



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 15, 2017 – 02:01 am GMT

PDB ID : 4A8J  
Title : Crystal Structure of the Elongator subcomplex Elp456  
Authors : Glatt, S.; Mueller, C.W.  
Deposited on : 2011-11-21  
Resolution : 2.10 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](mailto: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.

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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)	:	1.9-1692
EDS	:	trunk28620
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
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)	:	recalc28949

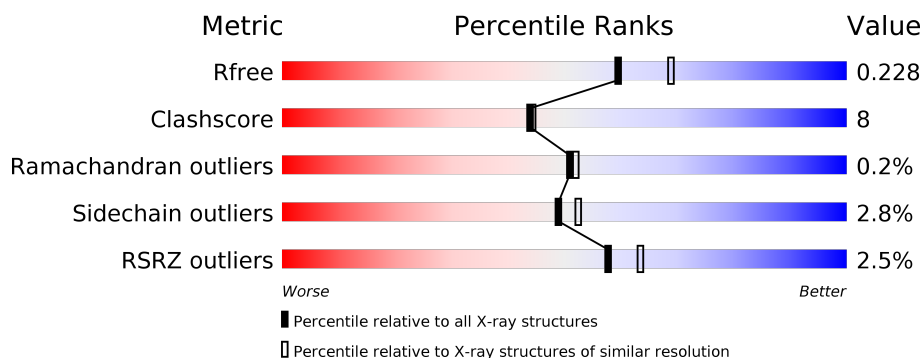
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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))
$R_{free}$	100719	4243 (2.10-2.10)
Clashscore	112137	4788 (2.10-2.10)
Ramachandran outliers	110173	4740 (2.10-2.10)
Sidechain outliers	110143	4741 (2.10-2.10)
RSRZ outliers	101464	4275 (2.10-2.10)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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	361	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 9%, green 90%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>67%</span> <span>9%</span> <span>•</span> <span>23%</span> </div> </div>
1	D	361	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 2%, orange 2%, yellow 8%, green 88%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>2%</span> <span>69%</span> <span>8%</span> <span>•</span> <span>22%</span> </div> </div>
2	B	270	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 4%, orange 4%, yellow 18%, green 74%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>4%</span> <span>62%</span> <span>18%</span> <span>•</span> <span>19%</span> </div> </div>
2	E	270	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 4%, orange 4%, yellow 20%, green 76%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>4%</span> <span>60%</span> <span>20%</span> <span>•</span> <span>18%</span> </div> </div>
3	C	280	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 14%, green 84%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>80%</span> <span>14%</span> <span>6%</span> </div> </div>
3	F	280	<div> <div style="width: 100%; height: 10px; background: linear-gradient(to right, red 1%, orange 1%, yellow 12%, green 86%, grey 0%);"></div> <div style="display: flex; justify-content: space-between; width: 100%;"> <span>%</span> <span>81%</span> <span>12%</span> <span>•</span> <span>6%</span> </div> </div>

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 13005 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 ELONGATOR COMPLEX PROTEIN 4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	277	Total	C	N	O	Se	26	0	0
			2203	1419	376	399	9			
1	D	280	Total	C	N	O	Se	34	0	0
			2222	1432	379	402	9			

- Molecule 2 is a protein called ELONGATOR COMPLEX PROTEIN 5.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	220	Total	C	N	O	S Se	28	0	0
			1781	1143	290	341	3 4			
2	E	221	Total	C	N	O	S Se	30	0	0
			1787	1146	291	343	3 4			

- Molecule 3 is a protein called ELONGATOR COMPLEX PROTEIN 6.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	263	Total	C	N	O	S Se	25	0	0
			2080	1324	352	397	4 3			
3	F	262	Total	C	N	O	S Se	14	0	0
			2070	1319	350	394	4 3			

There are 14 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-6	MSE	-	EXPRESSION TAG	UNP Q04868
C	-5	HIS	-	EXPRESSION TAG	UNP Q04868
C	-4	HIS	-	EXPRESSION TAG	UNP Q04868
C	-3	HIS	-	EXPRESSION TAG	UNP Q04868
C	-2	HIS	-	EXPRESSION TAG	UNP Q04868
C	-1	HIS	-	EXPRESSION TAG	UNP Q04868
C	0	HIS	-	EXPRESSION TAG	UNP Q04868
F	-6	MSE	-	EXPRESSION TAG	UNP Q04868

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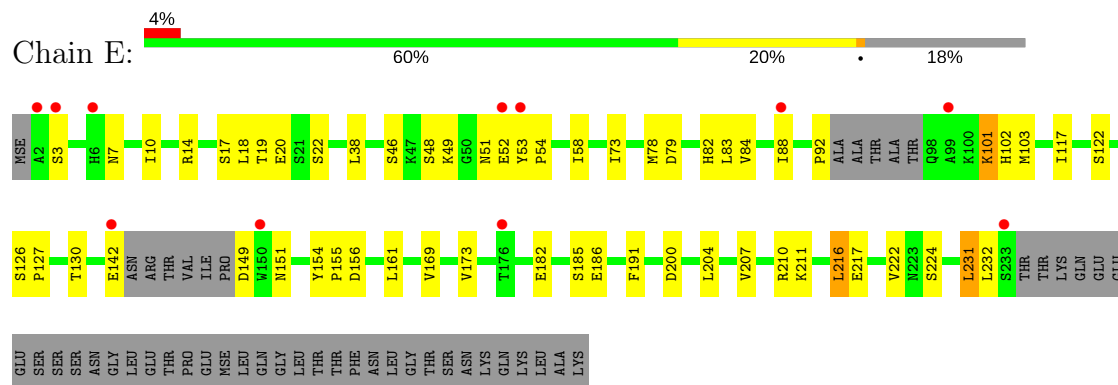
Chain	Residue	Modelled	Actual	Comment	Reference
F	-5	HIS	-	EXPRESSION TAG	UNP Q04868
F	-4	HIS	-	EXPRESSION TAG	UNP Q04868
F	-3	HIS	-	EXPRESSION TAG	UNP Q04868
F	-2	HIS	-	EXPRESSION TAG	UNP Q04868
F	-1	HIS	-	EXPRESSION TAG	UNP Q04868
F	0	HIS	-	EXPRESSION TAG	UNP Q04868

- Molecule 4 is water.

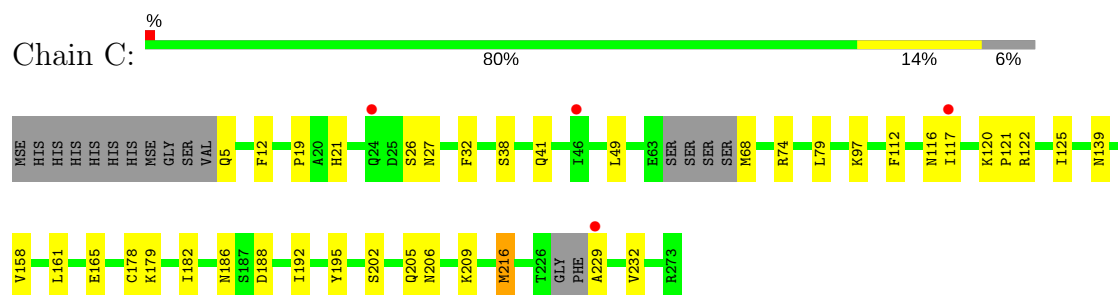
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	213	Total O 213 213	0	0
4	B	113	Total O 113 113	0	0
4	C	131	Total O 131 131	0	0
4	D	187	Total O 187 187	0	0
4	E	96	Total O 96 96	0	0
4	F	122	Total O 122 122	0	0



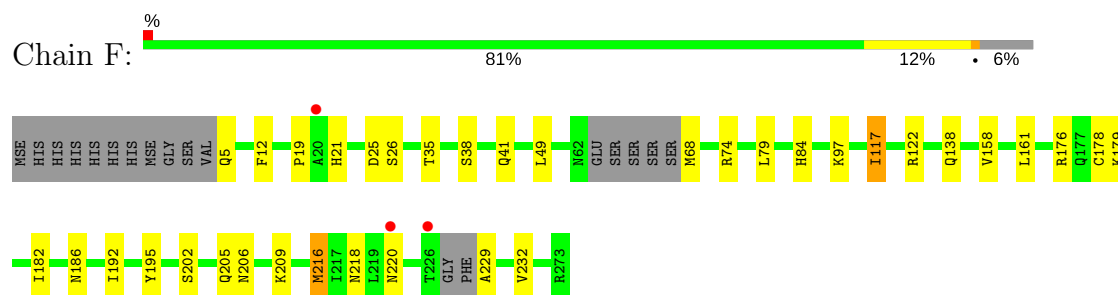
• Molecule 2: ELONGATOR COMPLEX PROTEIN 5



• Molecule 3: ELONGATOR COMPLEX PROTEIN 6



• Molecule 3: ELONGATOR COMPLEX PROTEIN 6



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	105.73Å 124.89Å 146.42Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.20 – 2.10 46.20 – 2.10	Depositor EDS
% Data completeness (in resolution range)	98.8 (46.20-2.10) 99.0 (46.20-2.10)	Depositor EDS
$R_{merge}$	0.13	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.27 (at 2.10Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, $R_{free}$	0.201 , 0.231 0.196 , 0.228	Depositor DCC
$R_{free}$ test set	5598 reflections (5.00%)	DCC
Wilson B-factor (Å <sup>2</sup> )	30.5	Xtriage
Anisotropy	0.754	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 61.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	13005	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 48.52 % 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 8.5003e-05. 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	0.46	0/2243	0.58	0/3022
1	D	0.46	0/2263	0.58	0/3050
2	B	0.43	0/1812	0.56	1/2451 (0.0%)
2	E	0.42	0/1818	0.55	0/2459
3	C	0.48	1/2120 (0.0%)	0.59	0/2878
3	F	0.50	1/2110 (0.0%)	0.60	0/2865
All	All	0.46	2/12366 (0.0%)	0.58	1/16725 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	178	CYS	CB-SG	-5.45	1.73	1.81
3	F	178	CYS	CB-SG	-5.19	1.73	1.81

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	211	LYS	CD-CE-NZ	5.70	124.80	111.70

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	2203	0	2255	27	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	D	2222	0	2276	22	0
2	B	1781	0	1775	34	0
2	E	1787	0	1780	45	0
3	C	2080	0	2056	30	0
3	F	2070	0	2051	28	0
4	A	213	0	0	8	0
4	B	113	0	0	3	0
4	C	131	0	0	4	0
4	D	187	0	0	4	0
4	E	96	0	0	5	0
4	F	122	0	0	5	0
All	All	13005	0	12193	181	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 8.

The worst 5 of 181 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:D:240:GLN:OE1	1:D:410:LYS:HE3	1.56	1.06
1:A:240:GLN:OE1	1:A:410:LYS:HE3	1.55	1.04
2:E:54:PRO:HG2	2:E:102:HIS:ND1	1.74	1.03
3:F:35:THR:OG1	3:F:220:ASN:ND2	1.99	0.94
2:E:92:PRO:HD3	2:E:102:HIS:CD2	2.04	0.92

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

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	271/361 (75%)	260 (96%)	11 (4%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	D	274/361 (76%)	263 (96%)	11 (4%)	0	100	100
2	B	214/270 (79%)	207 (97%)	7 (3%)	0	100	100
2	E	215/270 (80%)	208 (97%)	7 (3%)	0	100	100
3	C	257/280 (92%)	245 (95%)	11 (4%)	1 (0%)	38	35
3	F	256/280 (91%)	246 (96%)	8 (3%)	2 (1%)	22	17
All	All	1487/1822 (82%)	1429 (96%)	55 (4%)	3 (0%)	51	52

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	F	195	TYR
3	C	195	TYR
3	F	117	ILE

### 5.3.2 Protein sidechains ⓘ

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	250/315 (79%)	244 (98%)	6 (2%)	54	59
1	D	252/315 (80%)	247 (98%)	5 (2%)	60	66
2	B	207/246 (84%)	198 (96%)	9 (4%)	33	32
2	E	208/246 (85%)	198 (95%)	10 (5%)	30	27
3	C	244/257 (95%)	239 (98%)	5 (2%)	60	66
3	F	243/257 (95%)	238 (98%)	5 (2%)	59	64
All	All	1404/1636 (86%)	1364 (97%)	40 (3%)	49	52

5 of 40 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	C	97	LYS
1	D	240	GLN
3	F	74	ARG

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Mol	Chain	Res	Type
1	D	70	SER
1	D	248	MSE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
3	F	220	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 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, 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	268/361 (74%)	-0.39	2 (0%) 87 89	20, 33, 56, 88	8 (2%)
1	D	271/361 (75%)	-0.30	7 (2%) 56 62	21, 35, 61, 106	12 (4%)
2	B	216/270 (80%)	-0.04	10 (4%) 33 39	27, 43, 75, 124	9 (4%)
2	E	217/270 (80%)	0.04	11 (5%) 29 35	27, 44, 80, 144	9 (4%)
3	C	260/280 (92%)	-0.10	4 (1%) 74 77	22, 35, 75, 190	7 (2%)
3	F	259/280 (92%)	-0.08	3 (1%) 79 82	22, 34, 76, 208	7 (2%)
All	All	1491/1822 (81%)	-0.16	37 (2%) 58 63	20, 36, 73, 208	52 (3%)

The worst 5 of 37 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	E	142	GLU	7.6
1	D	419	PRO	5.1
2	B	6	HIS	5.1
2	B	142	GLU	5.1
1	D	418	ILE	4.0

### 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.