



wwPDB X-ray Structure Validation Summary Report ⓘ

Jan 16, 2017 – 05:10 PM EST

PDB ID : 5MQC
Title : Structure of black queen cell virus
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Deposited on : 2016-12-20
Resolution : 3.40 Å(reported)

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

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Mogul	:	unknown
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20028442
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20028442

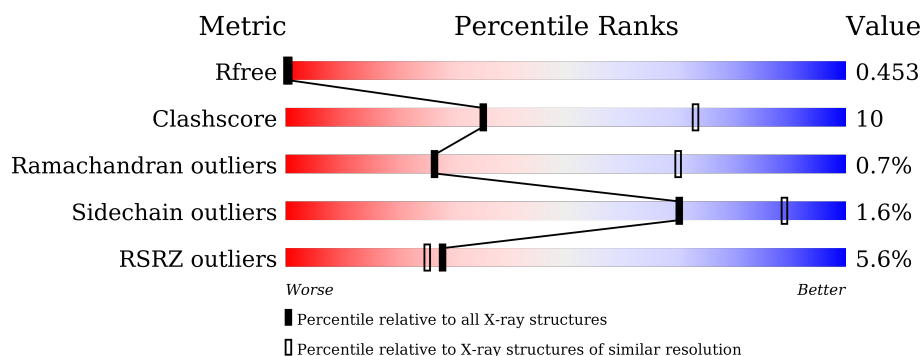
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.40 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))
R_{free}	91344	1476 (3.50-3.30)
Clashscore	102246	1611 (3.50-3.30)
Ramachandran outliers	100387	1571 (3.50-3.30)
Sidechain outliers	100360	1571 (3.50-3.30)
RSRZ outliers	91569	1485 (3.50-3.30)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	280	<div> <div>6%</div> <div>81%</div> <div>19%</div> </div>
2	C	267	<div> <div>6%</div> <div>66%</div> <div>31%</div> <div>.</div> </div>
3	B	231	<div> <div>5%</div> <div>71%</div> <div>27%</div> <div>.</div> </div>

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 6115 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 VP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	280	Total	C	N	O	S	0	0	0
			2199	1392	368	435	4			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	207	SER	THR	conflict	UNP Q9J7C2
A	208	ILE	VAL	conflict	UNP Q9J7C2

- Molecule 2 is a protein called VP3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	260	Total	C	N	O	S	0	0	0
			2066	1347	327	387	5			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	8	ALA	THR	conflict	UNP Q9J7C2
C	93	GLY	ALA	conflict	UNP Q9J7C2
C	104	ILE	LYS	conflict	UNP Q9J7C2
C	146	VAL	ILE	conflict	UNP Q9J7C2
C	156	THR	ALA	conflict	UNP Q9J7C2
C	157	GLY	ASN	conflict	UNP Q9J7C2
C	158	THR	SER	conflict	UNP Q9J7C2

- Molecule 3 is a protein called VP2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	B	231	Total	C	N	O	S	0	0	0
			1850	1186	307	347	10			

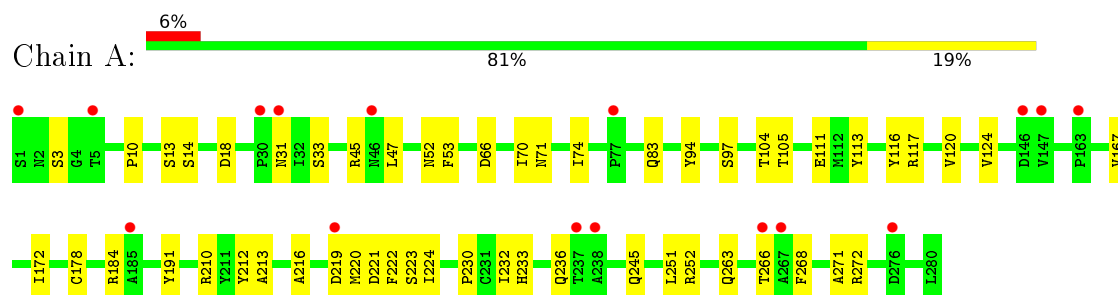
There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	40	SER	PRO	conflict	UNP Q9J7C2
B	43	PHE	TYR	conflict	UNP Q9J7C2
B	76	VAL	LEU	conflict	UNP Q9J7C2
B	210	PHE	TYR	conflict	UNP Q9J7C2

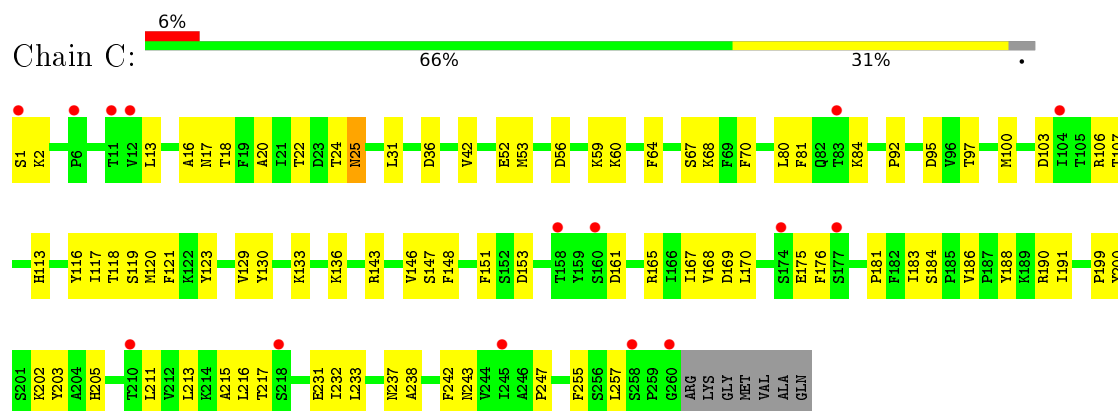
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ($\text{RSRZ} > 2$). 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.

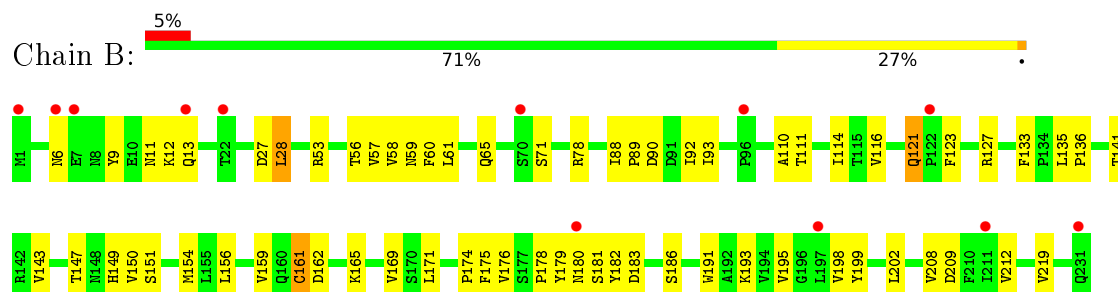
• Molecule 1: VP1



• Molecule 2: VP3



• Molecule 3: VP2



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	332.91Å 350.96Å 362.54Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.81 – 3.40 39.81 – 3.40	Depositor EDS
% Data completeness (in resolution range)	68.1 (39.81-3.40) 60.9 (39.81-3.40)	Depositor EDS
R_{merge}	0.21	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.34 (at 3.40Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.247 , (Not available) 0.460 , 0.453	Depositor DCC
R_{free} test set	1995 reflections (0.91%)	DCC
Wilson B-factor (Å ²)	67.8	Xtriage
Anisotropy	0.440	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , -29.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.000 for -h,-l,-k	Xtriage
F_o, F_c correlation	0.34	EDS
Total number of atoms	6115	wwPDB-VP
Average B, all atoms (Å ²)	46.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.26% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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	0.37	0/2250	0.53	0/3063
2	C	0.40	0/2128	0.54	0/2907
3	B	0.39	0/1897	0.55	0/2582
All	All	0.38	0/6275	0.54	0/8552

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	2199	0	2134	37	0
2	C	2066	0	2035	61	0
3	B	1850	0	1818	43	0
All	All	6115	0	5987	119	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 10.

The worst 5 of 119 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:222:PHE:H	2:C:53:MET:HE1	1.45	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:191:TYR:HE2	3:B:179:TYR:HE2	1.33	0.73
3:B:90:ASP:OD1	3:B:182:TYR:OH	2.06	0.72
1:A:52:ASN:ND2	1:A:105:THR:OG1	2.23	0.70
3:B:202:LEU:HD21	3:B:208:VAL:HG23	1.74	0.68

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	278/280 (99%)	263 (95%)	15 (5%)	0	100	100
2	C	258/267 (97%)	236 (92%)	19 (7%)	3 (1%)	16	59
3	B	229/231 (99%)	206 (90%)	21 (9%)	2 (1%)	21	65
All	All	765/778 (98%)	705 (92%)	55 (7%)	5 (1%)	26	70

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C	24	THR
2	C	36	ASP
3	B	28	LEU
2	C	92	PRO
3	B	12	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 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	243/244 (100%)	240 (99%)	3 (1%)	78	91
2	C	234/242 (97%)	230 (98%)	4 (2%)	68	88
3	B	211/211 (100%)	207 (98%)	4 (2%)	65	87
All	All	688/697 (99%)	677 (98%)	11 (2%)	70	89

5 of 11 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	22	THR
2	C	25	ASN
3	B	65	GLN
2	C	13	LEU
3	B	53	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	52	ASN
2	C	205	HIS
3	B	55	HIS
3	B	65	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 carbohydrates 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, 95th 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 ²)	Q<0.9
1	A	280/280 (100%)	0.99	16 (5%)	27 25	33, 48, 68, 87	0
2	C	260/267 (97%)	0.97	15 (5%)	26 24	29, 43, 57, 76	0
3	B	231/231 (100%)	0.92	12 (5%)	31 28	34, 44, 60, 110	0
All	All	771/778 (99%)	0.96	43 (5%)	28 25	29, 45, 64, 110	0

The worst 5 of 43 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	B	1	MET	9.6
2	C	260	GLY	7.4
1	A	267	ALA	3.2
1	A	219	ASP	3.1
1	A	30	PRO	3.1

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 carbohydrates 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.