wwPDB X-ray Structure Validation Summary Report (i)

Oct 10, 2023 – 08:45 PM EDT

PDB ID	:	6WAR
Title	:	Crystal structure of the MERS-CoV RBD bound by the neutralizing single-domain antibody MERS VHH-55
Authors	:	Wrapp, D.; Torres, G.M.; McLellan, J.S.
Deposited on	:	2020-03-25
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
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

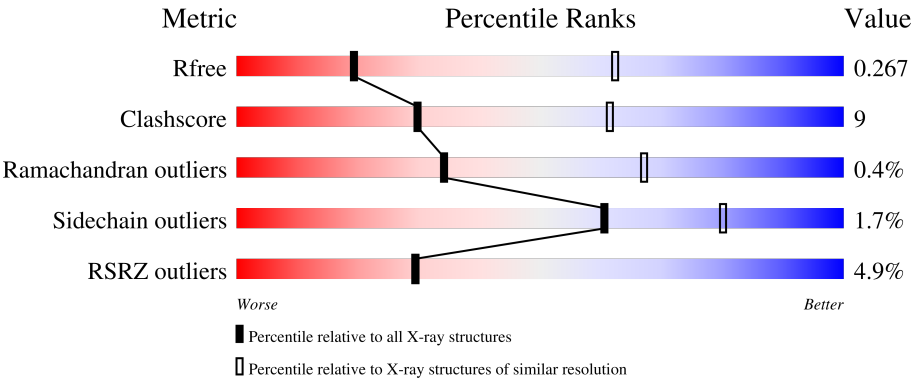
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35.1

1 Overall quality at a glance (i)

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}	130704	1026 (3.48-3.32)
Clashscore	141614	1055 (3.48-3.32)
Ramachandran outliers	138981	1038 (3.48-3.32)
Sidechain outliers	138945	1038 (3.48-3.32)
RSRZ outliers	127900	2173 (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 of the lower 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% 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	231	70% 21% 9%
1	C	231	74% 17% 9%
1	E	231	70% 21% 9%
1	G	231	65% 26% 9%
1	I	231	74% 17% 9%

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Mol	Chain	Length	Quality of chain
1	K	231	2% 70% 21% 9%
1	M	231	3% 75% 16% 9%
1	O	231	3% 78% 13% 9%
2	B	128	2% 67% 27% 5%
2	D	128	74% 22%
2	F	128	6% 76% 18% 6%
2	H	128	74% 18% 6%
2	J	128	5% 77% 16% 6%
2	L	128	20% 62% 24% 10%
2	N	128	20% 65% 26% 6%
2	P	128	17% 72% 22% 6%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 20212 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 Spike protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	211	Total	C	N	O	S	0	0	0
			1625	1036	258	320	11			
1	C	211	Total	C	N	O	S	0	0	0
			1625	1036	258	320	11			
1	E	211	Total	C	N	O	S	0	0	0
			1625	1036	258	320	11			
1	G	211	Total	C	N	O	S	0	0	0
			1629	1039	259	320	11			
1	I	211	Total	C	N	O	S	0	0	0
			1629	1039	259	320	11			
1	K	210	Total	C	N	O	S	0	0	0
			1621	1033	258	319	11			
1	M	211	Total	C	N	O	S	0	0	0
			1625	1036	258	320	11			
1	O	211	Total	C	N	O	S	0	0	0
			1629	1039	259	320	11			

There are 72 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	506	PHE	LEU	conflict	UNP A0A0U2MS80
A	590	GLY	-	expression tag	UNP A0A0U2MS80
A	591	SER	-	expression tag	UNP A0A0U2MS80
A	592	LEU	-	expression tag	UNP A0A0U2MS80
A	593	GLU	-	expression tag	UNP A0A0U2MS80
A	594	VAL	-	expression tag	UNP A0A0U2MS80
A	595	LEU	-	expression tag	UNP A0A0U2MS80
A	596	PHE	-	expression tag	UNP A0A0U2MS80
A	597	GLN	-	expression tag	UNP A0A0U2MS80
C	506	PHE	LEU	conflict	UNP A0A0U2MS80
C	590	GLY	-	expression tag	UNP A0A0U2MS80
C	591	SER	-	expression tag	UNP A0A0U2MS80
C	592	LEU	-	expression tag	UNP A0A0U2MS80

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Chain	Residue	Modelled	Actual	Comment	Reference
C	593	GLU	-	expression tag	UNP A0A0U2MS80
C	594	VAL	-	expression tag	UNP A0A0U2MS80
C	595	LEU	-	expression tag	UNP A0A0U2MS80
C	596	PHE	-	expression tag	UNP A0A0U2MS80
C	597	GLN	-	expression tag	UNP A0A0U2MS80
E	506	PHE	LEU	conflict	UNP A0A0U2MS80
E	590	GLY	-	expression tag	UNP A0A0U2MS80
E	591	SER	-	expression tag	UNP A0A0U2MS80
E	592	LEU	-	expression tag	UNP A0A0U2MS80
E	593	GLU	-	expression tag	UNP A0A0U2MS80
E	594	VAL	-	expression tag	UNP A0A0U2MS80
E	595	LEU	-	expression tag	UNP A0A0U2MS80
E	596	PHE	-	expression tag	UNP A0A0U2MS80
E	597	GLN	-	expression tag	UNP A0A0U2MS80
G	506	PHE	LEU	conflict	UNP A0A0U2MS80
G	590	GLY	-	expression tag	UNP A0A0U2MS80
G	591	SER	-	expression tag	UNP A0A0U2MS80
G	592	LEU	-	expression tag	UNP A0A0U2MS80
G	593	GLU	-	expression tag	UNP A0A0U2MS80
G	594	VAL	-	expression tag	UNP A0A0U2MS80
G	595	LEU	-	expression tag	UNP A0A0U2MS80
G	596	PHE	-	expression tag	UNP A0A0U2MS80
G	597	GLN	-	expression tag	UNP A0A0U2MS80
I	506	PHE	LEU	conflict	UNP A0A0U2MS80
I	590	GLY	-	expression tag	UNP A0A0U2MS80
I	591	SER	-	expression tag	UNP A0A0U2MS80
I	592	LEU	-	expression tag	UNP A0A0U2MS80
I	593	GLU	-	expression tag	UNP A0A0U2MS80
I	594	VAL	-	expression tag	UNP A0A0U2MS80
I	595	LEU	-	expression tag	UNP A0A0U2MS80
I	596	PHE	-	expression tag	UNP A0A0U2MS80
I	597	GLN	-	expression tag	UNP A0A0U2MS80
K	506	PHE	LEU	conflict	UNP A0A0U2MS80
K	590	GLY	-	expression tag	UNP A0A0U2MS80
K	591	SER	-	expression tag	UNP A0A0U2MS80
K	592	LEU	-	expression tag	UNP A0A0U2MS80
K	593	GLU	-	expression tag	UNP A0A0U2MS80
K	594	VAL	-	expression tag	UNP A0A0U2MS80
K	595	LEU	-	expression tag	UNP A0A0U2MS80
K	596	PHE	-	expression tag	UNP A0A0U2MS80
K	597	GLN	-	expression tag	UNP A0A0U2MS80
M	506	PHE	LEU	conflict	UNP A0A0U2MS80

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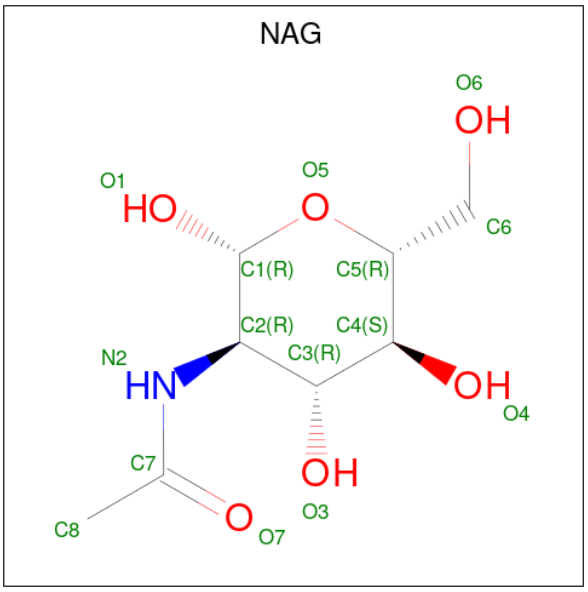
Chain	Residue	Modelled	Actual	Comment	Reference
M	590	GLY	-	expression tag	UNP A0A0U2MS80
M	591	SER	-	expression tag	UNP A0A0U2MS80
M	592	LEU	-	expression tag	UNP A0A0U2MS80
M	593	GLU	-	expression tag	UNP A0A0U2MS80
M	594	VAL	-	expression tag	UNP A0A0U2MS80
M	595	LEU	-	expression tag	UNP A0A0U2MS80
M	596	PHE	-	expression tag	UNP A0A0U2MS80
M	597	GLN	-	expression tag	UNP A0A0U2MS80
O	506	PHE	LEU	conflict	UNP A0A0U2MS80
O	590	GLY	-	expression tag	UNP A0A0U2MS80
O	591	SER	-	expression tag	UNP A0A0U2MS80
O	592	LEU	-	expression tag	UNP A0A0U2MS80
O	593	GLU	-	expression tag	UNP A0A0U2MS80
O	594	VAL	-	expression tag	UNP A0A0U2MS80
O	595	LEU	-	expression tag	UNP A0A0U2MS80
O	596	PHE	-	expression tag	UNP A0A0U2MS80
O	597	GLN	-	expression tag	UNP A0A0U2MS80

- Molecule 2 is a protein called nanobody MERS VHH-55.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	121	Total	C	N	O	S	0	0	0
			901	559	159	179	4			
2	D	124	Total	C	N	O	S	0	0	0
			925	575	162	184	4			
2	F	120	Total	C	N	O	S	0	0	0
			895	556	158	177	4			
2	H	120	Total	C	N	O	S	0	0	0
			895	556	158	177	4			
2	J	120	Total	C	N	O	S	0	0	0
			895	556	158	177	4			
2	L	115	Total	C	N	O	S	0	0	0
			861	535	151	171	4			
2	N	120	Total	C	N	O	S	0	0	0
			895	556	158	177	4			
2	P	120	Total	C	N	O	S	0	0	0
			895	556	158	177	4			

- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



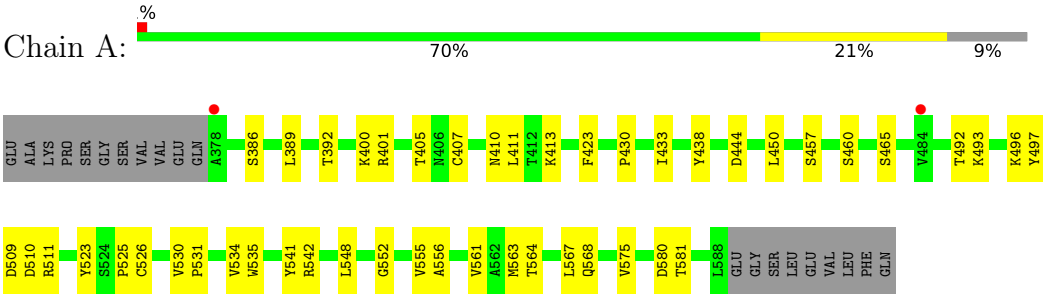
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	E	1	Total C N O 14 8 1 5	0	0
3	G	1	Total C N O 14 8 1 5	0	0
3	O	1	Total C N O 14 8 1 5	0	0

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.

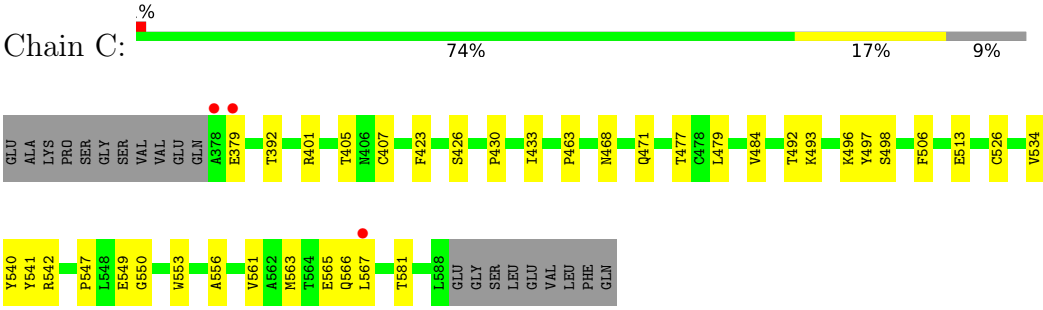
• Molecule 1: Spike protein

Chain A:



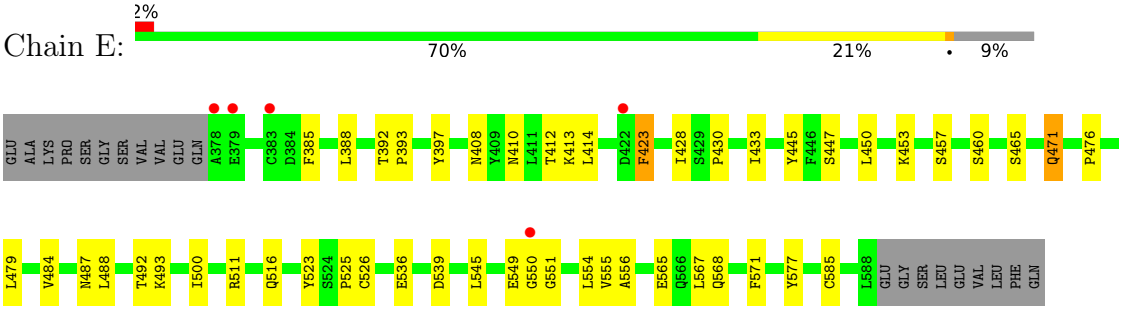
• Molecule 1: Spike protein

Chain C:



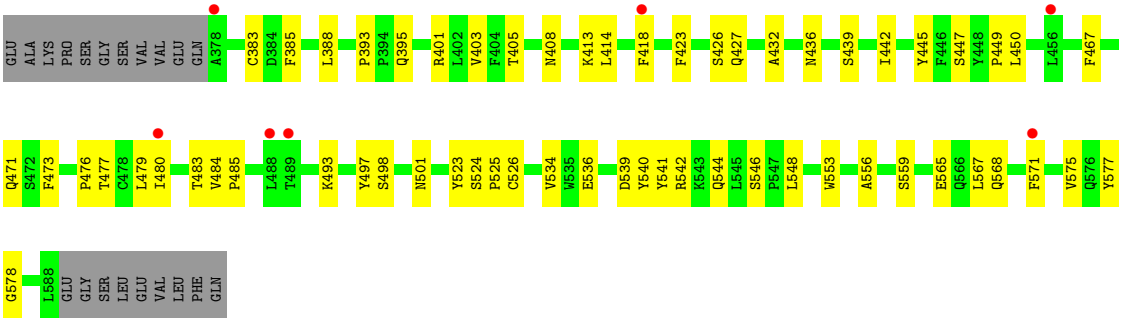
• Molecule 1: Spike protein

Chain E:



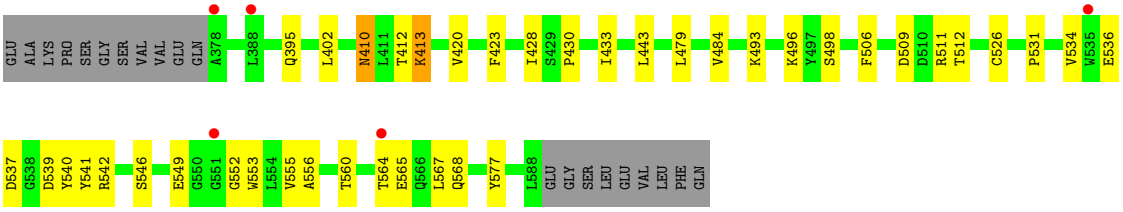
• Molecule 1: Spike protein

Chain G:



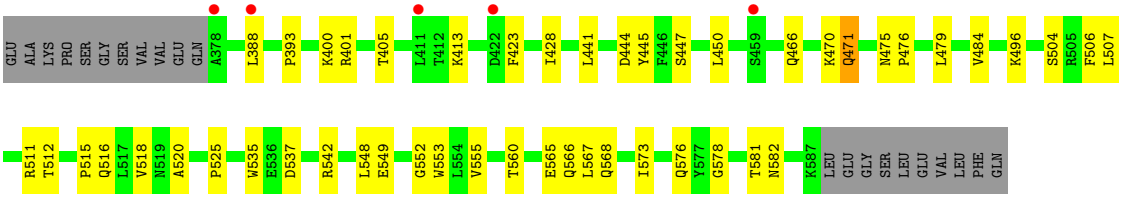
• Molecule 1: Spike protein

Chain I:



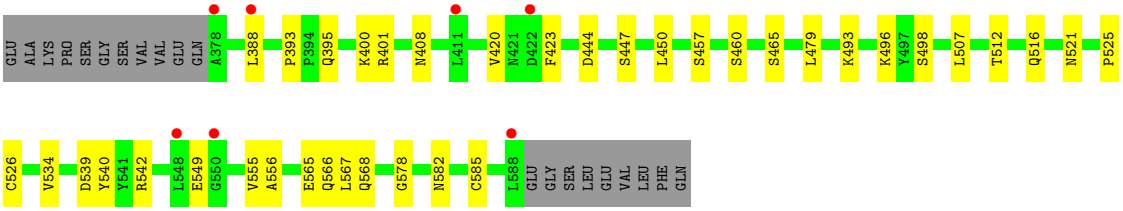
• Molecule 1: Spike protein

Chain K:



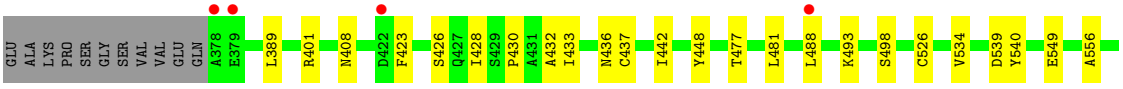
• Molecule 1: Spike protein

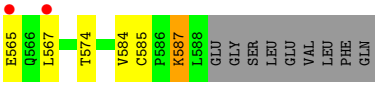
Chain M:



• Molecule 1: Spike protein

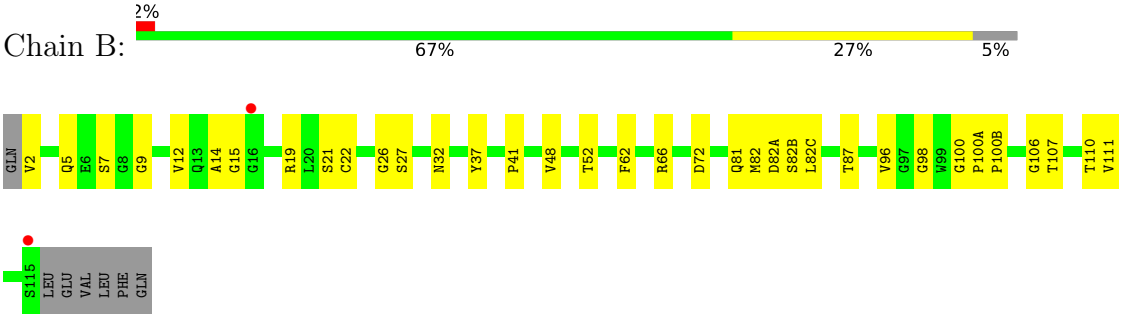
Chain O:





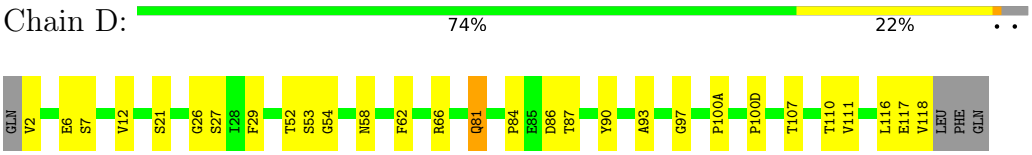
• Molecule 2: nanobody MERS VHH-55

Chain B:



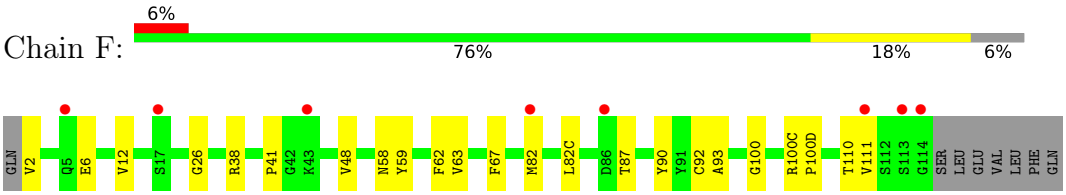
• Molecule 2: nanobody MERS VHH-55

Chain D:



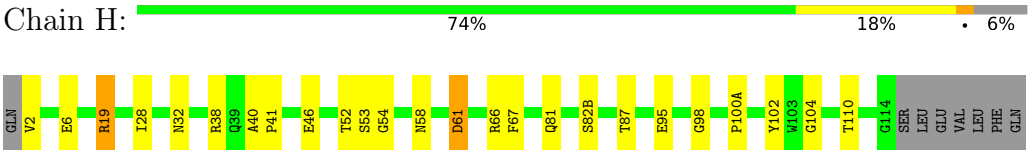
• Molecule 2: nanobody MERS VHH-55

Chain F:



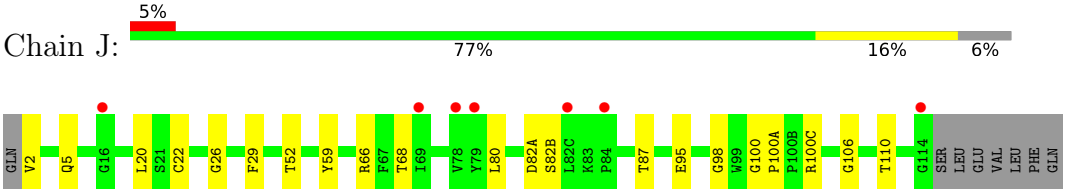
• Molecule 2: nanobody MERS VHH-55

Chain H:



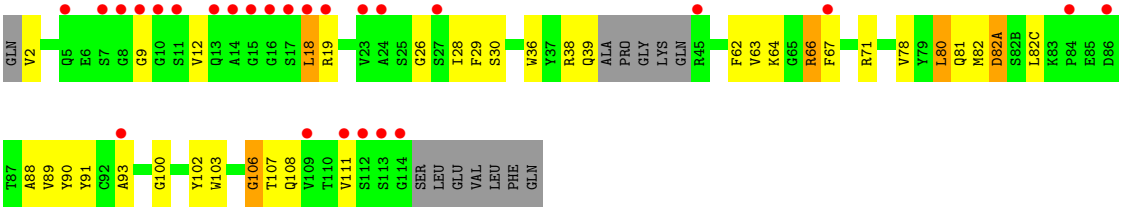
• Molecule 2: nanobody MERS VHH-55

Chain J:

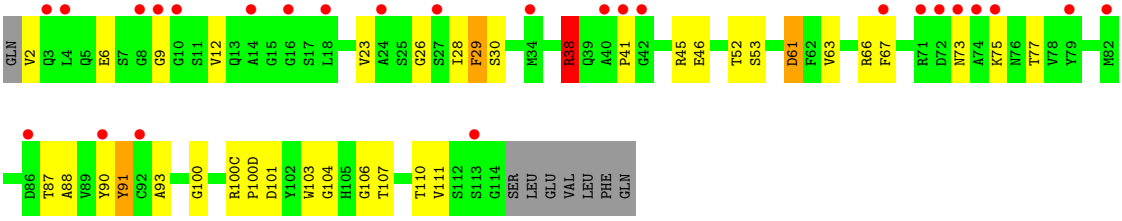


• Molecule 2: nanobody MERS VHH-55

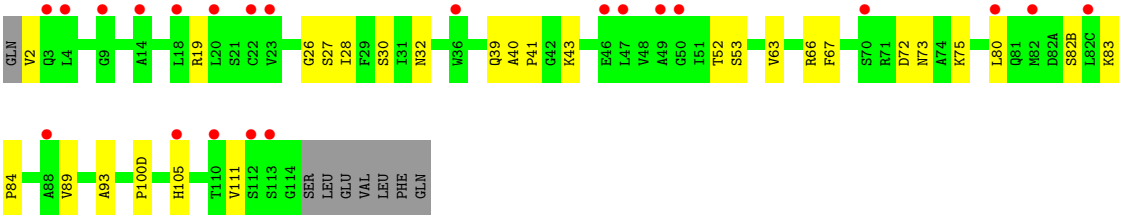
Chain L:



• Molecule 2: nanobody MERS VHH-55



• Molecule 2: nanobody MERS VHH-55



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, α, β, γ	150.05Å 283.38Å 173.76Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	54.90 – 3.40 54.90 – 3.40	Depositor EDS
% Data completeness (in resolution range)	93.2 (54.90-3.40) 93.2 (54.90-3.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.52 (at 3.40Å)	Xtriage
Refinement program	PHENIX dev_3758	Depositor
R, R_{free}	0.214 , 0.268 0.214 , 0.267	Depositor DCC
R_{free} test set	2474 reflections (5.19%)	wwPDB-VP
Wilson B-factor (Å^2)	71.4	Xtriage
Anisotropy	0.291	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 54.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.44$, $< L^2 > = 0.27$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.88	EDS
Total number of atoms	20212	wwPDB-VP
Average B, all atoms (Å^2)	84.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.06% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG

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	0.44	1/1665 (0.1%)	0.65	0/2274
1	C	0.44	1/1665 (0.1%)	0.64	0/2274
1	E	0.43	0/1665	0.65	0/2274
1	G	0.39	0/1669	0.62	0/2278
1	I	0.44	0/1669	0.65	0/2278
1	K	0.41	0/1661	0.62	0/2267
1	M	0.41	0/1665	0.60	0/2274
1	O	0.36	0/1669	0.61	0/2278
2	B	0.43	0/921	0.68	0/1248
2	D	0.40	0/945	0.67	0/1281
2	F	0.41	0/915	0.71	0/1240
2	H	0.45	0/915	0.67	0/1240
2	J	0.35	0/915	0.60	0/1240
2	L	0.52	0/879	0.70	0/1190
2	N	0.35	0/915	0.64	1/1240 (0.1%)
2	P	0.33	0/915	0.57	0/1240
All	All	0.41	2/20648 (0.0%)	0.64	1/28116 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	407	CYS	CB-SG	-5.49	1.72	1.81
1	A	407	CYS	CB-SG	-5.35	1.73	1.81

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	N	38	ARG	NE-CZ-NH1	-5.64	117.48	120.30

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	1625	0	1575	35	0
1	C	1625	0	1575	31	0
1	E	1625	0	1574	34	0
1	G	1629	0	1585	46	0
1	I	1629	0	1586	27	0
1	K	1621	0	1575	36	0
1	M	1625	0	1575	29	0
1	O	1629	0	1581	19	0
2	B	901	0	854	20	1
2	D	925	0	880	21	1
2	F	895	0	849	13	0
2	H	895	0	849	17	0
2	J	895	0	849	16	1
2	L	861	0	811	40	0
2	N	895	0	849	32	0
2	P	895	0	849	15	1
3	E	14	0	13	0	0
3	G	14	0	13	2	0
3	O	14	0	12	1	0
All	All	20212	0	19454	374	2

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 9.

The worst 5 of 374 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:L:12:VAL:HG21	2:L:18:LEU:CD2	1.49	1.41
2:L:12:VAL:CG2	2:L:18:LEU:HD23	1.70	1.19
2:L:12:VAL:CG2	2:L:18:LEU:CD2	2.26	1.12
2:L:36:TRP:CG	2:L:80:LEU:HD23	1.91	1.05
2:N:91:TYR:HD1	2:N:106:GLY:HA3	1.25	1.01

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:7:SER:OG	2:J:5:GLN:NE2[6_445]	2.10	0.10
2:B:14:ALA:O	2:P:105:HIS:NE2[4_555]	2.16	0.04

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	209/231 (90%)	202 (97%)	7 (3%)	0	100	100
1	C	209/231 (90%)	204 (98%)	5 (2%)	0	100	100
1	E	209/231 (90%)	203 (97%)	6 (3%)	0	100	100
1	G	209/231 (90%)	205 (98%)	4 (2%)	0	100	100
1	I	209/231 (90%)	202 (97%)	7 (3%)	0	100	100
1	K	208/231 (90%)	202 (97%)	6 (3%)	0	100	100
1	M	209/231 (90%)	204 (98%)	5 (2%)	0	100	100
1	O	209/231 (90%)	201 (96%)	7 (3%)	1 (0%)	29	61
2	B	119/128 (93%)	117 (98%)	0	2 (2%)	9	34
2	D	122/128 (95%)	116 (95%)	5 (4%)	1 (1%)	19	51
2	F	118/128 (92%)	116 (98%)	1 (1%)	1 (1%)	19	51
2	H	118/128 (92%)	117 (99%)	1 (1%)	0	100	100
2	J	118/128 (92%)	113 (96%)	4 (3%)	1 (1%)	19	51
2	L	111/128 (87%)	106 (96%)	3 (3%)	2 (2%)	8	32
2	N	118/128 (92%)	114 (97%)	3 (2%)	1 (1%)	19	51
2	P	118/128 (92%)	115 (98%)	2 (2%)	1 (1%)	19	51
All	All	2613/2872 (91%)	2537 (97%)	66 (2%)	10 (0%)	34	67

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	L	106	GLY
2	J	106	GLY
1	O	587	LYS
2	B	41	PRO
2	L	62	PHE

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	190/208 (91%)	189 (100%)	1 (0%)	88 94
1	C	190/208 (91%)	189 (100%)	1 (0%)	88 94
1	E	190/208 (91%)	186 (98%)	4 (2%)	53 76
1	G	191/208 (92%)	190 (100%)	1 (0%)	88 94
1	I	191/208 (92%)	186 (97%)	5 (3%)	46 72
1	K	190/208 (91%)	188 (99%)	2 (1%)	73 86
1	M	190/208 (91%)	188 (99%)	2 (1%)	73 86
1	O	191/208 (92%)	190 (100%)	1 (0%)	88 94
2	B	94/101 (93%)	93 (99%)	1 (1%)	73 86
2	D	97/101 (96%)	96 (99%)	1 (1%)	76 88
2	F	93/101 (92%)	91 (98%)	2 (2%)	52 75
2	H	93/101 (92%)	90 (97%)	3 (3%)	39 67
2	J	93/101 (92%)	93 (100%)	0	100 100
2	L	90/101 (89%)	84 (93%)	6 (7%)	16 46
2	N	93/101 (92%)	87 (94%)	6 (6%)	17 46
2	P	93/101 (92%)	90 (97%)	3 (3%)	39 67
All	All	2269/2472 (92%)	2230 (98%)	39 (2%)	60 80

5 of 39 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	M	423	PHE

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Mol	Chain	Res	Type
1	O	423	PHE
2	N	29	PHE
2	N	73	ASN
2	P	73	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
2	B	44	GLN
1	C	516	GLN
1	I	410	ASN
1	K	421	ASN
2	L	81	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 monosaccharides in this entry.

5.6 Ligand geometry (i)

3 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
3	NAG	G	601	1	14,14,15	0.71	1 (7%)	17,19,21	0.75	1 (5%)
3	NAG	E	601	1	14,14,15	0.38	0	17,19,21	0.49	0
3	NAG	O	601	1	14,14,15	0.58	0	17,19,21	0.74	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	G	601	1	-	3/6/23/26	0/1/1/1
3	NAG	E	601	1	-	3/6/23/26	0/1/1/1
3	NAG	O	601	1	-	4/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	G	601	NAG	C1-C2	2.17	1.55	1.52

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	G	601	NAG	C1-O5-C5	2.45	115.51	112.19

There are no chirality outliers.

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	601	NAG	C8-C7-N2-C2
3	E	601	NAG	O7-C7-N2-C2
3	O	601	NAG	C8-C7-N2-C2
3	O	601	NAG	O7-C7-N2-C2
3	O	601	NAG	O5-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	G	601	NAG	2	0
3	O	601	NAG	1	0

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

6.1 Protein, DNA and RNA chains

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^{th} 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	211/231 (91%)	0.10	2 (0%) 84 83	26, 55, 107, 186	0
1	C	211/231 (91%)	-0.01	3 (1%) 75 74	28, 57, 106, 165	0
1	E	211/231 (91%)	0.04	5 (2%) 59 57	28, 59, 109, 193	0
1	G	211/231 (91%)	0.31	7 (3%) 46 45	43, 76, 127, 166	0
1	I	211/231 (91%)	0.12	5 (2%) 59 57	36, 60, 108, 196	0
1	K	210/231 (90%)	0.08	5 (2%) 59 57	38, 74, 130, 203	0
1	M	211/231 (91%)	0.20	7 (3%) 46 45	45, 78, 136, 172	0
1	O	211/231 (91%)	0.31	6 (2%) 53 51	56, 89, 140, 216	0
2	B	121/128 (94%)	-0.03	2 (1%) 70 68	32, 68, 115, 170	0
2	D	124/128 (96%)	0.14	0 100 100	48, 73, 121, 168	0
2	F	120/128 (93%)	0.44	8 (6%) 17 19	59, 111, 188, 238	0
2	H	120/128 (93%)	-0.11	0 100 100	37, 60, 96, 130	0
2	J	120/128 (93%)	0.50	7 (5%) 23 24	55, 102, 146, 177	0
2	L	115/128 (89%)	1.12	26 (22%) 0 1	79, 134, 206, 219	0
2	N	120/128 (93%)	1.18	26 (21%) 0 1	97, 145, 192, 238	0
2	P	120/128 (93%)	1.12	22 (18%) 1 1	76, 124, 166, 197	0
All	All	2647/2872 (92%)	0.29	131 (4%) 29 29	26, 77, 157, 238	0

The worst 5 of 131 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	378	ALA	9.9
2	F	114	GLY	8.2
1	I	378	ALA	8.0
1	E	378	ALA	7.8
2	L	109	VAL	5.1

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 monosaccharides in this entry.

6.4 Ligands (i)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	NAG	O	601	14/15	0.78	0.33	138,148,154,156	0
3	NAG	G	601	14/15	0.86	0.19	87,96,105,105	0
3	NAG	E	601	14/15	0.86	0.23	85,100,112,115	0

6.5 Other polymers (i)

There are no such residues in this entry.