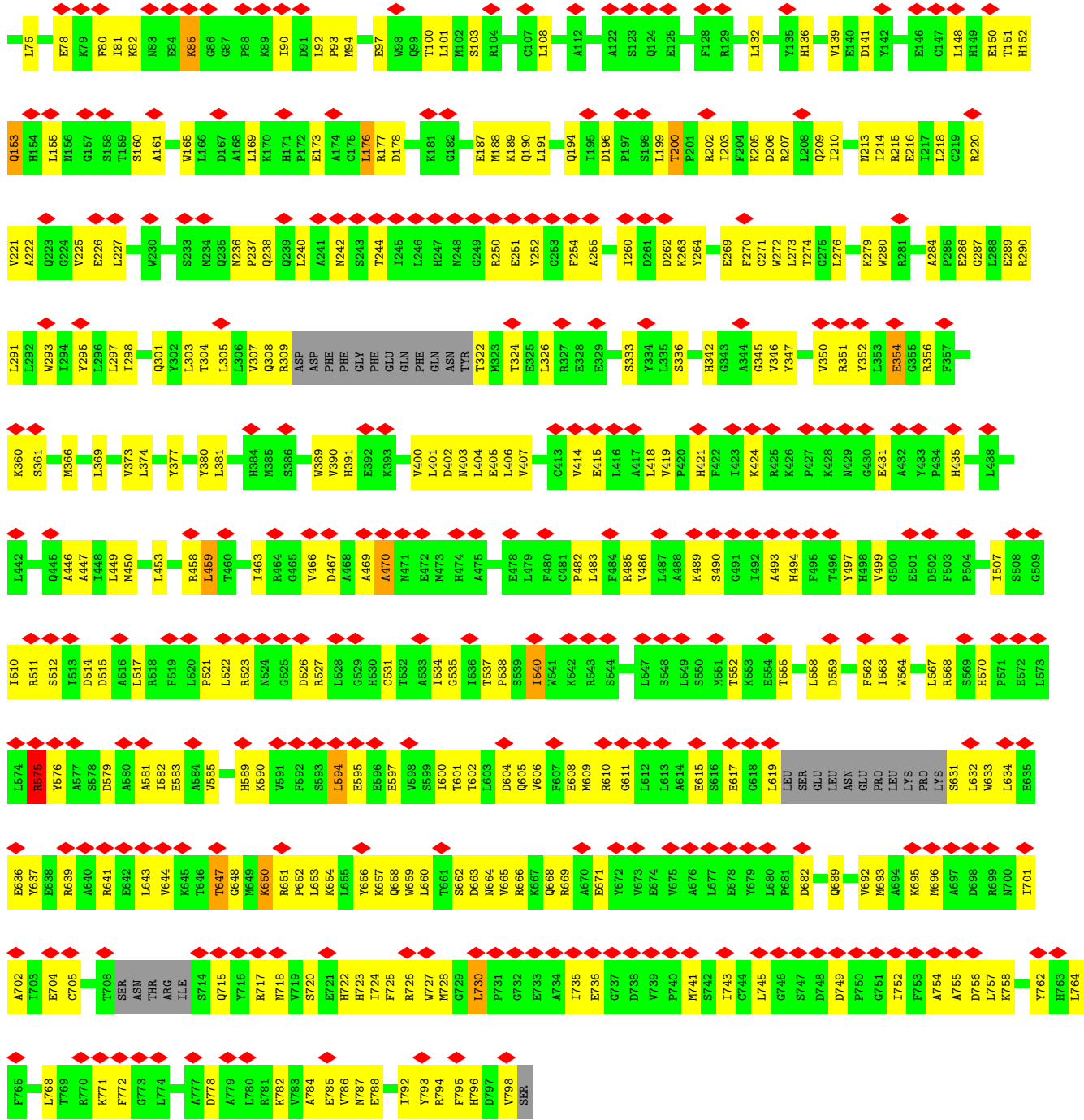
● Molecule 1: Adenosine deaminase



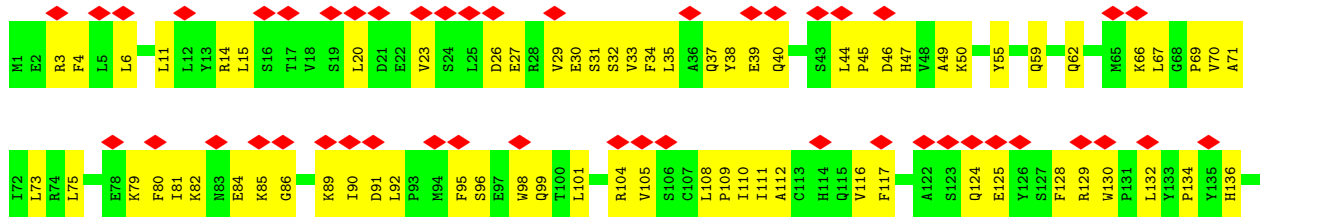


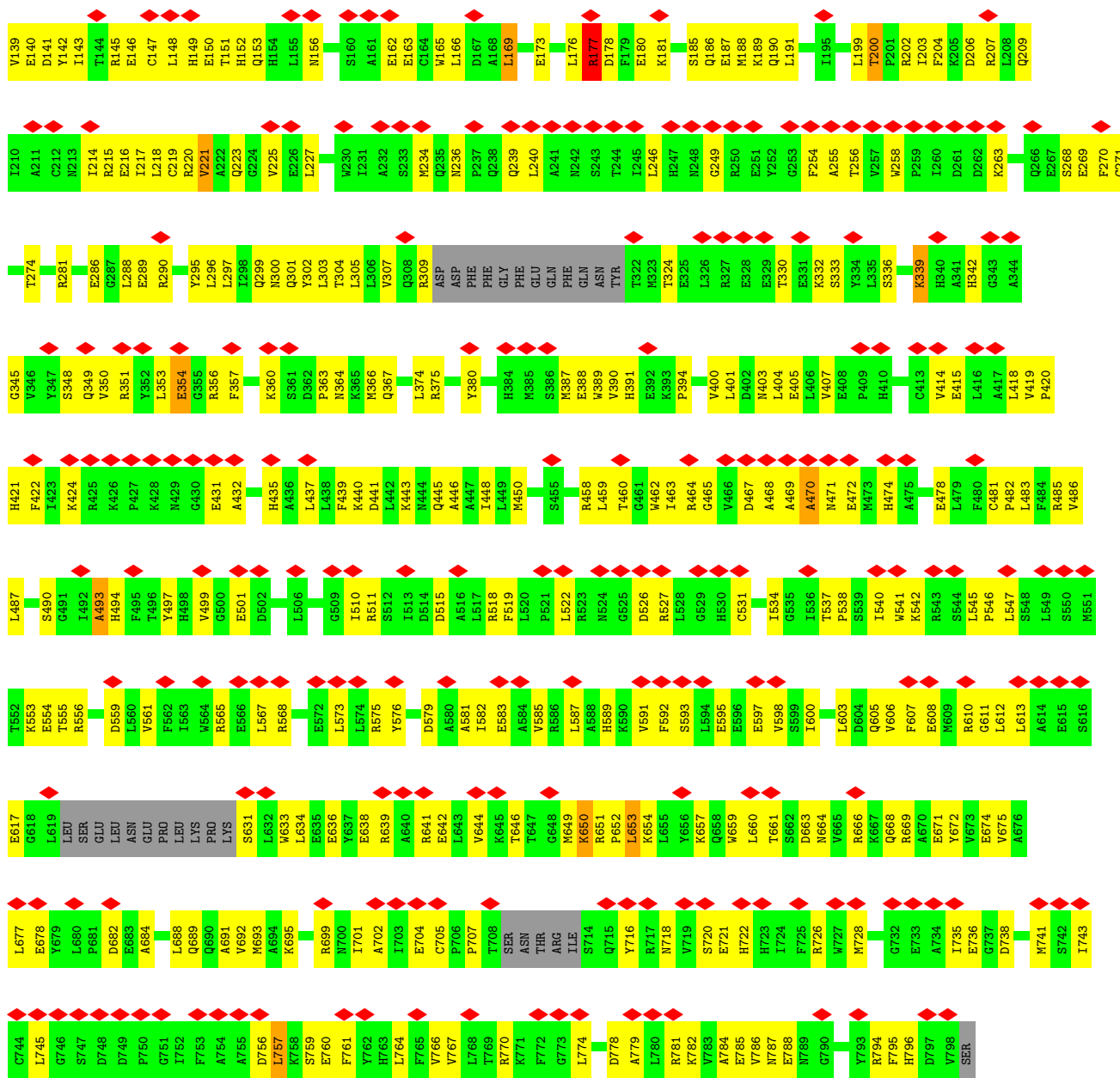
● Molecule 1: Adenosine deaminase



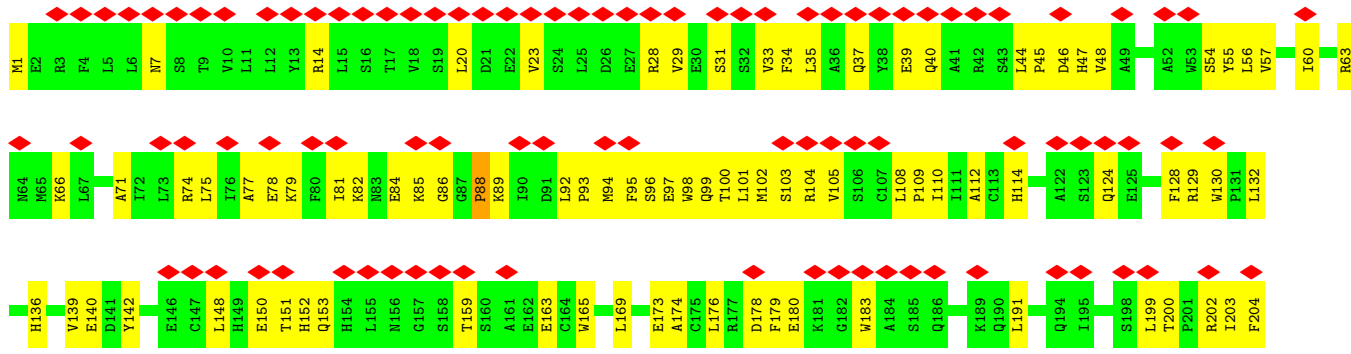
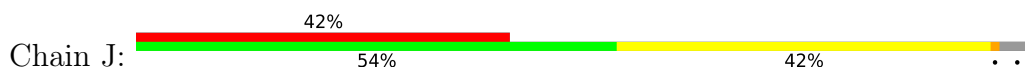


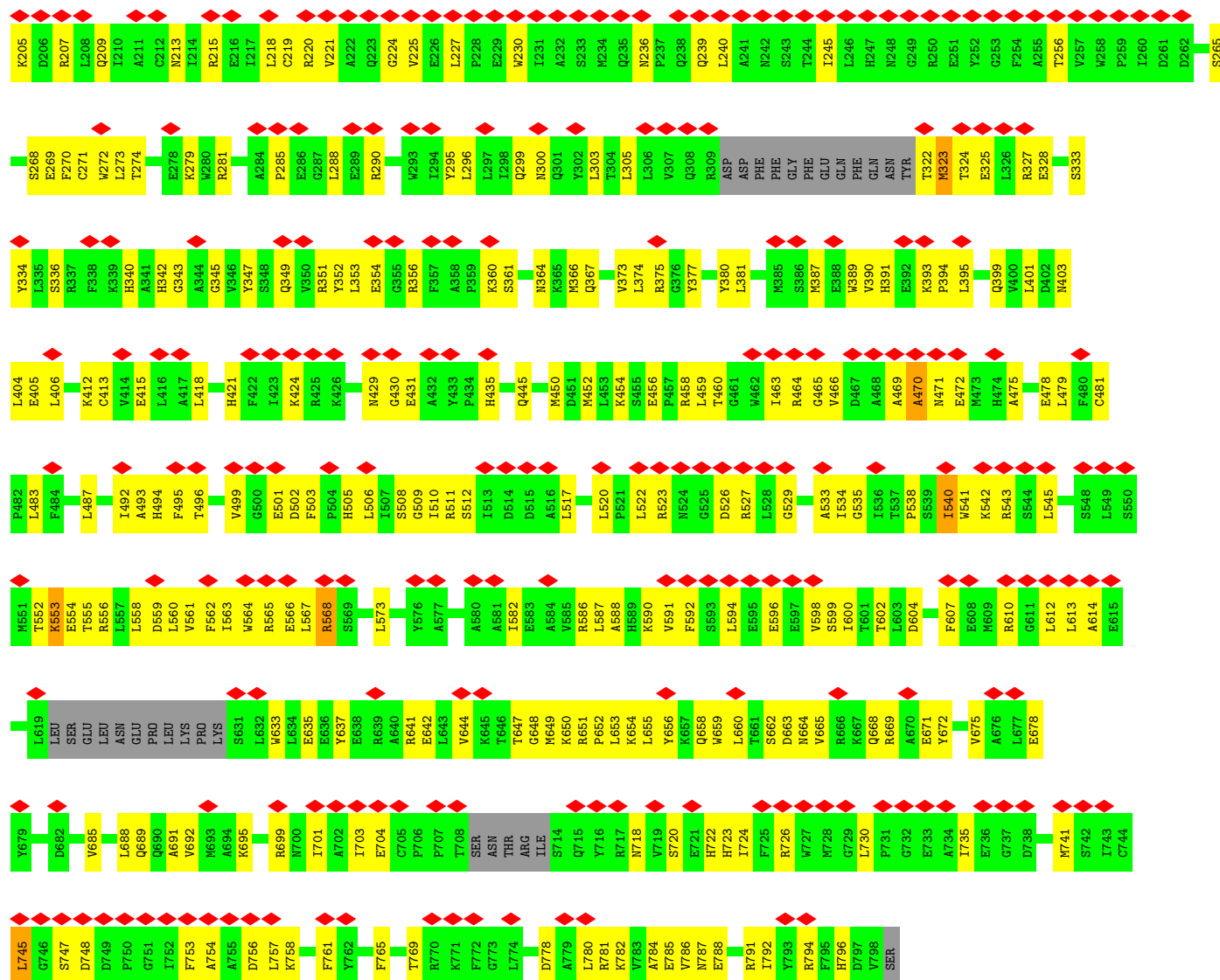
● Molecule 1: Adenosine deaminase



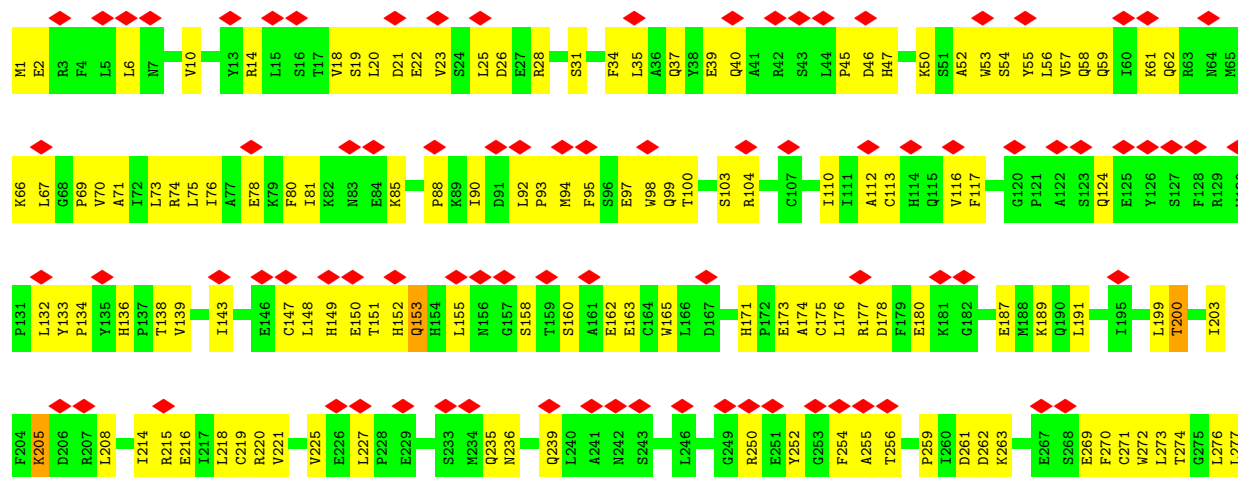


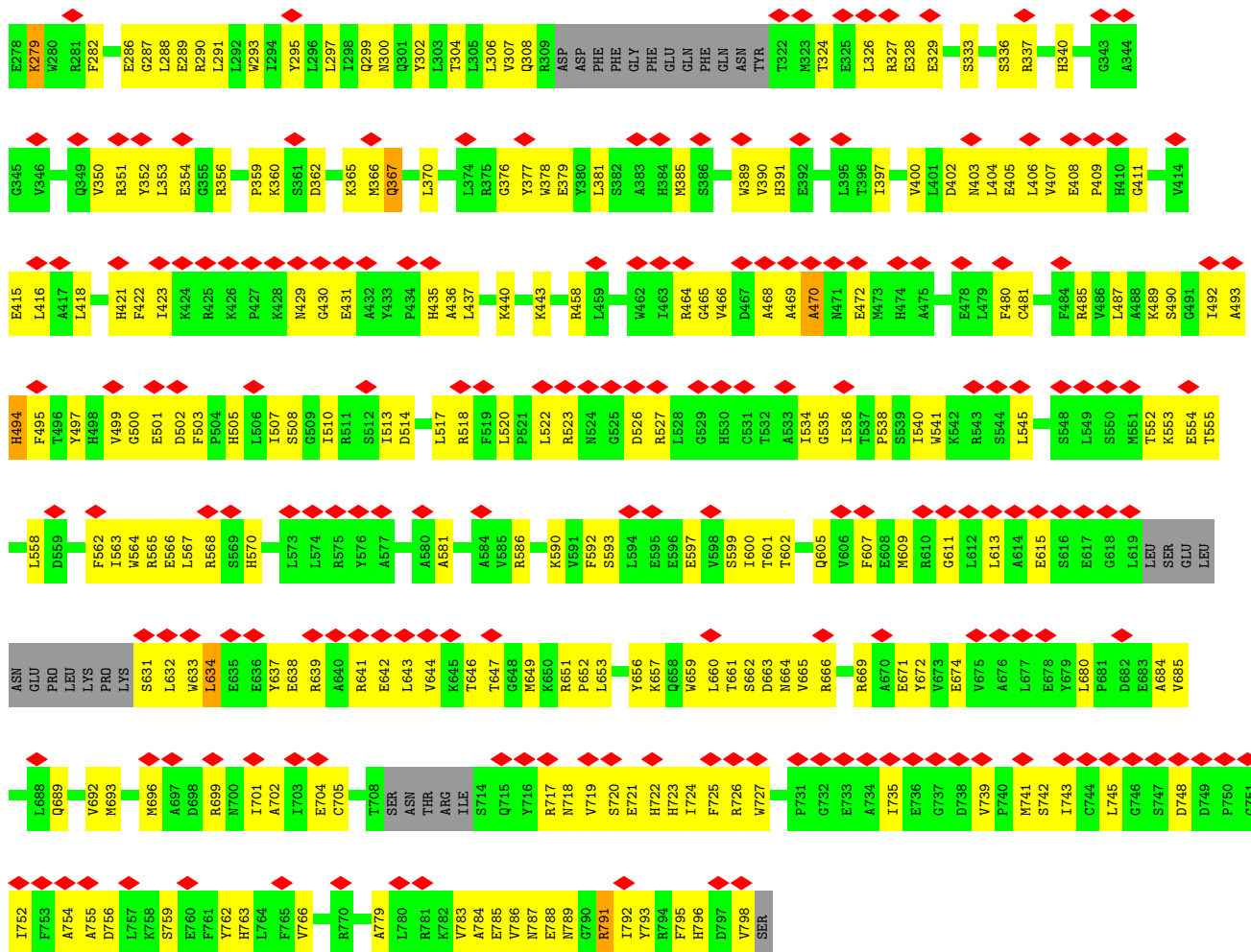
• Molecule 1: Adenosine deaminase



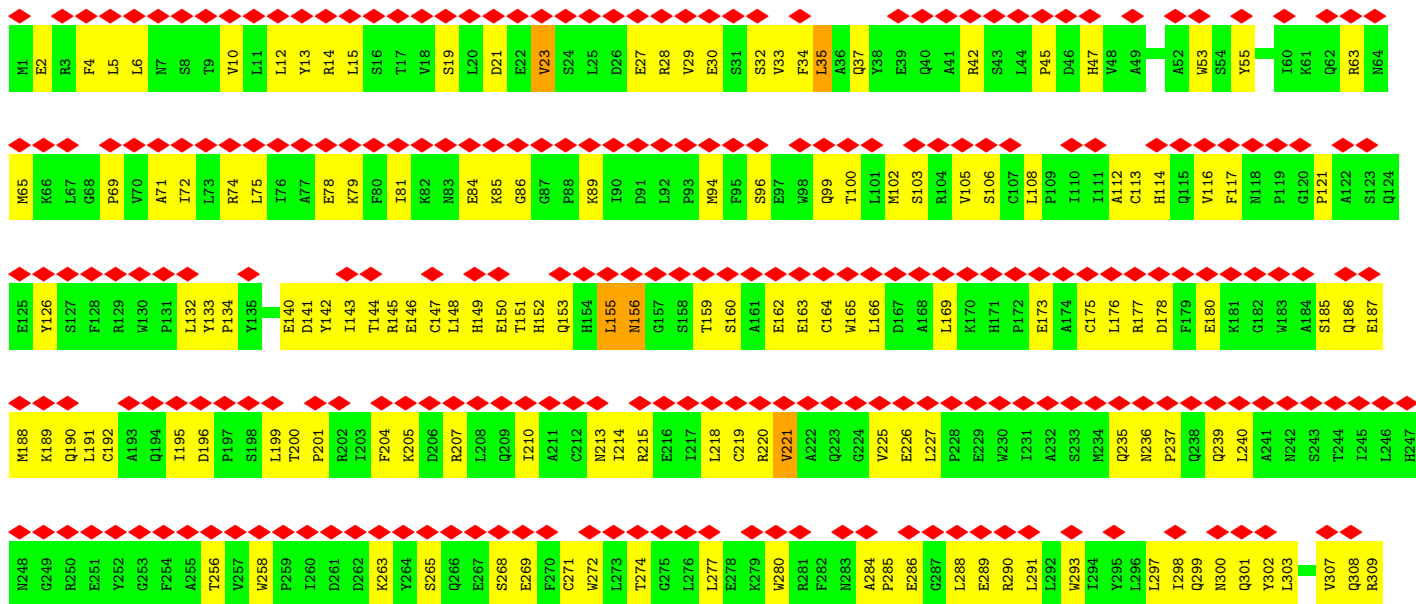


• Molecule 1: Adenosine deaminase





• Molecule 1: Adenosine deaminase



P303	V304	Q305	K306	R307	I308	Q309	L310	K311	T312	M313	L314	Q315	L316	V317	G318	E319	K320	G321	K322	A323	G324	K325	E326	E327	I328	K329	V330	K331	T332	E333	P334	S335	M336	Q337	D338	I339	G340	A341	I342	D343	V344	R345	Q346	A347	I348	G349	D350	A351	R352	R353	E354	G355	L356	N357	L358	R359	E360	G361	S362			
D363	A364	D365	M366	Y367	V368	N369	E370	L371	L372	K373	Q374	P375	V376	R377	L378	L379	M380	Q381	V382	L383	Q384	D385	F386	Y387	T388	K389	K390	V391	H392	A393	T394	S395	VAL	LEU	ASP	GLY	ARG	LYS	GLN	SER	GLU	ASP	ARG	ASN	GLU	S412	V413	P414	N415	L416	R418	N419	A420	L421	Y422							
G423	S424	M425	L426	S427	N428	I429	Y430	R431	A432	G433	L434	M435	Y436	E437	L438	Q438	H439	R440	F441	G442	M443	D444	S445	S446	L446	C447	K448	D449	I450	F451	T452	Y453	V454	K455	Q456	D457	R458	D459	F460	M461	T462	G463	F464	Y465	L466	R467	P468	Q469	S470	E471	S472	E473	A474	L475	R476	N477	C478	S479	I480	Y481	L482	
A483	S484	Q485	V486	S487	E488	M489	C490	Q491	G492	S493	L494	S495	K496	F497	L498	Q499	M500	L501	V502	V503	G504	C505	G506	S507	V508	S509	I510	F511	N512	Q513	F514	V515	T516	L518	A519	ARG	ALA	GLU	ASN	D524	R525	E526	K527	F528	E529	Q530	L531	I532	S533	E534	Y535	V536	A537	Y538	M539	S540	V541	G542				
R543	I544	E545	S546	A547	S548	H549	V550	A551	N552	R553	C554	C555	A556	V557	V558	A559	N560	L561	S562	P563	D564	E565	S567	K566	I567	G568	V569	F570	L571	F574	G572	M573	V574	Q575	L576	N577	N578	R578	K579	S580	R581	Q582	N583	N584	P585	E586	G587	V588	K589	K590	F591	N592	I593	T594	T595	E596	N597	G598	L599	A600	K601	A602
A603	M604	A605	S606	S607	L608	S609	T610	V611	A612	S613	S614	N615	L616	M617	D618	F619	C620	S621	V622	F623	N624	L625	E626	G627	A628	I629	A630	D631	I632	S633	A634	C635	R636	C637	E638	R639	S640	A641	T642	T643	N644	A645	F646	N647	K648	V649	A651	Q652	T653	T654	C655	L656	V657	P658	P659	W660	S661	GLU				
ALA	ALA	VAL	ARG	ALA	GLU	MET	LYS	GLY	SER	LYS	SER	ALA	ASP	ASN	ALA	VAL	LEU	ASP	VAL	ASP	LEU	PRO	LYS	ASP	ASP	GLY	VAL	ILE	GLU	SER	GLN	ASP	ALA	TYR	E705	F706	S707	D708	A709	I710	T711	K712	V713	E714	Q715	W716	L717	K718	N719	V720	N721	E722										
I723	E724	I725	G726	I727	R728	P729	S730	A731	L732	L733	I734	G735	V736	K737	W738	S739	R740	F741	F742	F743	N744	L745	N746	N747	V748	A749	D750	W751	H752	K753	T754	R755	L756	Y757	R758	N759	A760	E761	H762	G763	R764	N765	A766	S767	Q768	S769	N770	A771	A772	K773	W774	W775	R776	F777	N778	V779	L780	A781	F782			
L783	H784	A785	V786	L787	V788	E789	E790	S791	L792	Y793	H794	S795	V796	W797	D798	R799	E800	Y801	L802	G803	E804	G805	L806	R807	L808	N809	P810	W811	W814	D815	E816	F817	E818	K819	K820	L821	K822	L823	L824	E825	E826	K827	L828	K829	A830	D831	N832	K833	T834	W835	K836	N837	H838	H839	P840	L841	F842	F843				
L844	L845	I846	S847	C848	P849	R850	L851	H852	P853	F854	I855	F856	P857	I858	S859	C860	L861	N862	C863	S864	V865	K866	A867	L868	N869	K870	E871	T872	S873	F874	K875	L877	L878	D879	E880	L881	W882	G883	D884	K885	L886	S888	N889	E890	E891	W892	Y893	Y894	L895	T896	K897	ASN	ASN	ASP	GLN	LYS	THR					
ASN	THR	ARG	GLN	VAL	GLN	THR	GLY	THR	LYS	LYS	LYS	ILE	ILE	ILE	ASN	LEU	PHE	ALA	PRO	ASN	LEU	SER	GLY	SER	THR	LYS	GLU	ASP	ASP	LEU	LYS	THR	THR	GLY	ASP	ASP	ASP	GLU	LYS																							

● Molecule 2: Archaeal ATPase



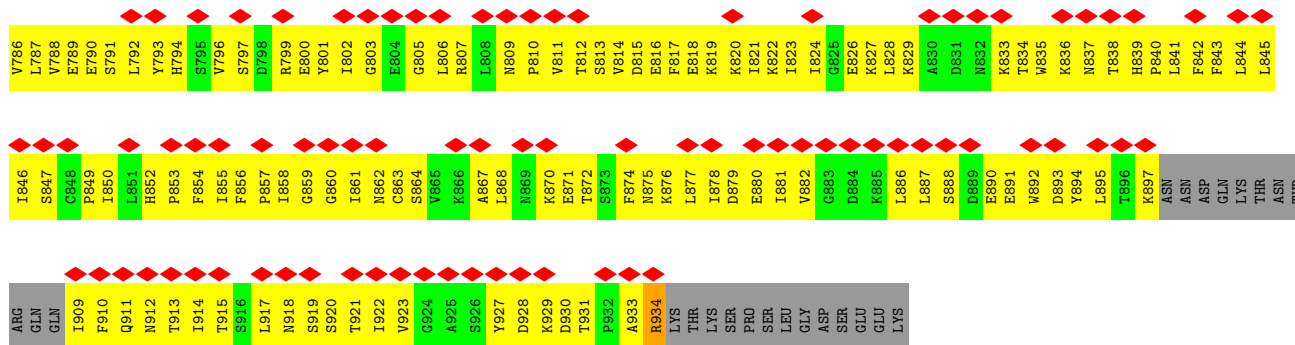
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THR	ARG	PHE	ILE	ASP	GLN	GLU	PRO	GLY	R69	N70	V71	F72	F73	W74	D75	G76	THR	ARG	ARG	GLY	ALA	G81	K82	T83	F84	F85	I86	N87	S88	W89	V90	R91	S92	L93	SER	N94	ASP	GLN	D39	Q40	L41	V42	E43	S44	I45	R46	G47	S48	A50	TYR	PRO	PRO	ASP	THR	THR	ASP	LYS	LYS	PHE	ALA	ALA	GLY	LEU	

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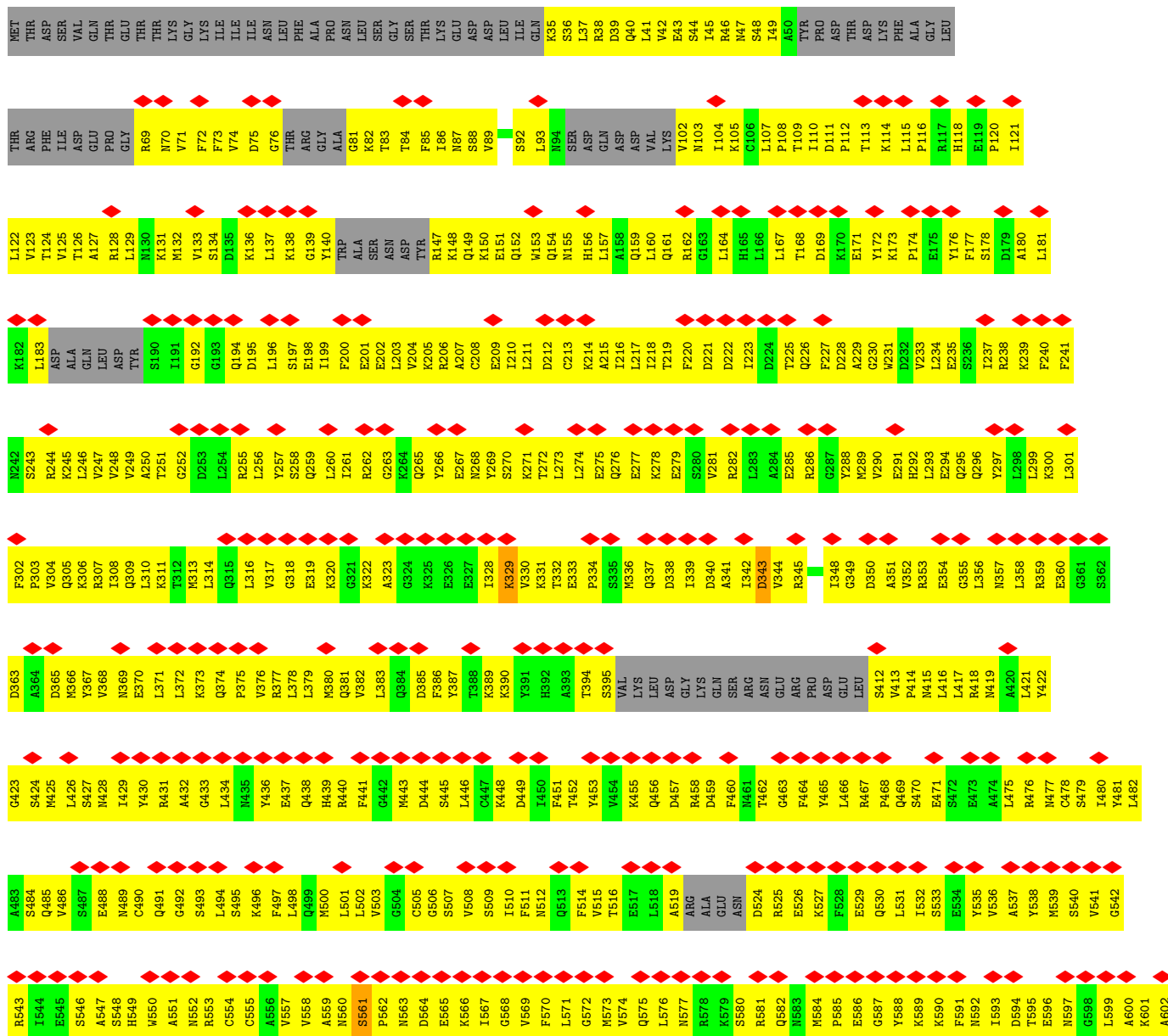
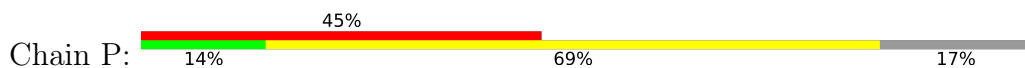
• Molecule 2: Archaeal ATPase

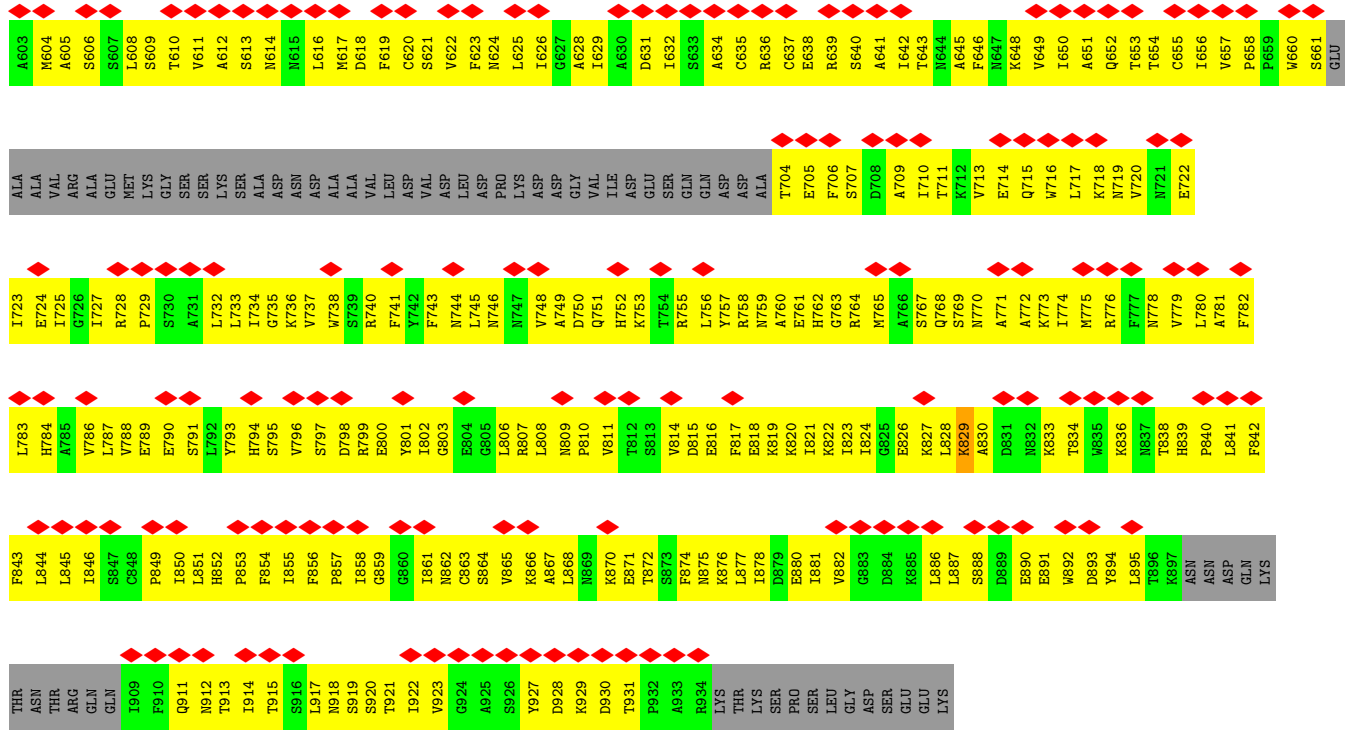


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THR	ARG	PHE	ILE	ASP	GLU	PRO	GLY	R69	N70	V71	F72	F73	V74	D75	G76	THR	ARG	GLY	ALA	G81	K82	R83	T84	F85	R86	N87	S88	V89	V90	K91	S92	L93	N94	SER	GLN	ASP	ASP	ASP	VAL	VAL	LYS	V102	N103	I104	K105	C106	L107	P108	T109	I110	D111	P112	T113	K114	L115	P116	R117	H118	E119	P120							
V123	R128	L129	M130	M132	V133	S134	D135	K136	L137	K138	G139	I140	TRP	ALA	SER	ASN	ASP	THR	R147	K148	Q149	E151	Q152	W153	Q154	M155	H156	L157	L159	A158	Q159	L160	Q161	R162	C163	L164	H165	L166	L167	T168	D169	K170	E171	I172	K173	P174	E175	Y176	F177	S178	D179	A180	L181	L183	ASP												
ALA	GLN	LEU	ASP	TYR	S190	I191	G192	G193	I194	D195	L196	S197	E198	I199	F200	E201	V204	K205	R206	A207	C208	E209	I210	L211	I212	C213	K214	I216	I218	T219	F220	D221	D222	D223	D224	T225	Q226	F227	D228	A229	G230	V231	D232	V233	L234	E235	S236	L237	R238	K239	F240	F241	N242	S243	R244	K245											
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ARG	ALA	GLU	MET	LYS	GLY	SER	SER	LYS	ALA	ASP	ASN	ASP	ALA	VAL	VAL	ASP	LEU	PRO	LYS	ASP	GLY	VAL	ILE	ASP	GLU	SER	GLN	GLM	ASP	ALA	T704	F706	S707	D708	A709	I710	T711	K712	V713	E714	Q715	W716	L717	K718	N719	W720	N721	E722	T723	E724	I725																
G726	I727	R728	P729	S730	T731	L732	L733	I734	G735	V736	K737	W738	S739	R740	F741	Y742	F743	N744	L745	N746	N747	V748	A749	D750	I751	H752	K753	T754	R755	L756	Y757	F758	N759	A760	E761	G762	G763	R764	M765	A766	S767	Q768	S769	N770	A771	A772	K773	I774	M775	R776	F777	N778	V779	A781	F782	L783	H784	A785									

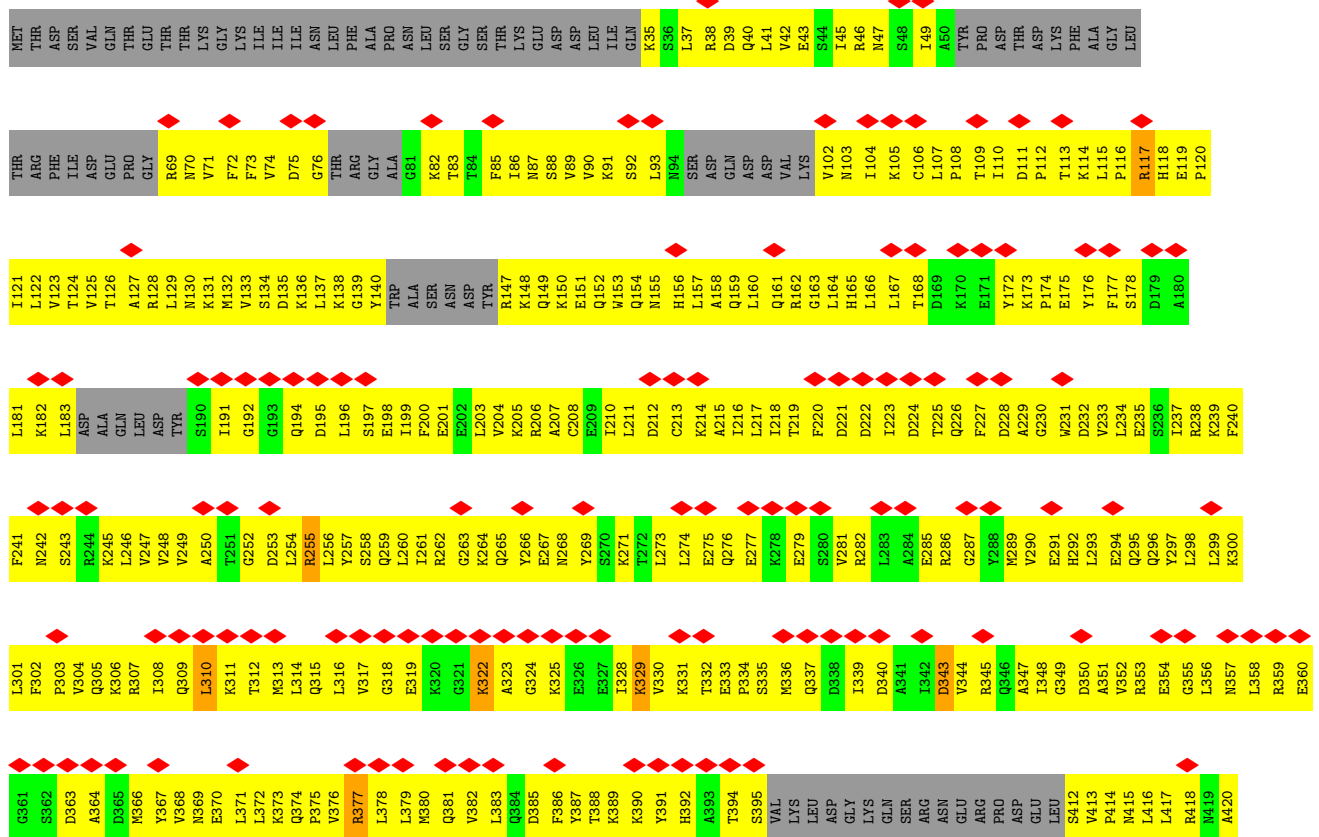
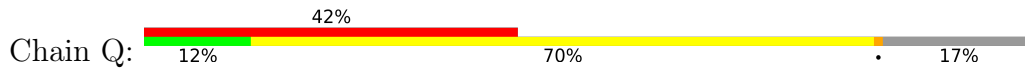


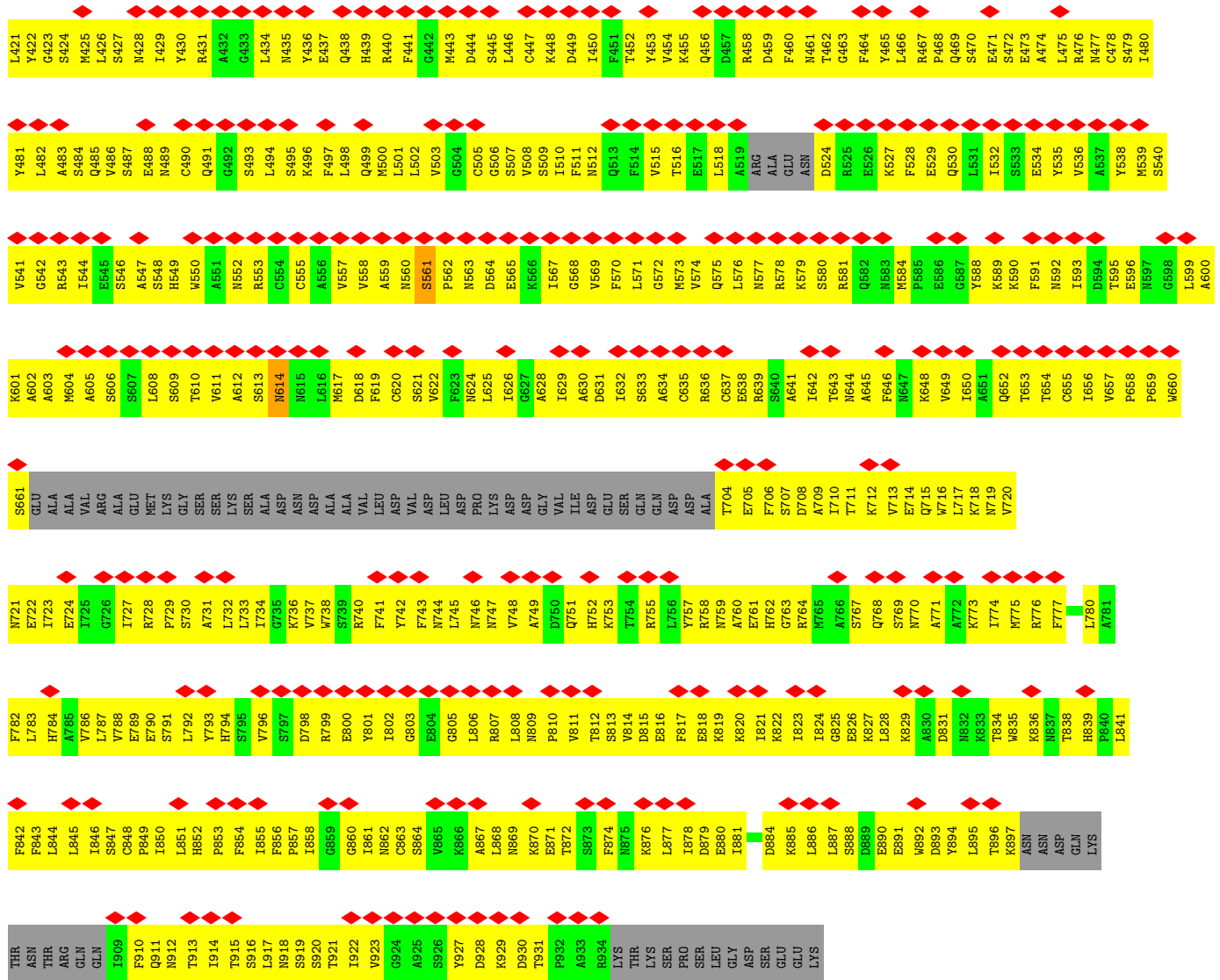
● Molecule 2: Archaeal ATPase



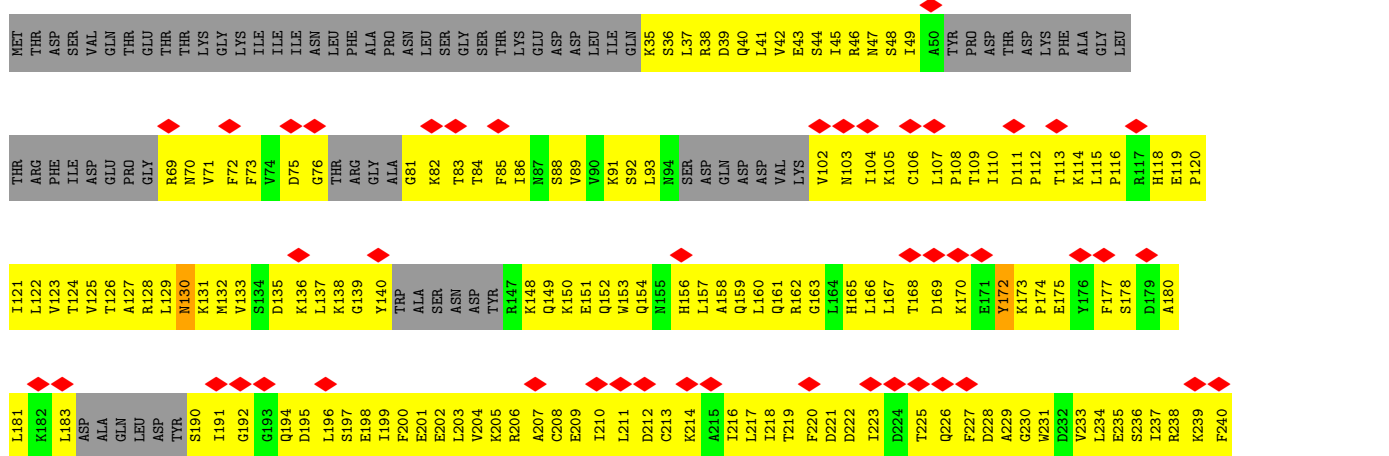


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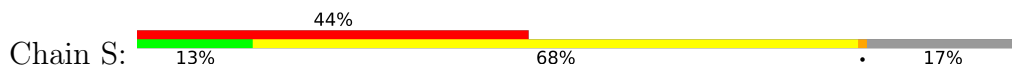


Molecule 2: Archaeal ATPase



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S362	G363	A364	M365	M366	V367	V368	I429	Y430	R431	L372	K373	Q374	P375	V376	R377	L378	L379	M380	Q381	V382	L383	Q384	D385	F386	Y387	I388	K389	K390	Y391	H392	A393	T394	S395	VAL	LYS	LEU	ASP	GLY	LYS	GLN	SER	ARG	ASN	ASN	GLU	ARG	PRO	ASP	GLU	LEU	S412	V413	P414	N415	L416	L417	R418	N419	A420	L421																
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A602	A603	M604	A605	S606	L608	S609	T610	V611	A612	S613	M614	N615	L616	M617	D618	F619	C620	S621	V622	F623	N624	L625	I626	A628	L629	A630	D631	I632	S633	A634	C635	R636	C637	E638	R639	S640	A641	I642	T643	N644	A645	K648	V649	L650	A651	Q652	T653	T654	T655	T656	T657	T658	T659	T660	T661	T662	T663	T664	T665	T666	T667	T668	T669	T670	T671	T672	T673	T674	T675	T676	T677	T678	T679	T680	T681	T682
ALA	ALA	VAL	ALA	GLU	MET	LYS	SER	SER	LYS	SER	ALA	ASP	ASP	ALA	VAL	LEU	ASP	VAL	ASP	LEU	ASP	PRO	LYS	ASP	ASP	GLY	VAL	ILE	ASP	GLN	GLN	ASP	ASP	ALA	T704	E705	F706	S707	D708	A709	I710	T711	K712	V713	E714	Q715	W716	L717	K718	N719	W720	N721	E722																							
I723	E724	I725	G726	R727	R728	P729	S730	A731	L732	L733	I734	G735	K736	V737	W738	S739	R740	F741	Y742	F743	N744	L745	N746	N747	V748	A749	Q751	H752	K753	T754	R755	L756	Y757	R758	N759	A760	E761	H762	G763	R764	M765	A766	S767	Q768	N769	N770	A771	K772	K773	I774	M775	R776	F777	N778	L779	L780	A781	F782																		
L783	H784	V785	L787	V788	E789	S790	S791	L792	V793	H794	S795	V796	S797	D798	R799	E800	Y801	L802	G803	E804	G805	L806	R807	L808	M809	P810	V811	T812	S813	V814	D815	E816	R817	E880	I881	V882	G883	D884	R885	L886	L887	S888	D889	E890	E891	N892	D893	Y894	L895	T896	K897	ASN	ASN	ASP	GLN	LYS	F842																			
F843	L844	L845	I846	S847	C848	P849	I850	L851	H852	P853	F854	I855	F856	P857	L858	C859	C860	I861	H862	C863	S864	N865	K866	A867	L868	N869	K870	E871	S872	H873	F874	N875	K876	L877	I878	P879	E880	I881	V882	G883	D884	R885	L886	L887	S888	D889	E890	E891	N892	D893	Y894	L895	T896	K897	ASN	ASN	ASP	GLN	LYS	F842																
THR	ASN	THR	ARG	VAL	GLN	THR	GLU	THR	THR	LYS	LYS	ILE	ILE	ASN	LEU	PHE	ALA	PRO	ASN	LEU	SER	GLY	THR	LYS	GLU	ASP	ASP	LEU	ILE	GLN	K35	S36	L37	R38	D39	Q40	L41	V42	E43	S44	I45	R46	N47	S48	I49	TVR	PRO	ASP	THR	LYS	PHE	ALA	GLY	LEU																						

Molecule 2: Archaeal ATPase



MET	THR	ASP	ARG	VAL	GLN	THR	GLU	THR	THR	LYS	LYS	ILE	ILE	ASN	LEU	PHE	ALA	PRO	ASN	LEU	SER	GLY	THR	LYS	GLU	ASP	ASP	LEU	ILE	GLN	K35	S36	L37	R38	D39	Q40	L41	V42	E43	S44	I45	R46	N47	S48	I49	TVR	PRO	ASP	THR	LYS	PHE	ALA	GLY	LEU
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	9236	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	49	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	7.256	Depositor
Minimum map value	-3.896	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.303	Depositor
Recommended contour level	1.9	Depositor
Map size (\AA)	659.9987, 659.9987, 659.9987	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	2.57812, 2.57812, 2.57812	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:
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	0.30	0/6400	0.64	18/8672 (0.2%)
1	B	0.30	0/6400	0.62	17/8672 (0.2%)
1	C	0.33	0/6400	0.63	13/8672 (0.1%)
1	D	0.34	1/6375 (0.0%)	0.62	10/8637 (0.1%)
1	E	0.32	0/6400	0.63	14/8672 (0.2%)
1	F	0.32	0/6400	0.63	16/8672 (0.2%)
1	G	0.31	0/6400	0.59	13/8672 (0.1%)
1	H	0.31	0/6400	0.65	21/8672 (0.2%)
1	I	0.32	0/6400	0.63	14/8672 (0.2%)
1	J	0.31	0/6400	0.61	13/8672 (0.1%)
1	K	0.33	0/6400	0.63	11/8672 (0.1%)
1	L	0.31	0/6400	0.65	22/8672 (0.3%)
2	M	0.28	0/6379	0.50	2/8592 (0.0%)
2	N	0.29	0/6379	0.51	1/8592 (0.0%)
2	O	0.28	0/6379	0.49	2/8592 (0.0%)
2	P	0.28	0/6379	0.51	1/8592 (0.0%)
2	Q	0.28	0/6379	0.50	1/8592 (0.0%)
2	R	0.28	0/6379	0.50	2/8592 (0.0%)
2	S	0.29	0/6379	0.51	2/8592 (0.0%)
All	All	0.31	1/121428 (0.0%)	0.58	193/164173 (0.1%)

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	C	0	1
1	E	0	1
1	H	0	2
1	I	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
1	J	0	1
1	K	0	1
1	L	0	1
2	N	0	1
All	All	0	9

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	45	PRO	CG-CD	-5.40	1.32	1.50

The worst 5 of 193 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	647	THR	C-N-CA	14.53	152.82	122.30
1	A	650	LYS	CD-CE-NZ	12.84	141.23	111.70
1	B	695	LYS	CD-CE-NZ	12.51	140.46	111.70
1	K	205	LYS	CD-CE-NZ	12.12	139.58	111.70
1	J	553	LYS	CD-CE-NZ	11.97	139.23	111.70

There are no chirality outliers.

5 of 9 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	290	ARG	Sidechain
1	E	568	ARG	Sidechain
1	H	540	ILE	Peptide
1	H	575	ARG	Sidechain
1	I	177	ARG	Sidechain

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	6245	0	6229	262	0
1	B	6245	0	6229	268	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	C	6245	0	6229	316	0
1	D	6221	0	6209	329	0
1	E	6245	0	6229	331	0
1	F	6245	0	6229	284	0
1	G	6245	0	6229	311	0
1	H	6245	0	6228	275	0
1	I	6245	0	6229	318	0
1	J	6245	0	6229	273	0
1	K	6245	0	6229	328	0
1	L	6245	0	6229	311	0
2	M	6277	0	6328	1412	0
2	N	6277	0	6328	1517	0
2	O	6277	0	6328	1413	0
2	P	6277	0	6328	1428	0
2	Q	6277	0	6328	1431	0
2	R	6277	0	6328	1441	0
2	S	6277	0	6328	1433	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
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
3	I	1	0	0	0	0
3	J	1	0	0	0	0
3	K	1	0	0	0	0
3	L	1	0	0	0	0
All	All	118867	0	119023	13162	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 55.

The worst 5 of 13162 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)
2:S:173:LYS:NZ	2:S:175:GLU:HG3	1.07	1.40
2:P:751:GLN:OE1	2:P:811:VAL:CG1	1.70	1.38
2:M:751:GLN:OE1	2:M:811:VAL:CG1	1.69	1.38
2:R:751:GLN:OE1	2:R:811:VAL:CG1	1.76	1.34

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:O:751:GLN:OE1	2:O:811:VAL:CG1	1.73	1.33

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	762/799 (95%)	697 (92%)	61 (8%)	4 (0%)	29	69
1	B	762/799 (95%)	706 (93%)	51 (7%)	5 (1%)	22	63
1	C	762/799 (95%)	697 (92%)	60 (8%)	5 (1%)	22	63
1	D	757/799 (95%)	688 (91%)	64 (8%)	5 (1%)	22	63
1	E	762/799 (95%)	693 (91%)	65 (8%)	4 (0%)	29	69
1	F	762/799 (95%)	693 (91%)	64 (8%)	5 (1%)	22	63
1	G	762/799 (95%)	690 (91%)	67 (9%)	5 (1%)	22	63
1	H	762/799 (95%)	692 (91%)	65 (8%)	5 (1%)	22	63
1	I	762/799 (95%)	704 (92%)	53 (7%)	5 (1%)	22	63
1	J	762/799 (95%)	696 (91%)	61 (8%)	5 (1%)	22	63
1	K	762/799 (95%)	690 (91%)	66 (9%)	6 (1%)	19	60
1	L	762/799 (95%)	697 (92%)	60 (8%)	5 (1%)	22	63
2	M	766/947 (81%)	704 (92%)	58 (8%)	4 (0%)	29	69
2	N	766/947 (81%)	695 (91%)	66 (9%)	5 (1%)	22	63
2	O	766/947 (81%)	704 (92%)	58 (8%)	4 (0%)	29	69
2	P	766/947 (81%)	680 (89%)	82 (11%)	4 (0%)	29	69
2	Q	766/947 (81%)	698 (91%)	63 (8%)	5 (1%)	22	63
2	R	766/947 (81%)	706 (92%)	56 (7%)	4 (0%)	29	69
2	S	766/947 (81%)	700 (91%)	61 (8%)	5 (1%)	22	63

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	14501/16217 (89%)	13230 (91%)	1181 (8%)	90 (1%)	29 66

5 of 90 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	23	VAL
1	B	23	VAL
1	C	23	VAL
1	D	23	VAL
1	E	23	VAL

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	678/706 (96%)	673 (99%)	5 (1%)	84 90
1	B	678/706 (96%)	677 (100%)	1 (0%)	93 96
1	C	678/706 (96%)	673 (99%)	5 (1%)	84 90
1	D	675/706 (96%)	671 (99%)	4 (1%)	86 92
1	E	678/706 (96%)	673 (99%)	5 (1%)	84 90
1	F	678/706 (96%)	675 (100%)	3 (0%)	91 94
1	G	678/706 (96%)	677 (100%)	1 (0%)	93 96
1	H	678/706 (96%)	676 (100%)	2 (0%)	92 94
1	I	678/706 (96%)	675 (100%)	3 (0%)	91 94
1	J	678/706 (96%)	676 (100%)	2 (0%)	92 94
1	K	678/706 (96%)	676 (100%)	2 (0%)	92 94
1	L	678/706 (96%)	676 (100%)	2 (0%)	92 94
2	M	696/837 (83%)	687 (99%)	9 (1%)	69 82
2	N	696/837 (83%)	691 (99%)	5 (1%)	84 90
2	O	696/837 (83%)	692 (99%)	4 (1%)	86 92
2	P	696/837 (83%)	695 (100%)	1 (0%)	93 96

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	Q	696/837 (83%)	692 (99%)	4 (1%)	86	92
2	R	696/837 (83%)	691 (99%)	5 (1%)	84	90
2	S	696/837 (83%)	691 (99%)	5 (1%)	84	90
All	All	13005/14331 (91%)	12937 (100%)	68 (0%)	89	93

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	Q	377	ARG
2	R	331	LYS
2	S	579	LYS
1	H	309	ARG
1	G	556	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 149 such sidechains are listed below:

Mol	Chain	Res	Type
2	P	875	ASN
2	S	435	ASN
2	Q	276	GLN
2	Q	778	ASN
1	I	723	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 12 ligands modelled in this entry, 12 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.

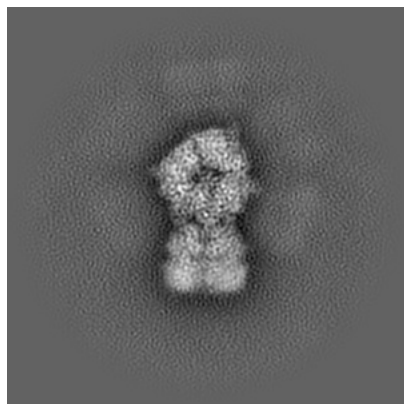
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-29328. These allow visual inspection of the internal detail of the map and identification of artifacts.

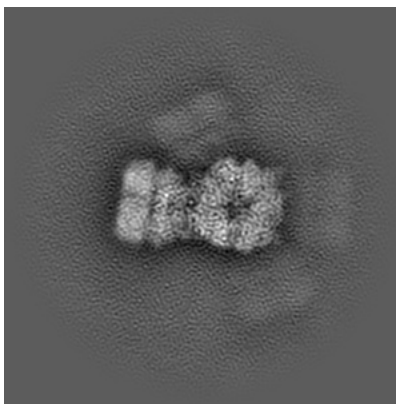
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

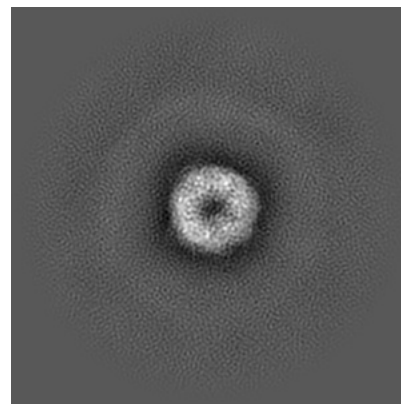
6.1.1 Primary map



X

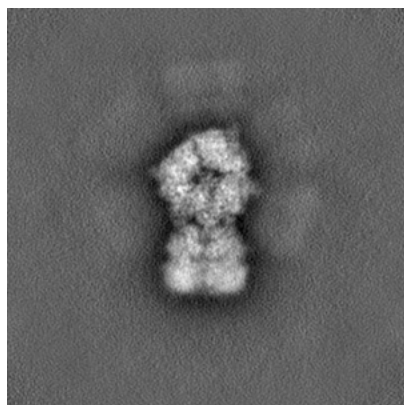


Y

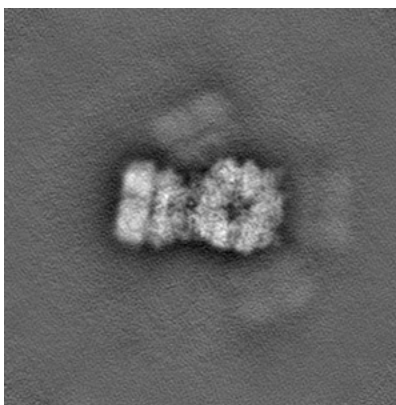


Z

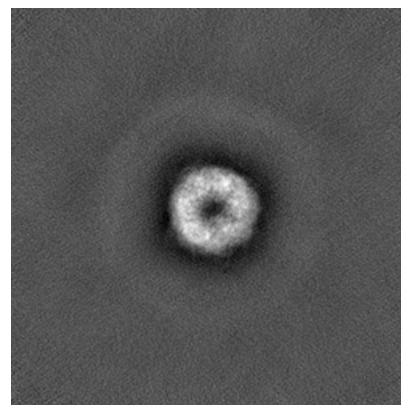
6.1.2 Raw map



X



Y

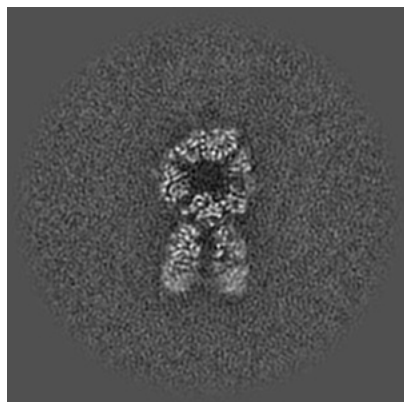


Z

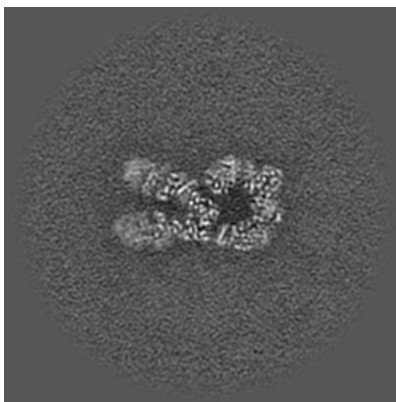
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

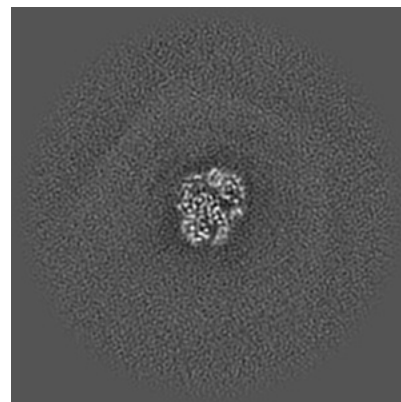
6.2.1 Primary map



X Index: 128

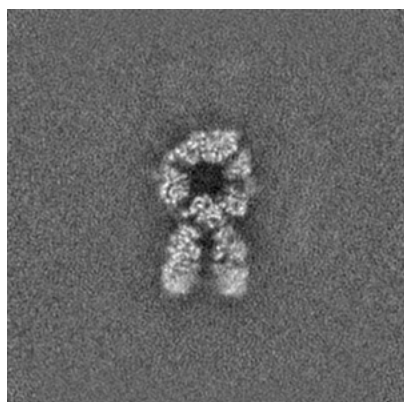


Y Index: 128

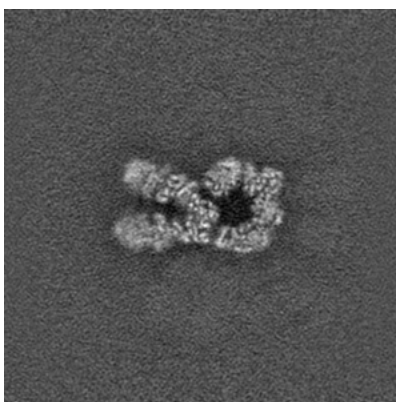


Z Index: 128

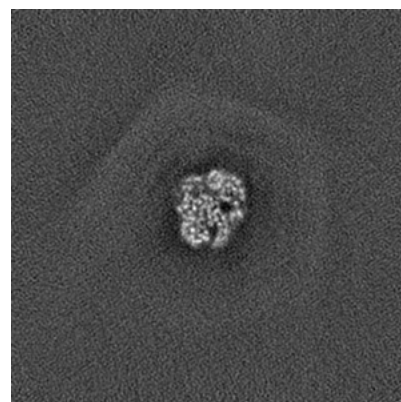
6.2.2 Raw map



X Index: 128



Y Index: 128

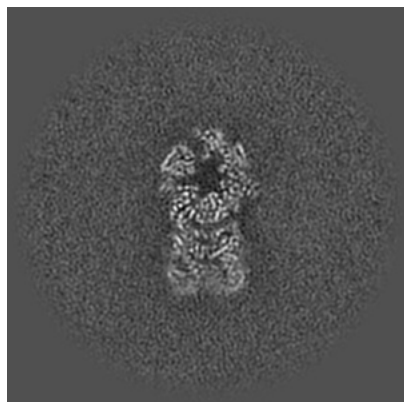


Z Index: 128

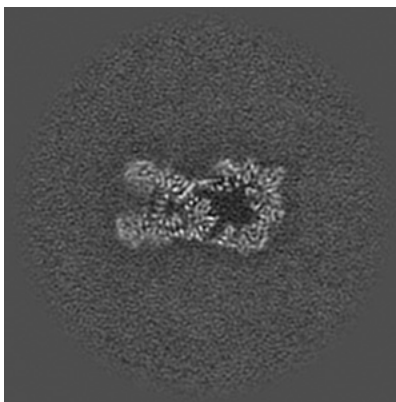
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

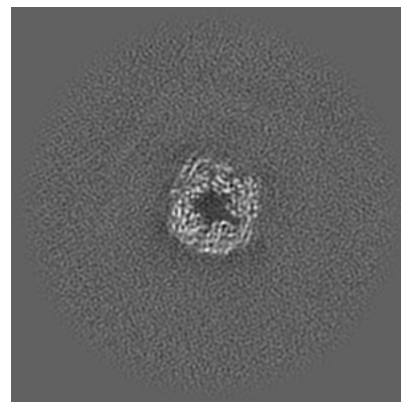
6.3.1 Primary map



X Index: 121

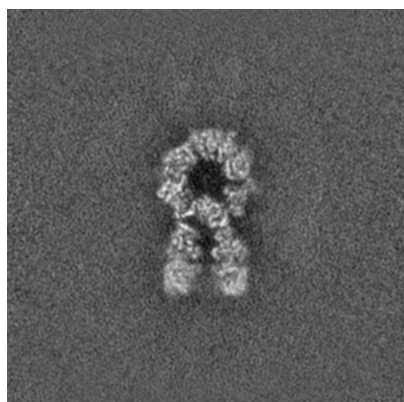


Y Index: 131

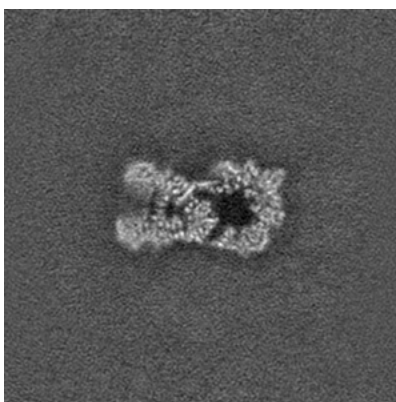


Z Index: 141

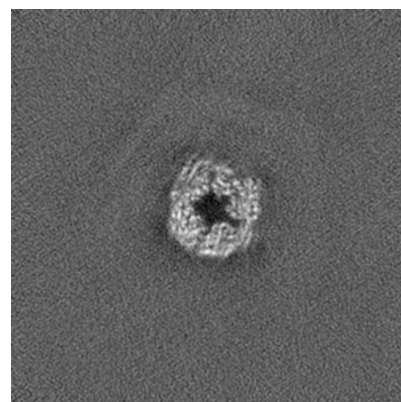
6.3.2 Raw map



X Index: 126



Y Index: 131

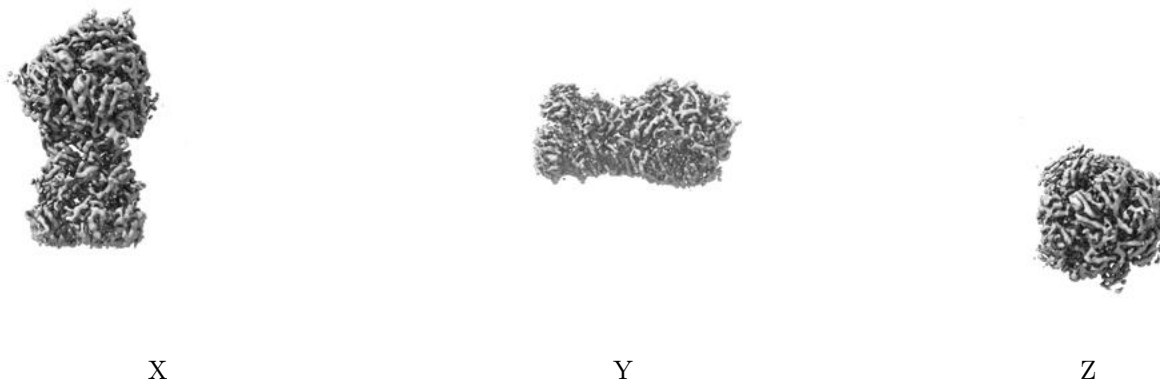


Z Index: 141

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

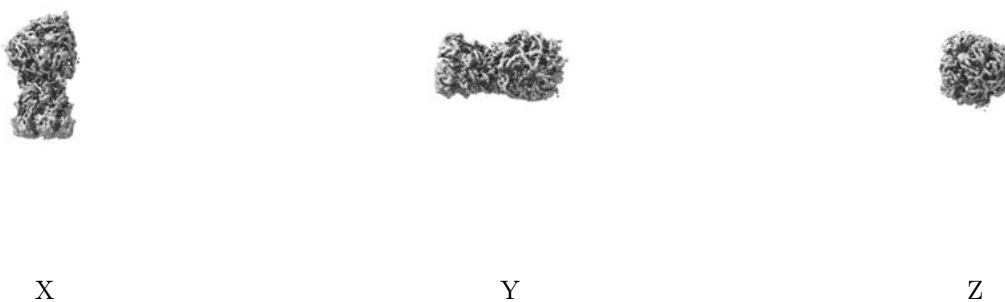
6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 1.9. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 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.

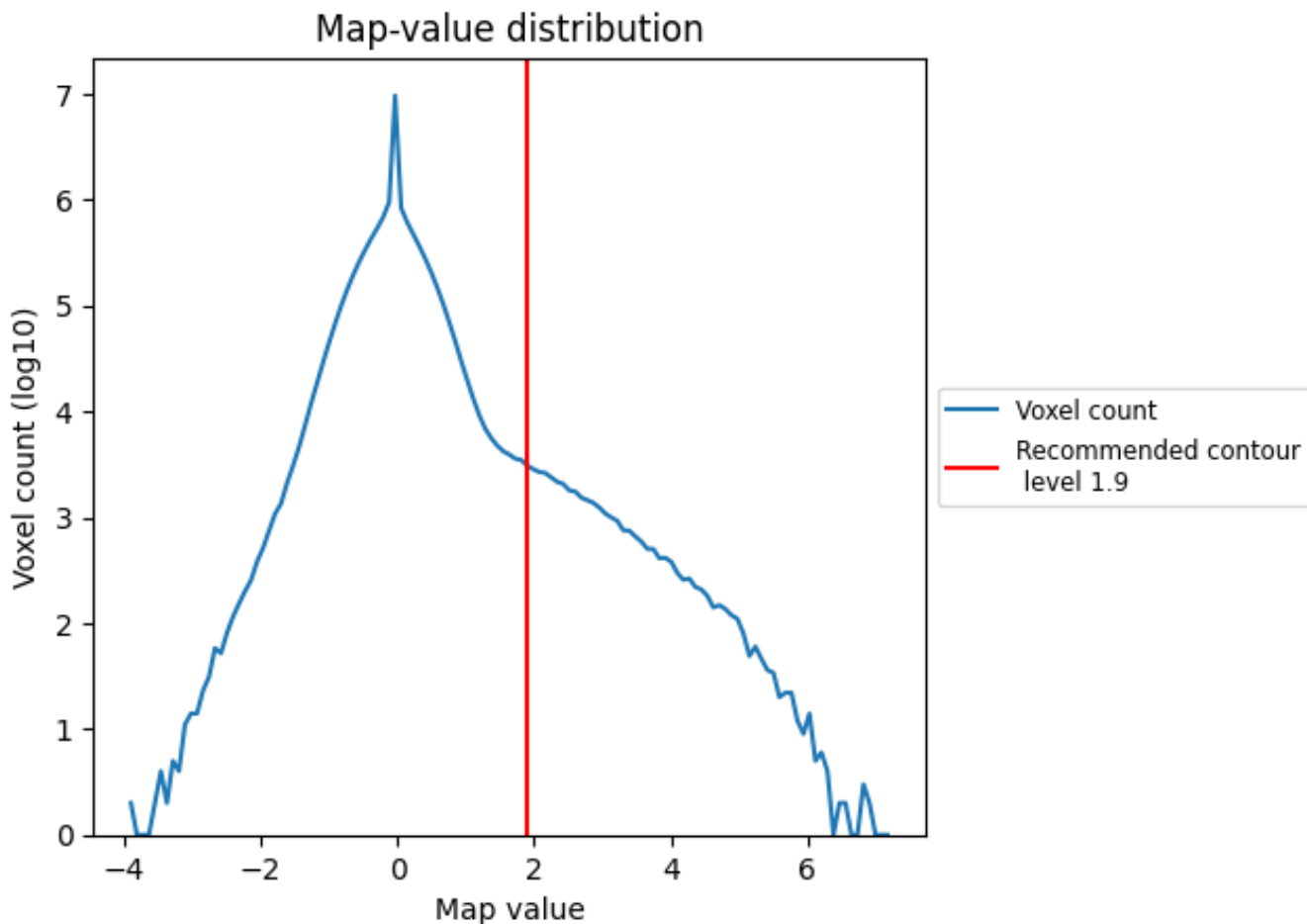
6.5 Mask visualisation [i](#)

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

7 Map analysis [i](#)

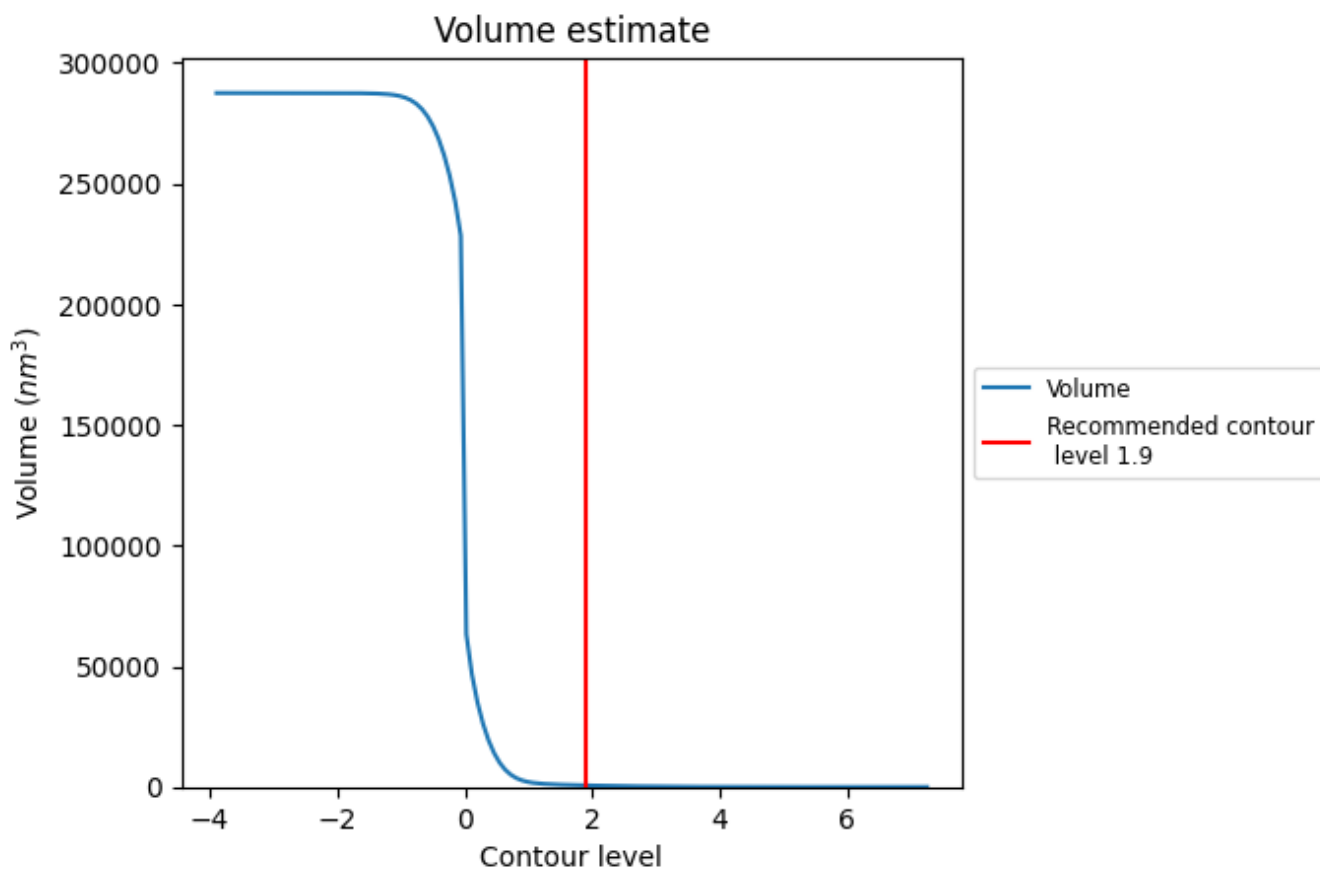
This section contains the results of statistical analysis of the map.

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.

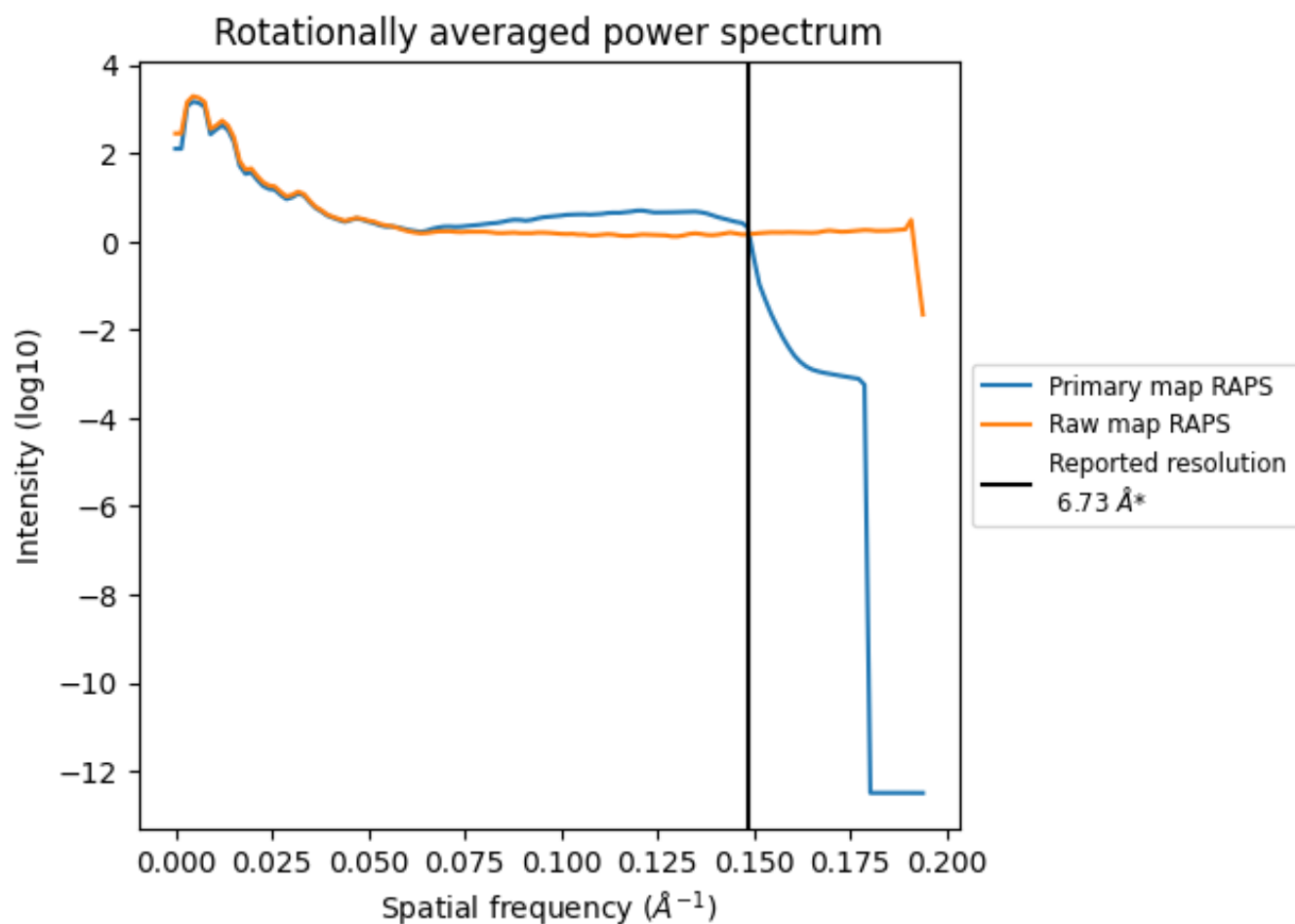
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 643 nm³; this corresponds to an approximate mass of 581 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

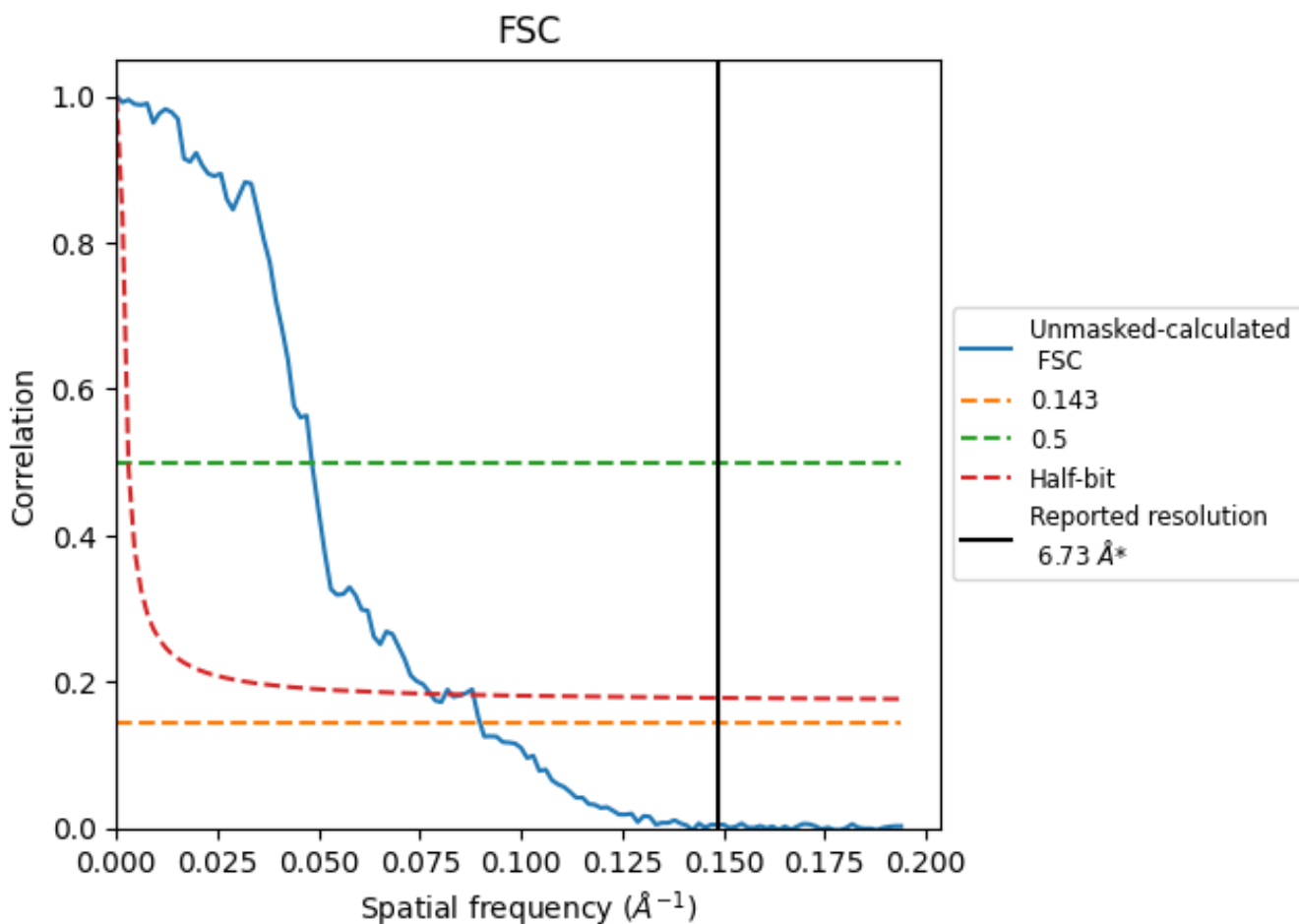


*Reported resolution corresponds to spatial frequency of 0.149 Å⁻¹

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 0.149 Å⁻¹

8.2 Resolution estimates [i](#)

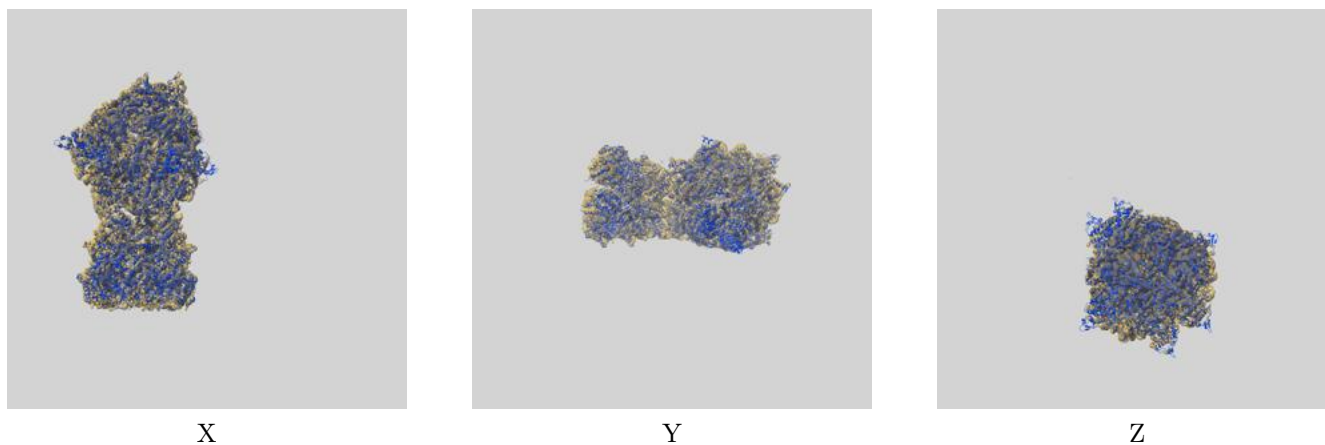
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	6.73	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	11.12	20.70	12.89

*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 11.12 differs from the reported value 6.73 by more than 10 %

9 Map-model fit [i](#)

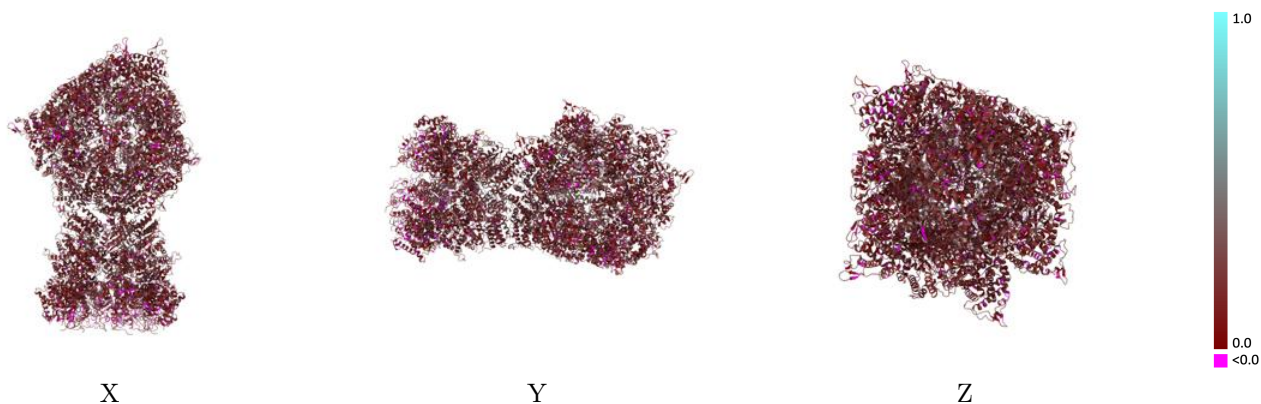
This section contains information regarding the fit between EMDB map EMD-29328 and PDB model 8FNW. Per-residue inclusion information can be found in section [3](#) on page [8](#).

9.1 Map-model overlay [i](#)



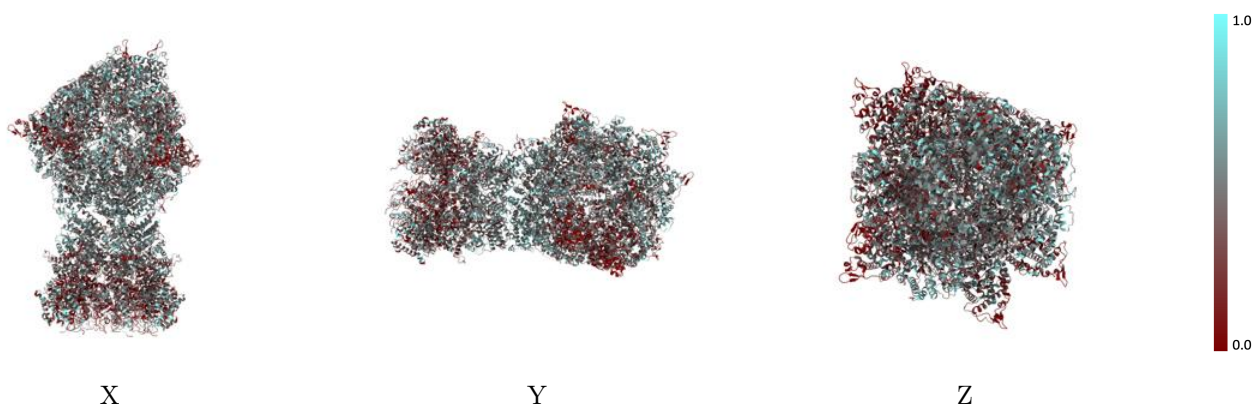
The images above show the 3D surface view of the map at the recommended contour level 1.9 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



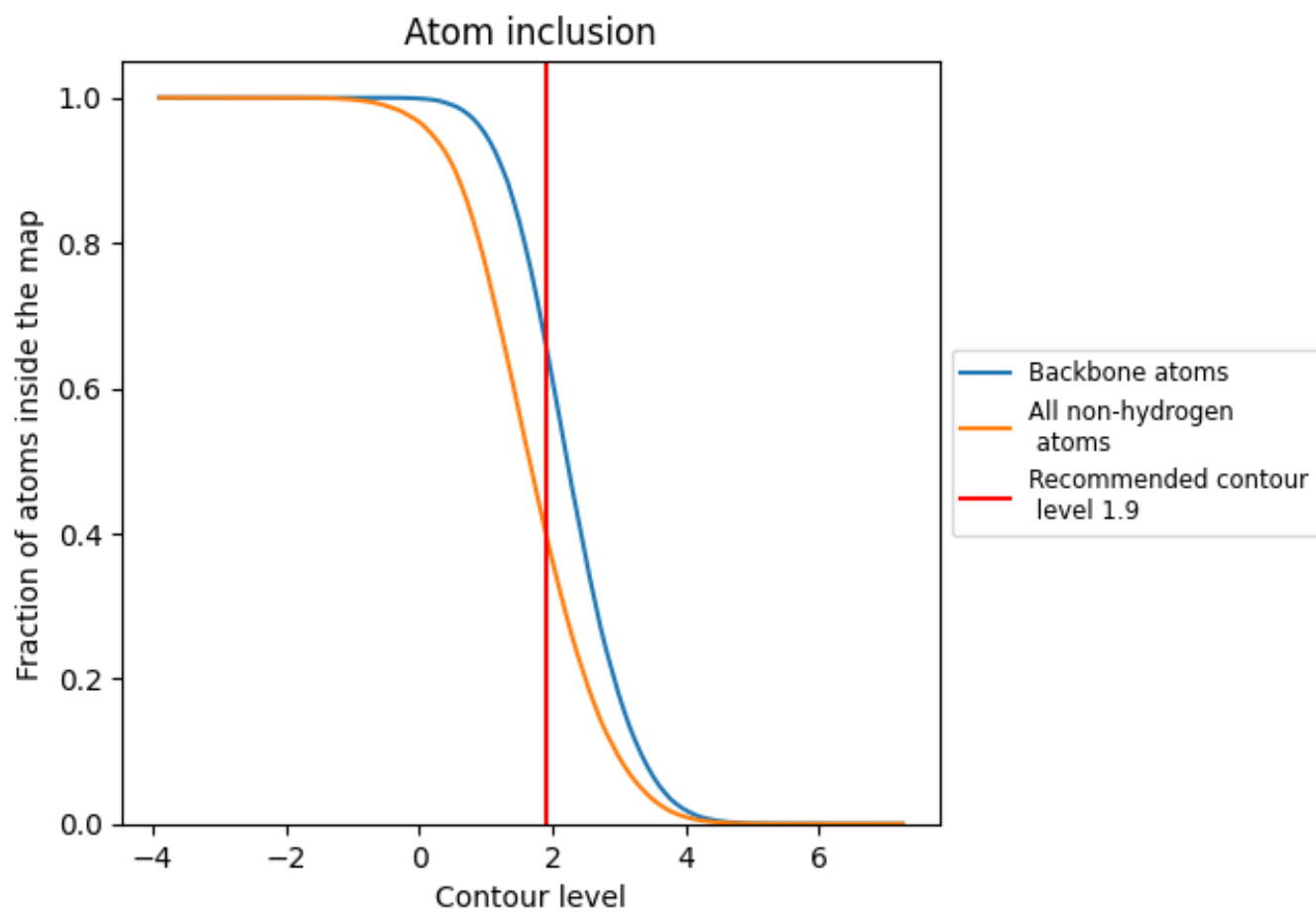
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (1.9).

9.4 Atom inclusion [i](#)



At the recommended contour level, 66% of all backbone atoms, 40% 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 (1.9) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4001	0.1870
A	0.3030	0.1790
B	0.3445	0.1840
C	0.5372	0.1950
D	0.5225	0.2000
E	0.3897	0.1880
F	0.4128	0.1900
G	0.4082	0.1880
H	0.4503	0.1930
I	0.4535	0.1920
J	0.4246	0.1920
K	0.4544	0.1920
L	0.3173	0.1890
M	0.3824	0.1870
N	0.3939	0.1850
O	0.3418	0.1760
P	0.3697	0.1820
Q	0.3831	0.1820
R	0.3469	0.1820
S	0.3683	0.1830

