



## wwPDB EM Validation Summary Report ⓘ

May 13, 2024 – 09:23 pm BST

PDB ID : 6S2C  
EMDB ID : EMD-10087  
Title : Acquired functional capsid structures in metazoan totivirus-like dsRNA virus.  
Authors : Okamoto, K.; Larsson, S.D.D.; Maia, R.N.C.F.; Murata, K.; Hajdu, J.;  
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Deposited on : 2019-06-20  
Resolution : 3.20 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](mailto: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>.

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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.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : **FAILED**  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

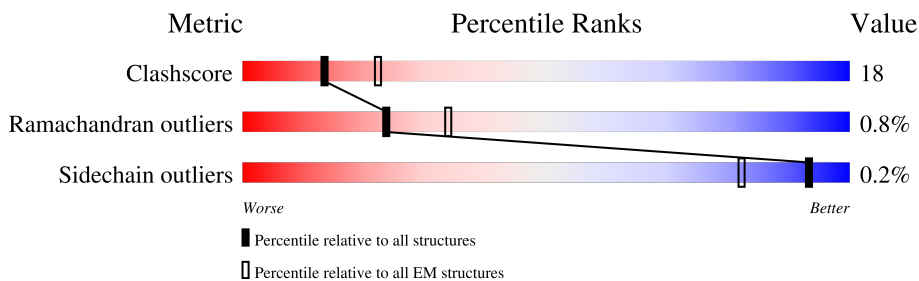
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.20 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	840	76% 22% ..
2	B	842	73% 25% ..

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 12716 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 Capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	830	6352	4027	1091	1205	29	0	0

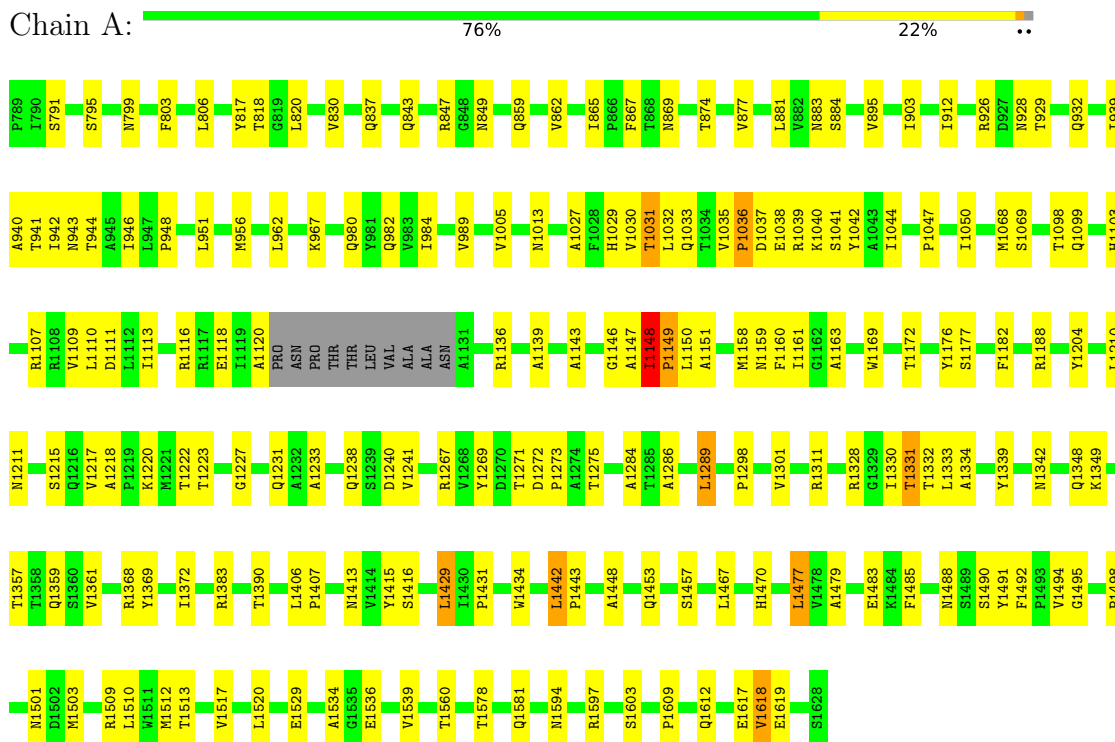
- Molecule 2 is a protein called Capsid protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	831	6364	4037	1093	1208	26	0	0

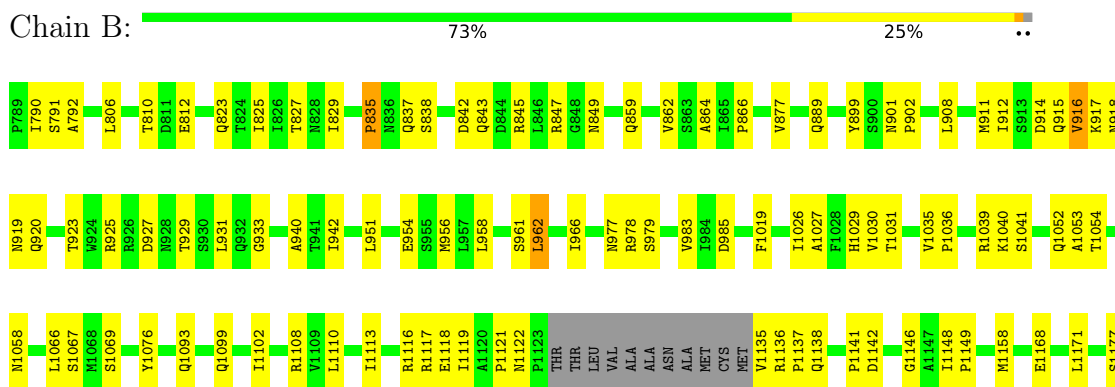
### 3 Residue-property plots

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. 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: Capsid protein



- Molecule 2: Capsid protein



W1178	W1335	Q1455	L1614
F1182	D1341	F1461	E1617
T1185	Q1348	H1470	A1621
R1188	R1352	N1476	F1622
Q1189	T1363	L1477	D1623
E1209	I1364	Y1478	T1625
L1210	A1367	A1479	T1626
N1211	A1373	E1483	F1630
L1214	V1373	S1489	
S1215	F1381	S1490	
K1220	H1382	Y1491	
M1221	R1383	P1498	
T1222	A1386	N1501	
T1223	T1390	N1507	
G1227	I1399	G1508	
A1233	T1400	R1509	
D1240	H1401	L1510	
L1246	F1402	W1511	
R1251	E1403	M1512	
F1256	R1404	T1513	
P1257	M1413	D1521	
Y1269	Y1414	P1532	
D1270	Y1415	V1539	
M1277	V1421	G1540	
K1278	V1422	K1541	
V1279	M1423	Q1542	
L1289	C1424	I1543	
V1289	F1425	E1549	
V1301	S1426	A1559	
R1305	P1427	Y1566	
F1308	L1428	R1571	
R1311	V1429	L1577	
M1323	I1430	T1578	
R1328	F1431	T1579	
G1329	D1432	A1580	
T1330	I1433	Q1581	
T1331	W1434	N1594	
T1332	C1435	L1601	
L1333	Q1436	N1604	
A1334	Y1437	Y1605	
	K1441	Y1606	
	L1442		
	P1443		
	A1448		
	Q1453		
	G1454		

## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, I	Depositor
Number of particles used	30363	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 ( $e^-/\text{\AA}^2$ )	20	Depositor
Minimum defocus (nm)	100	Depositor
Maximum defocus (nm)	225	Depositor
Magnification	59000	Depositor
Image detector	FEI FALCON II (4k x 4k)	Depositor

## 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	0.42	0/6505	0.69	10/8896 (0.1%)
2	B	0.42	0/6520	0.68	6/8920 (0.1%)
All	All	0.42	0/13025	0.69	16/17816 (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
2	B	0	2

There are no bond length outliers.

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	A	1477	LEU	CA-CB-CG	8.05	133.82	115.30
1	A	1429	LEU	CA-CB-CG	7.37	132.25	115.30
2	B	1432	ASP	N-CA-CB	-7.16	97.71	110.60
2	B	1510	LEU	CA-CB-CG	6.84	131.04	115.30
1	A	1510	LEU	CA-CB-CG	6.68	130.66	115.30

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	1035	VAL	Peptide
2	B	1256	PHE	Peptide

## 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	6352	0	6220	270	0
2	B	6364	0	6228	316	0
All	All	12716	0	12448	453	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 18.

The worst 5 of 453 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:944:THR:CG2	2:B:923:THR:HG21	1.18	1.65
1:A:1036:PRO:CG	1:A:1039:ARG:NH2	1.68	1.56
1:A:912:ILE:CD1	1:A:939:ILE:HG12	1.37	1.50
1:A:946:ILE:HD13	2:B:916:VAL:N	1.33	1.41
1:A:944:THR:HG21	2:B:923:THR:CG2	1.50	1.40

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 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	826/840 (98%)	714 (86%)	106 (13%)	6 (1%)	22	61
2	B	827/842 (98%)	689 (83%)	130 (16%)	8 (1%)	15	54
All	All	1653/1682 (98%)	1403 (85%)	236 (14%)	14 (1%)	24	58



5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1618	VAL
2	B	916	VAL
2	B	1040	LYS
1	A	1149	PRO
1	A	1331	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	A	675/683 (99%)	673 (100%)	2 (0%)	92	96
2	B	677/685 (99%)	676 (100%)	1 (0%)	93	98
All	All	1352/1368 (99%)	1349 (100%)	3 (0%)	93	98

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1148	ILE
1	A	1361	VAL
2	B	1429	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1507	ASN
2	B	919	ASN
2	B	1501	ASN
2	B	915	GLN
2	B	977	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 Map visualisation

This section contains visualisations of the EMDB entry EMD-10087. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

### 6.1 Orthogonal projections

This section was not generated.

### 6.2 Central slices

This section was not generated.

### 6.3 Largest variance slices

This section was not generated.

### 6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

### 6.5 Orthogonal surface views

This section was not generated.

### 6.6 Mask visualisation

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

## 7 Map analysis

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

### 7.1 Map-value distribution

This section was not generated.

### 7.2 Volume estimate versus contour level

This section was not generated.

### 7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

## 8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

## 9 Map-model fit

This section was not generated.