



# Full wwPDB X-ray Structure Validation Report ⓘ

Jun 16, 2024 – 02:37 AM EDT

PDB ID : 1VCQ  
Title : SEMLIKI FOREST VIRUS CAPSID PROTEIN (CRYSTAL FORM II)  
Authors : Lu, G.; Choi, H.-K.; Rossmann, M.G.  
Deposited on : 1996-03-04  
Resolution : 3.10 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

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:

MolProbity : 4.02b-467  
Xtriage (Phenix) : 1.20.1  
EDS : 2.37.1  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.37.1

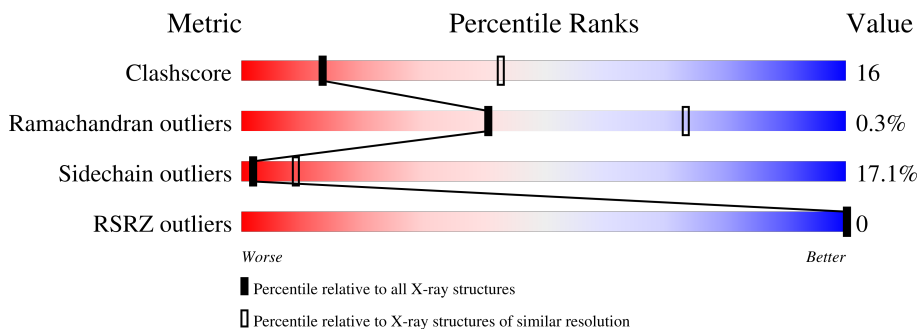
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 3.10 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)	Similar resolution (#Entries, resolution range(Å))
Clashscore	141614	1184 (3.10-3.10)
Ramachandran outliers	138981	1141 (3.10-3.10)
Sidechain outliers	138945	1141 (3.10-3.10)
RSRZ outliers	127900	1067 (3.10-3.10)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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 electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	149	
1	B	149	

## 2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 2284 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 SEMLIKI FOREST VIRUS CAPSID PROTEIN.

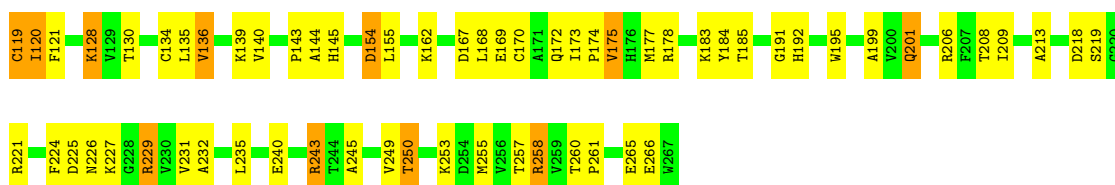
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	149	Total 1142	C 718	N 205	O 213	S 6	9	0	0
1	B	149	Total 1142	C 718	N 205	O 213	S 6	9	0	0

### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron 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 dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). 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.

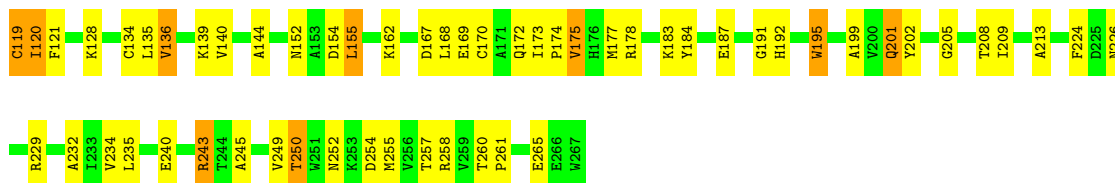
- Molecule 1: SEMLIKI FOREST VIRUS CAPSID PROTEIN

Chain A:  58% 34% 7%



- Molecule 1: SEMLIKI FOREST VIRUS CAPSID PROTEIN

Chain B:  62% 32% 6%



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	53.72Å 48.57Å 70.37Å 90.00° 105.77° 90.00°	Depositor
Resolution (Å)	6.50 – 3.10 35.40 – 3.10	Depositor EDS
% Data completeness (in resolution range)	(Not available) (6.50-3.10) 79.9 (35.40-3.10)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.34 (at 3.12Å)	Xtrriage
Refinement program	X-PLOR	Depositor
R, $R_{free}$	0.157 , (Not available) 0.172 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	39.2	Xtrriage
Anisotropy	0.750	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 74.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.93	EDS
Total number of atoms	2284	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	19.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 41.95 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.1901e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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	0.64	0/1170	0.88	0/1579
1	B	0.67	0/1170	0.89	0/1579
All	All	0.65	0/2340	0.88	0/3158

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 [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1142	0	1119	42	0
1	B	1142	0	1119	35	0
All	All	2284	0	2238	72	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 16.

All (72) 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:199:ALA:HB2	1:B:192:HIS:CD2	2.23	0.73
1:A:232:ALA:HB2	1:A:250:THR:HG23	1.71	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:119:CYS:O	1:B:134:CYS:HA	1.94	0.67
1:A:253:LYS:O	1:A:255:MET:SD	2.52	0.67
1:B:232:ALA:HB2	1:B:250:THR:HG23	1.78	0.64
1:A:119:CYS:O	1:A:134:CYS:HA	1.98	0.64
1:A:226:ASN:ND2	1:B:191:GLY:HA3	2.15	0.61
1:A:226:ASN:HD21	1:B:191:GLY:HA3	1.65	0.61
1:A:218:ASP:O	1:A:221:ARG:HG3	2.02	0.59
1:B:135:LEU:HD22	1:B:140:VAL:HG22	1.85	0.59
1:B:136:VAL:HG12	1:B:184:TYR:HB3	1.86	0.58
1:A:135:LEU:HD22	1:A:140:VAL:HG22	1.88	0.56
1:B:120:ILE:HD12	1:B:120:ILE:H	1.71	0.56
1:B:168:LEU:HD13	1:B:249:VAL:HG21	1.87	0.56
1:A:192:HIS:NE2	1:A:201:GLN:HG2	2.21	0.55
1:A:235:LEU:HD11	1:A:249:VAL:HG23	1.89	0.55
1:A:192:HIS:CD2	1:B:199:ALA:HB2	2.41	0.55
1:A:140:VAL:HG23	1:A:173:ILE:HG12	1.89	0.55
1:A:201:GLN:HB2	1:A:243:ARG:HH21	1.72	0.55
1:B:175:VAL:HG22	1:B:178:ARG:NH1	2.23	0.54
1:A:175:VAL:HG22	1:A:178:ARG:NH1	2.24	0.53
1:A:136:VAL:HG12	1:A:184:TYR:HB3	1.90	0.52
1:A:168:LEU:HD13	1:A:249:VAL:HG21	1.92	0.52
1:B:174:PRO:HG2	1:B:177:MET:HG3	1.91	0.52
1:B:240:GLU:OE2	1:B:245:ALA:HB2	2.10	0.51
1:B:252:ASN:O	1:B:255:MET:HB2	2.11	0.50
1:A:120:ILE:H	1:A:120:ILE:HD12	1.77	0.50
1:A:162:LYS:HE2	1:A:169:GLU:OE1	2.13	0.49
1:A:139:LYS:O	1:A:173:ILE:HD11	2.12	0.49
1:B:144:ALA:HB2	1:B:168:LEU:O	2.12	0.49
1:B:175:VAL:HG13	1:B:178:ARG:HH11	1.77	0.49
1:A:144:ALA:HB2	1:A:168:LEU:O	2.12	0.49
1:A:232:ALA:HB2	1:A:250:THR:CG2	2.42	0.48
1:B:192:HIS:NE2	1:B:201:GLN:HG2	2.28	0.48
1:A:232:ALA:CB	1:A:250:THR:HG23	2.42	0.48
1:B:175:VAL:HG22	1:B:178:ARG:HH12	1.78	0.48
1:B:192:HIS:CE1	1:B:201:GLN:HG2	2.50	0.47
1:B:140:VAL:HG23	1:B:173:ILE:HG12	1.97	0.47
1:B:121:PHE:HE2	1:B:135:LEU:HD11	1.80	0.47
1:A:175:VAL:HG22	1:A:178:ARG:HH12	1.79	0.46
1:B:152:ASN:OD1	1:B:155:LEU:HD22	2.15	0.46
1:A:227:LYS:HB2	1:A:227:LYS:NZ	2.30	0.46
1:A:209:ILE:HD12	1:A:213:ALA:HB3	1.97	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:121:PHE:HE2	1:A:135:LEU:HD11	1.81	0.45
1:A:128:LYS:O	1:A:130:THR:HG23	2.15	0.45
1:B:260:THR:HA	1:B:261:PRO:HD3	1.80	0.45
1:A:191:GLY:HA3	1:B:226:ASN:ND2	2.31	0.44
1:A:225:ASP:OD2	1:A:229:ARG:HD3	2.18	0.44
1:A:260:THR:HA	1:A:261:PRO:HD3	1.79	0.44
1:B:209:ILE:HD12	1:B:213:ALA:HB3	1.99	0.44
1:B:235:LEU:HD11	1:B:249:VAL:HG23	1.99	0.44
1:B:139:LYS:O	1:B:173:ILE:HD11	2.18	0.44
1:B:202:TYR:OH	1:B:205:GLY:HA2	2.17	0.44
1:B:254:ASP:O	1:B:255:MET:HG3	2.16	0.43
1:A:185:THR:HG21	1:A:229:ARG:NH1	2.33	0.43
1:A:140:VAL:CG2	1:A:173:ILE:HG12	2.49	0.43
1:A:227:LYS:HB2	1:A:227:LYS:HZ3	1.83	0.43
1:B:162:LYS:HE2	1:B:169:GLU:OE1	2.19	0.42
1:B:167:ASP:HB3	1:B:235:LEU:HD13	2.02	0.42
1:B:174:PRO:O	1:B:178:ARG:HG3	2.20	0.42
1:B:201:GLN:HB2	1:B:243:ARG:HH21	1.84	0.42
1:A:175:VAL:HG13	1:A:178:ARG:HH11	1.85	0.41
1:B:136:VAL:CG1	1:B:184:TYR:HB3	2.50	0.41
1:A:167:ASP:HB2	1:A:258:ARG:HH12	1.84	0.41
1:A:143:PRO:HG2	1:A:219:SER:HB3	2.02	0.41
1:A:192:HIS:CE1	1:A:201:GLN:HG2	2.56	0.41
1:A:154:ASP:OD1	1:A:154:ASP:N	2.52	0.41
1:A:240:GLU:OE2	1:A:245:ALA:HB2	2.21	0.41
1:A:174:PRO:HG2	1:A:177:MET:HG3	2.03	0.41
1:A:231:VAL:O	1:A:250:THR:HG22	2.20	0.40
1:A:145:HIS:CD2	1:A:266:GLU:HB3	2.57	0.40
1:B:195:TRP:CZ3	1:B:234:VAL:HG21	2.57	0.40

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 X-ray entries followed by that with respect to entries of similar resolution.

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	147/149 (99%)	138 (94%)	9 (6%)	0	100	100
1	B	147/149 (99%)	135 (92%)	11 (8%)	1 (1%)	22	57
All	All	294/298 (99%)	273 (93%)	20 (7%)	1 (0%)	41	73

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	187	GLU

### 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 X-ray entries followed by that with respect to entries of similar resolution.

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	120/120 (100%)	99 (82%)	21 (18%)	2	8
1	B	120/120 (100%)	100 (83%)	20 (17%)	2	9
All	All	240/240 (100%)	199 (83%)	41 (17%)	2	9

All (41) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	119	CYS
1	A	120	ILE
1	A	128	LYS
1	A	136	VAL
1	A	154	ASP
1	A	155	LEU
1	A	170	CYS
1	A	172	GLN
1	A	175	VAL
1	A	183	LYS
1	A	195	TRP
1	A	201	GLN
1	A	206	ARG
1	A	208	THR
1	A	224	PHE

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Mol	Chain	Res	Type
1	A	229	ARG
1	A	243	ARG
1	A	250	THR
1	A	257	THR
1	A	258	ARG
1	A	265	GLU
1	B	119	CYS
1	B	120	ILE
1	B	128	LYS
1	B	136	VAL
1	B	154	ASP
1	B	155	LEU
1	B	170	CYS
1	B	172	GLN
1	B	175	VAL
1	B	183	LYS
1	B	195	TRP
1	B	201	GLN
1	B	208	THR
1	B	224	PHE
1	B	229	ARG
1	B	243	ARG
1	B	250	THR
1	B	257	THR
1	B	258	ARG
1	B	265	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	172	GLN
1	A	197	HIS
1	A	226	ASN

### 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](#)

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.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	149/149 (100%)	-0.61	0 100 100	4, 20, 32, 38	2 (1%)
1	B	149/149 (100%)	-0.58	0 100 100	4, 19, 32, 41	2 (1%)
All	All	298/298 (100%)	-0.60	0 100 100	4, 19, 32, 41	4 (1%)

There are no RSRZ outliers to report.

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

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

### 6.3 Carbohydrates [i](#)

There are no monosaccharides in this entry.

### 6.4 Ligands [i](#)

There are no ligands in this entry.

### 6.5 Other polymers [i](#)

There are no such residues in this entry.