wwPDB EM Validation Summary Report

Oct 7, 2024 – 02:12 PM JST

PDB ID	:	8I8B
EMDB ID	:	EMD-35246
Title	:	Outer shell and inner layer structures of Autographa californica multiple nucleopolyhedrovirus (AcMNPV)
Authors	:	Jia, X.; Gao, Y.; Zhang, Q.
Deposited on	:	2023-02-03
Resolution	:	4.31 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:

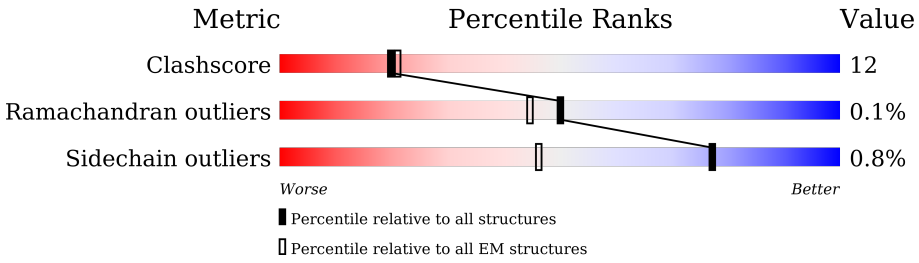
EMDB validation analysis	:	FAILED
MolProbity	:	4.02b-467
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance

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

The reported resolution of this entry is 4.31 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5%

Mol	Chain	Length	Quality of chain
1	W	347	43% 35% 22%
1	X	347	39% 38% · 22%
1	Y	347	37% 41% 22%
1	Z	347	37% 40% 22%
2	A	691	24% · 73%
2	B	691	24% · 73%
2	C	691	29% · 67%
3	D	390	71% 17% · 11%
4	E	477	82% 17% ·

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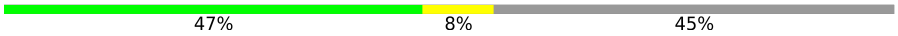
Mol	Chain	Length	Quality of chain
5	F	361	
5	G	361	
6	H	290	
6	I	290	
7	J	320	

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 30015 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 Major viral capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	W	271	Total	C	N	O	S	0	0
			2187	1379	379	416	13		
1	X	271	Total	C	N	O	S	0	0
			2187	1379	379	416	13		
1	Y	271	Total	C	N	O	S	0	0
			2187	1379	379	416	13		
1	Z	271	Total	C	N	O	S	0	0
			2187	1379	379	416	13		

- Molecule 2 is a protein called Viral capsid associated protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	188	Total	C	N	O	S	0	0
			1565	1012	263	276	14		
2	B	188	Total	C	N	O	S	0	0
			1565	1012	263	276	14		
2	C	229	Total	C	N	O	S	0	0
			1919	1235	324	346	14		

- Molecule 3 is a protein called AcOrf-109 peptide.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	D	346	Total	C	N	O	S	0	0
			2817	1820	468	514	15		

- Molecule 4 is a protein called Early 49 Daa protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	E	474	Total	C	N	O	S	0	0
			3888	2524	640	701	23		

- Molecule 5 is a protein called P40.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	F	224	Total	C	N	O	S	0	0
			1853	1172	317	348	16		
5	G	224	Total	C	N	O	S	0	0
			1853	1172	317	348	16		

- Molecule 6 is a protein called Occlusion-derived virus envelope/capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	H	228	Total	C	N	O	S	0	0
			1854	1194	293	358	9		
6	I	159	Total	C	N	O	S	0	0
			1294	838	203	246	7		

- Molecule 7 is a protein called 38K.

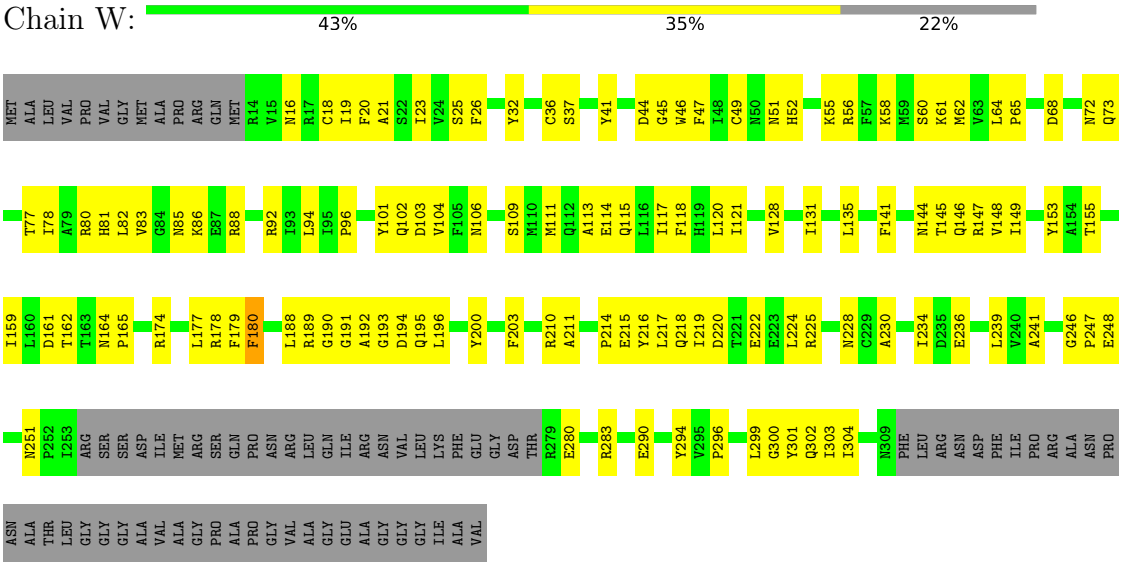
Mol	Chain	Residues	Atoms					AltConf	Trace
7	J	316	Total	C	N	O	S	0	0
			2659	1724	438	483	14		

3 Residue-property plots (i)

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

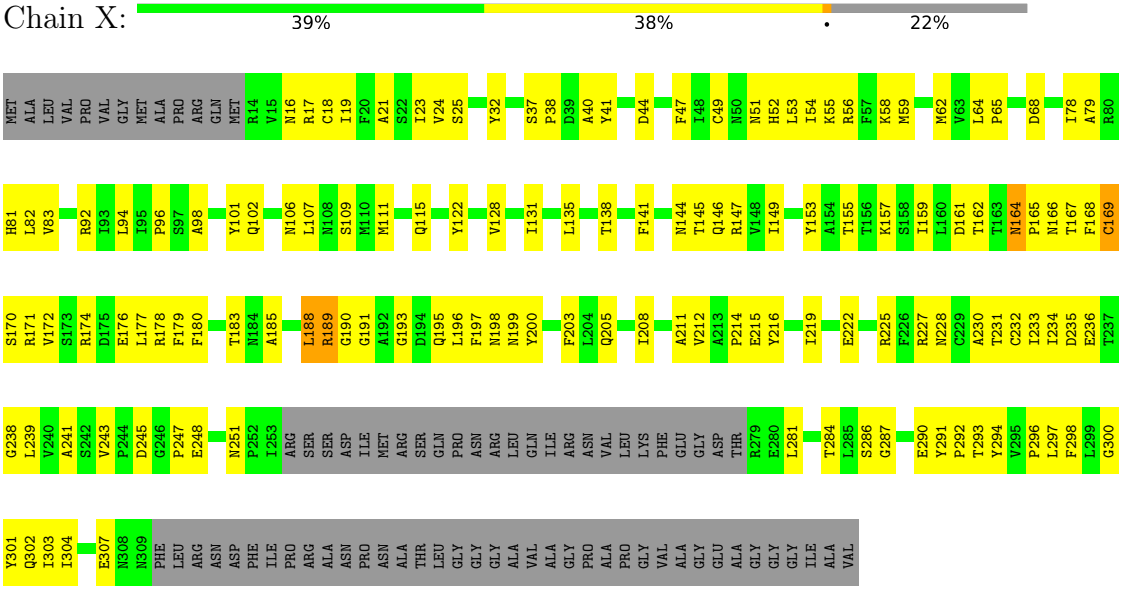
• Molecule 1: Major viral capsid protein

Chain W:



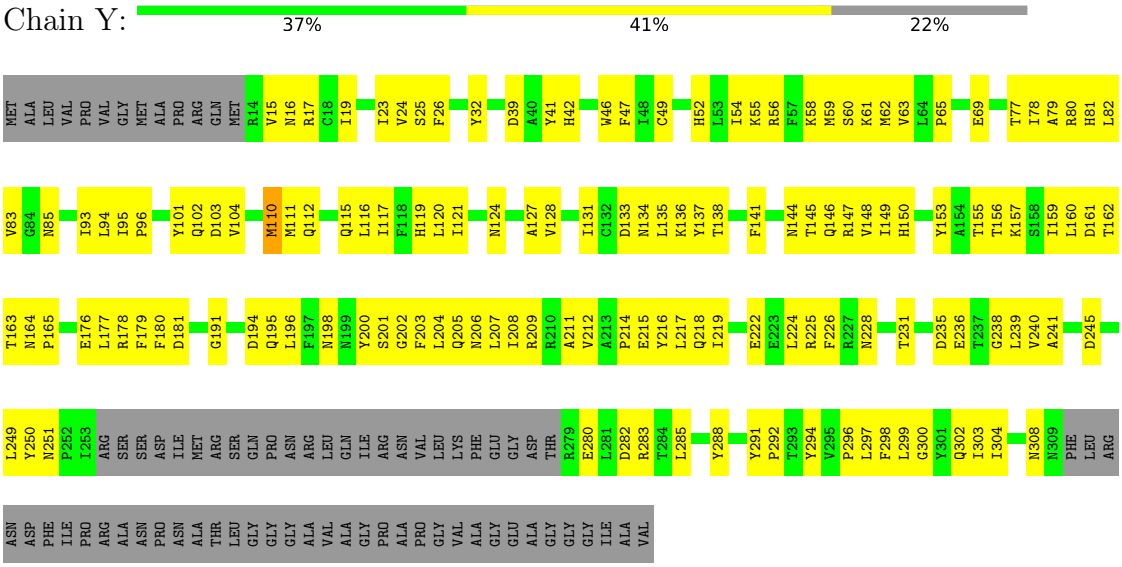
• Molecule 1: Major viral capsid protein

Chain X:



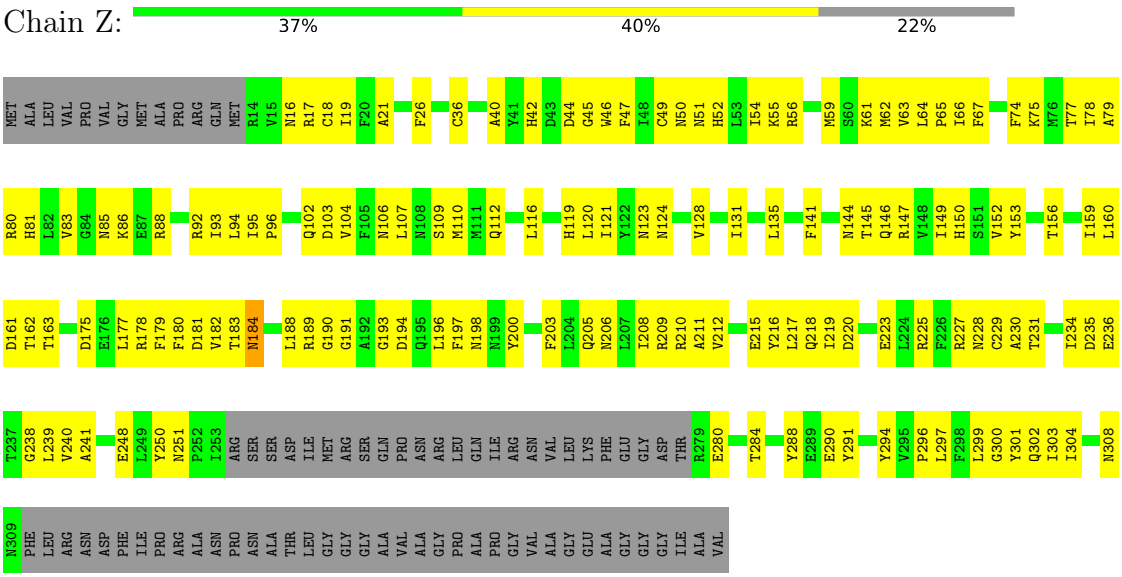
• Molecule 1: Major viral capsid protein

Chain Y:



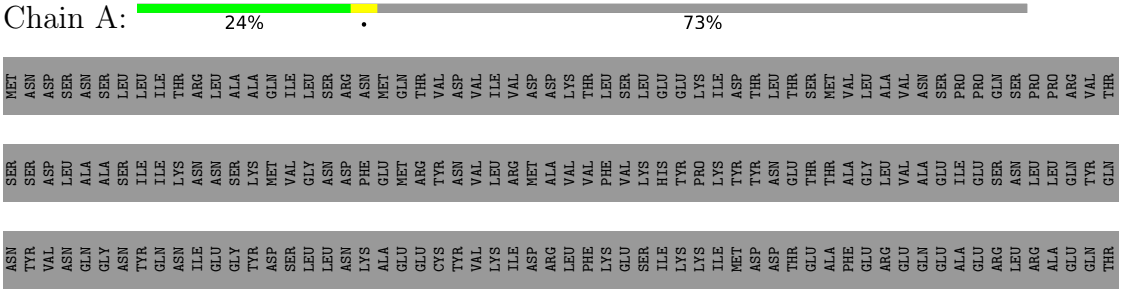
• Molecule 1: Major viral capsid protein

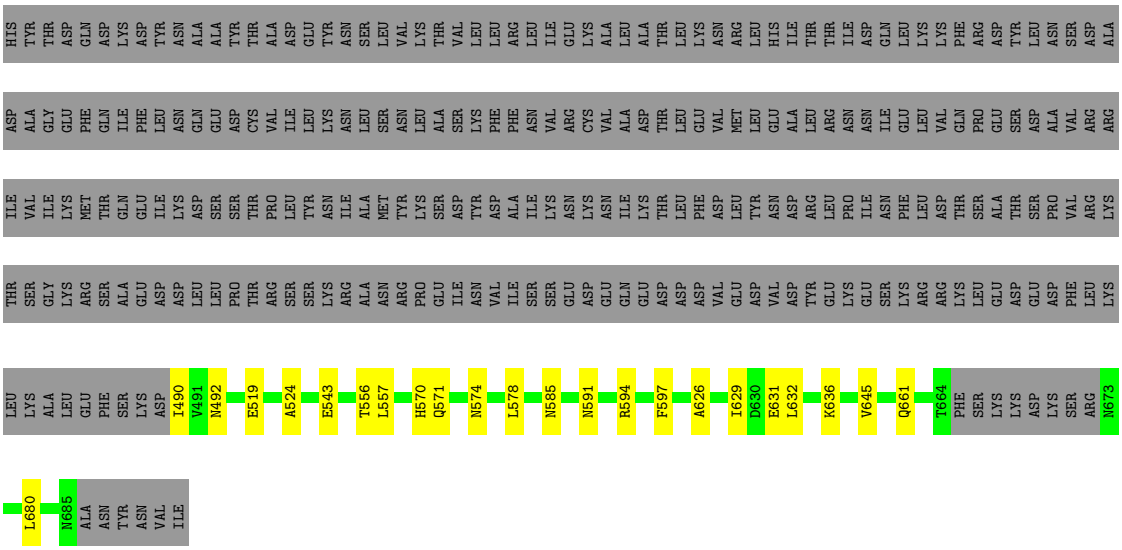
Chain Z:



• Molecule 2: Viral capsid associated protein

Chain A:



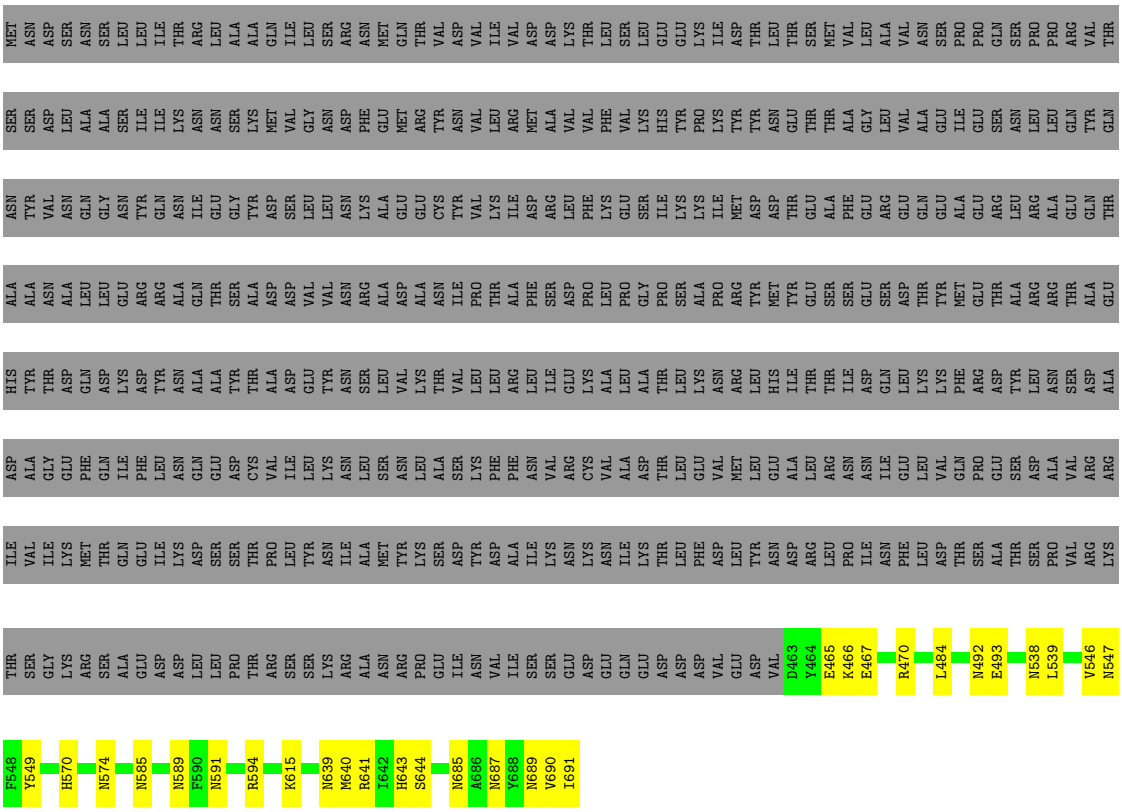


• Molecule 2: Viral capsid associated protein

Chain B:

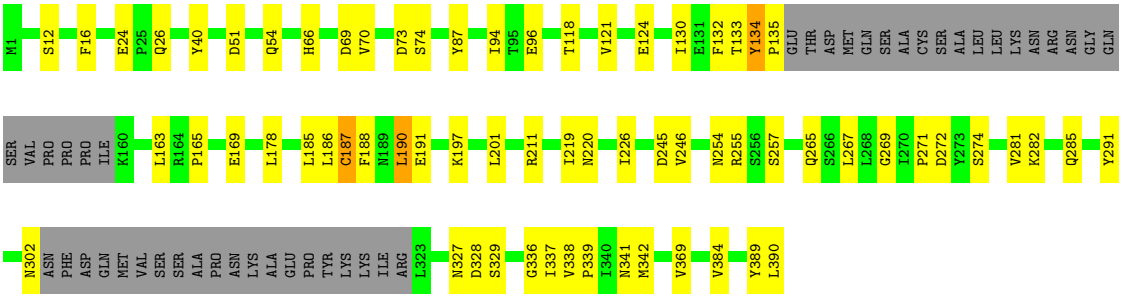
• Molecule 2: Viral capsid associated protein

Chain C:



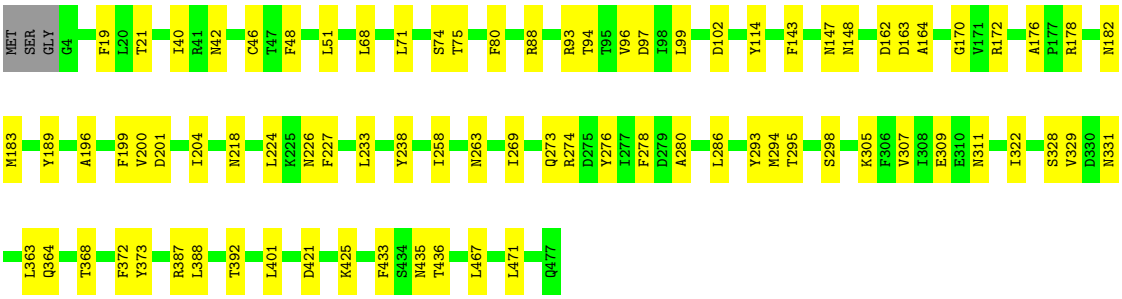
• Molecule 3: AcOrf-109 peptide

Chain D:



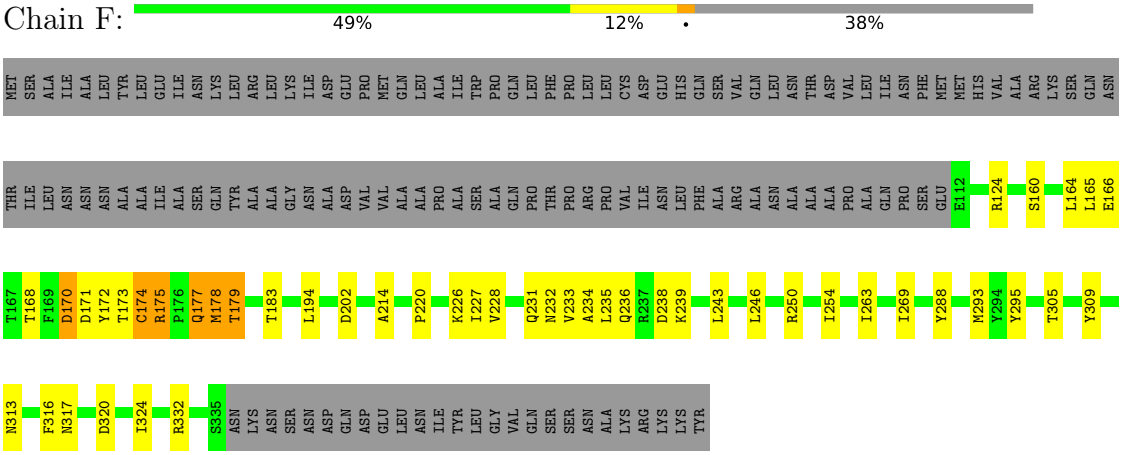
• Molecule 4: Early 49 Daa protein

Chain E:



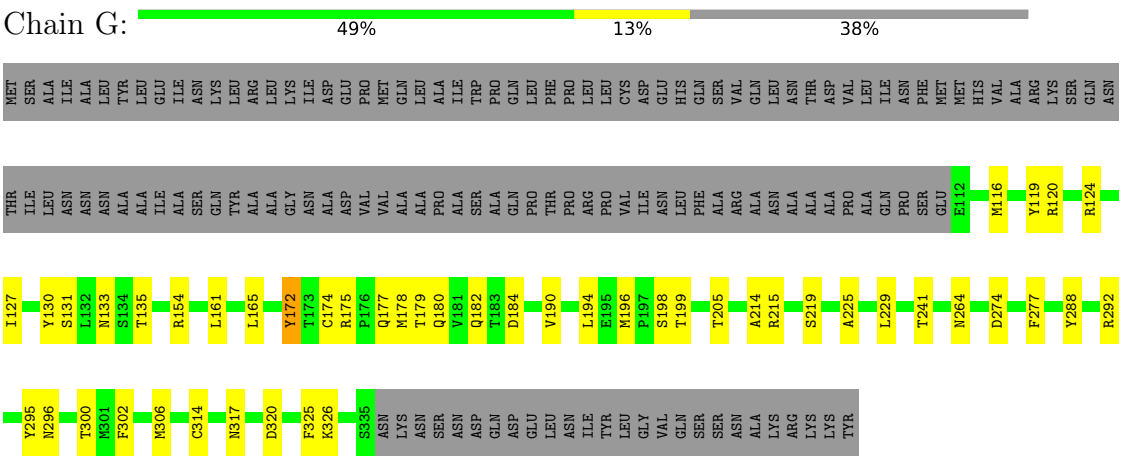
• Molecule 5: P40

Chain F:



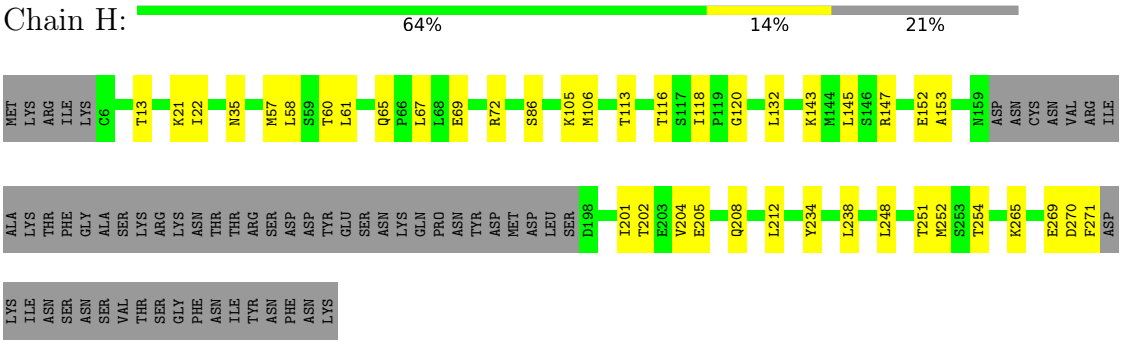
• Molecule 5: P40

Chain G:



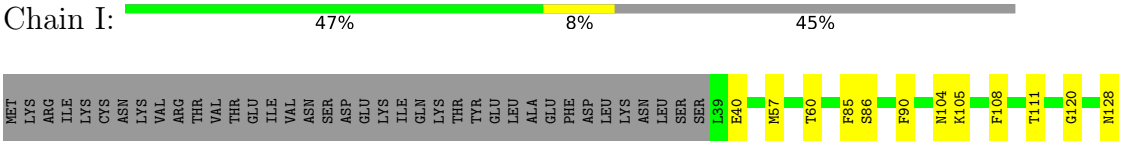
• Molecule 6: Occlusion-derived virus envelope/capsid protein

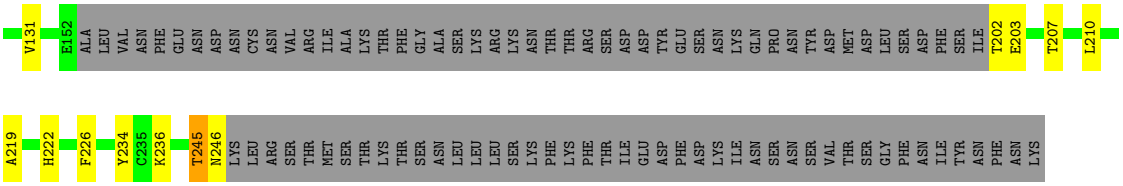
Chain H:



• Molecule 6: Occlusion-derived virus envelope/capsid protein

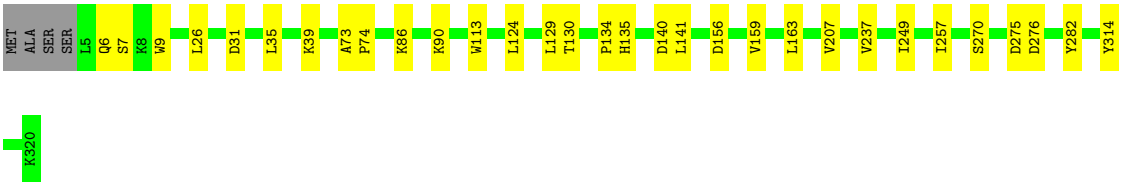
Chain I:





• Molecule 7: 38K

Chain J:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	337988	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

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	W	0.30	0/2232	0.53	0/3026
1	X	0.30	0/2232	0.52	0/3026
1	Y	0.29	0/2232	0.53	0/3026
1	Z	0.28	0/2232	0.52	0/3026
2	A	0.28	0/1596	0.45	0/2150
2	B	0.30	0/1596	0.45	0/2150
2	C	0.28	0/1956	0.44	0/2626
3	D	0.31	0/2888	0.50	0/3925
4	E	0.31	0/3987	0.48	0/5397
5	F	0.28	0/1887	0.50	0/2548
5	G	0.29	0/1887	0.48	0/2548
6	H	0.28	0/1888	0.46	0/2554
6	I	0.27	0/1321	0.45	0/1792
7	J	0.25	0/2733	0.44	0/3702
All	All	0.29	0/30667	0.49	0/41496

There are no bond length outliers.

There are no bond angle outliers.

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	W	2187	0	2121	104	0
1	X	2187	0	2120	109	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	Y	2187	0	2121	131	0
1	Z	2187	0	2121	142	0
2	A	1565	0	1576	32	0
2	B	1565	0	1576	28	0
2	C	1919	0	1934	20	0
3	D	2817	0	2812	51	0
4	E	3888	0	3880	53	0
5	F	1853	0	1853	62	0
5	G	1853	0	1853	31	0
6	H	1854	0	1858	49	0
6	I	1294	0	1288	24	0
7	J	2659	0	2595	19	0
All	All	30015	0	29708	728	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 12.

The worst 5 of 728 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)
5:F:295:TYR:CE1	6:H:13:THR:HB	1.58	1.35
5:F:295:TYR:CD1	6:H:22:ILE:HG22	1.68	1.29
5:F:295:TYR:OH	6:H:21:LYS:HA	1.33	1.26
5:F:295:TYR:CD1	6:H:22:ILE:CG2	2.37	1.07
1:W:218:GLN:HB2	1:W:301:TYR:OH	1.56	1.05

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	W	267/347 (77%)	240 (90%)	26 (10%)	1 (0%)	30 67
1	X	267/347 (77%)	241 (90%)	26 (10%)	0	100 100
1	Y	267/347 (77%)	243 (91%)	24 (9%)	0	100 100
1	Z	267/347 (77%)	245 (92%)	21 (8%)	1 (0%)	30 67
2	A	184/691 (27%)	174 (95%)	10 (5%)	0	100 100
2	B	184/691 (27%)	173 (94%)	11 (6%)	0	100 100
2	C	227/691 (33%)	212 (93%)	15 (7%)	0	100 100
3	D	340/390 (87%)	318 (94%)	22 (6%)	0	100 100
4	E	472/477 (99%)	428 (91%)	44 (9%)	0	100 100
5	F	222/361 (62%)	199 (90%)	23 (10%)	0	100 100
5	G	222/361 (62%)	205 (92%)	17 (8%)	0	100 100
6	H	224/290 (77%)	209 (93%)	15 (7%)	0	100 100
6	I	155/290 (53%)	147 (95%)	7 (4%)	1 (1%)	22 59
7	J	314/320 (98%)	291 (93%)	23 (7%)	0	100 100
All	All	3612/5950 (61%)	3325 (92%)	284 (8%)	3 (0%)	50 83

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	Z	220	ASP
1	W	220	ASP
6	I	245	THR

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	W	244/299 (82%)	243 (100%)	1 (0%)	89 91
1	X	244/299 (82%)	239 (98%)	5 (2%)	50 69
1	Y	244/299 (82%)	243 (100%)	1 (0%)	89 91
1	Z	244/299 (82%)	243 (100%)	1 (0%)	89 91

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
2	A	179/634 (28%)	179 (100%)	0	100 100
2	B	179/634 (28%)	179 (100%)	0	100 100
2	C	218/634 (34%)	217 (100%)	1 (0%)	86 90
3	D	327/366 (89%)	322 (98%)	5 (2%)	60 75
4	E	438/440 (100%)	438 (100%)	0	100 100
5	F	212/326 (65%)	205 (97%)	7 (3%)	33 55
5	G	212/326 (65%)	207 (98%)	5 (2%)	44 64
6	H	215/273 (79%)	215 (100%)	0	100 100
6	I	148/273 (54%)	148 (100%)	0	100 100
7	J	301/304 (99%)	301 (100%)	0	100 100
All	All	3405/5406 (63%)	3379 (99%)	26 (1%)	77 85

5 of 26 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
5	F	170	ASP
5	F	175	ARG
5	G	325	PHE
5	F	174	CYS
5	F	177	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 15 such sidechains are listed below:

Mol	Chain	Res	Type
1	Z	184	ASN
5	G	231	GLN
1	Z	205	GLN
6	H	241	HIS
2	C	574	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

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.