



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 14, 2017 – 10:23 am GMT

PDB ID : 4TTX  
Title : N-terminal domain of C. Reinhardtii SAS-6 homolog bld12p variant G94C K146C (NN19)  
Authors : Hilbert, M.; Kraatz, S.H.W.  
Deposited on : 2014-06-23  
Resolution : 2.50 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

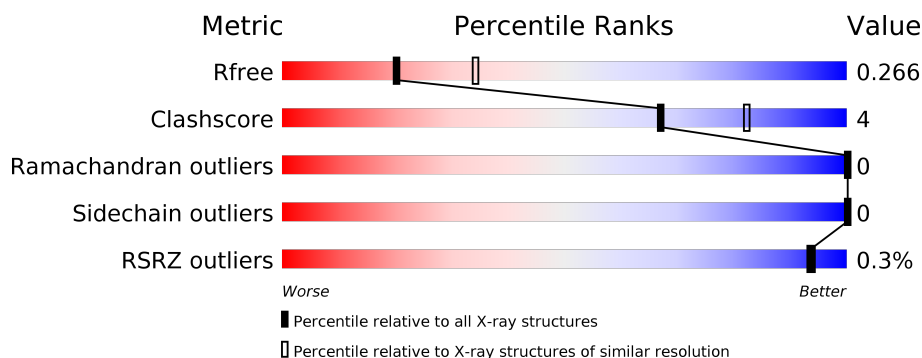
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	3846 (2.50-2.50)
Clashscore	112137	4554 (2.50-2.50)
Ramachandran outliers	110173	4463 (2.50-2.50)
Sidechain outliers	110143	4465 (2.50-2.50)
RSRZ outliers	101464	3876 (2.50-2.50)

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	161	<div> <div></div> <div>80%10%10%</div> </div>
1	B	161	<div> <div>%</div> <div>83%6%11%</div> </div>
1	C	161	<div> <div></div> <div>81%9%10%</div> </div>
1	D	161	<div> <div>%</div> <div>74%14%12%</div> </div>
1	E	161	<div> <div></div> <div>84%6%10%</div> </div>
1	F	161	<div> <div></div> <div>79%11%11%</div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 7710 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 Centriole protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	145	Total	C	N	O	S	0	0	0
			1163	746	199	215	3			
1	B	144	Total	C	N	O	S	0	0	0
			1154	742	197	212	3			
1	C	145	Total	C	N	O	S	0	0	0
			1163	746	199	215	3			
1	D	141	Total	C	N	O	S	0	0	0
			1132	725	195	209	3			
1	E	145	Total	C	N	O	S	0	0	0
			1163	746	199	215	3			
1	F	144	Total	C	N	O	S	0	0	0
			1159	744	198	214	3			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP A9CQL4
A	0	SER	-	expression tag	UNP A9CQL4
A	94	CYS	GLY	engineered mutation	UNP A9CQL4
A	146	CYS	LYS	engineered mutation	UNP A9CQL4
B	-1	GLY	-	expression tag	UNP A9CQL4
B	0	SER	-	expression tag	UNP A9CQL4
B	94	CYS	GLY	engineered mutation	UNP A9CQL4
B	146	CYS	LYS	engineered mutation	UNP A9CQL4
C	-1	GLY	-	expression tag	UNP A9CQL4
C	0	SER	-	expression tag	UNP A9CQL4
C	94	CYS	GLY	engineered mutation	UNP A9CQL4
C	146	CYS	LYS	engineered mutation	UNP A9CQL4
D	-1	GLY	-	expression tag	UNP A9CQL4
D	0	SER	-	expression tag	UNP A9CQL4
D	94	CYS	GLY	engineered mutation	UNP A9CQL4
D	146	CYS	LYS	engineered mutation	UNP A9CQL4
E	-1	GLY	-	expression tag	UNP A9CQL4

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Chain	Residue	Modelled	Actual	Comment	Reference
E	0	SER	-	expression tag	UNP A9CQL4
E	94	CYS	GLY	engineered mutation	UNP A9CQL4
E	146	CYS	LYS	engineered mutation	UNP A9CQL4
F	-1	GLY	-	expression tag	UNP A9CQL4
F	0	SER	-	expression tag	UNP A9CQL4
F	94	CYS	GLY	engineered mutation	UNP A9CQL4
F	146	CYS	LYS	engineered mutation	UNP A9CQL4


- Molecule 2 is water.

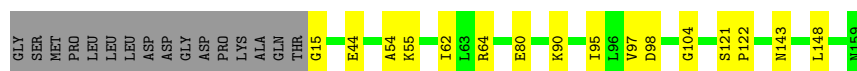
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	99	Total O 99 99	0	0
2	B	109	Total O 109 109	0	0
2	C	143	Total O 143 143	0	0
2	D	137	Total O 137 137	0	0
2	E	153	Total O 153 153	0	0
2	F	135	Total O 135 135	0	0

### 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 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.

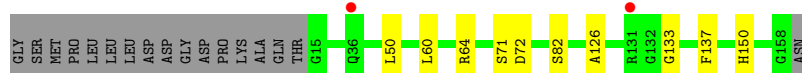
- Molecule 1: Centriole protein

Chain A: 




- Molecule 1: Centriole protein

Chain B: 



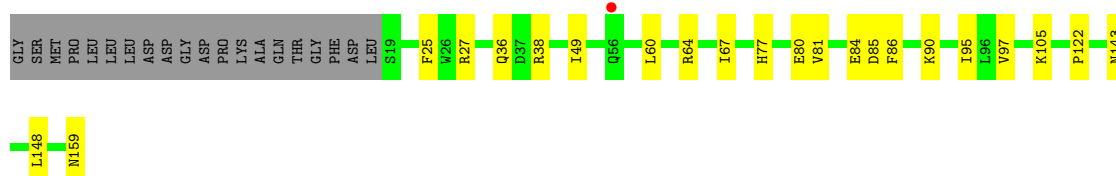
- Molecule 1: Centriole protein

Chain C: 




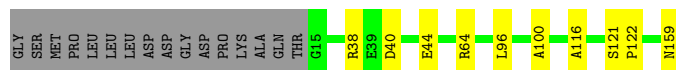
- Molecule 1: Centriole protein

Chain D: 



- Molecule 1: Centriole protein

Chain E: 



- Molecule 1: Centriole protein

Chain F: 

79%

11%

11%

GLY	SER	PRO	LEU	LEU	LEU	ASP	ASP	GLY	ASP	PRO	LYS	ALA	GLN	THR	GLY	F16	T23	Q35	R38	I62	L63	R64	D72	E80	V81	S82	K90	C94	I95	G119	D120	S121	K138	C146	N159
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## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	87.59Å 95.55Å 91.43Å 90.00° 112.61° 90.00°	Depositor
Resolution (Å)	63.26 – 2.50 84.40 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.7 (63.26-2.50) 99.7 (84.40-2.50)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.01 (at 2.48Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.4_1496)	Depositor
R, $R_{free}$	0.216 , 0.266 0.216 , 0.266	Depositor DCC
$R_{free}$ test set	2416 reflections (5.01%)	DCC
Wilson B-factor (Å <sup>2</sup> )	41.3	Xtriage
Anisotropy	0.456	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 33.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.066 for l,-k,h	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	7710	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.83% of the height of the origin peak. No significant pseudotranslation is detected.*

<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	0.21	0/1188	0.35	0/1609
1	B	0.21	0/1179	0.36	0/1598
1	C	0.21	0/1188	0.35	0/1609
1	D	0.21	0/1156	0.37	0/1566
1	E	0.21	0/1188	0.35	0/1609
1	F	0.21	0/1184	0.34	0/1604
All	All	0.21	0/7083	0.35	0/9595

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	1163	0	1163	11	0
1	B	1154	0	1157	8	0
1	C	1163	0	1163	13	0
1	D	1132	0	1136	17	0
1	E	1163	0	1163	9	0
1	F	1159	0	1160	13	0
2	A	99	0	0	3	0
2	B	109	0	0	2	0
2	C	143	0	0	4	0
2	D	137	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	E	153	0	0	5	1
2	F	135	0	0	6	1
All	All	7710	0	6942	62	1

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 4.

The worst 5 of 62 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:E:116:ALA:O	2:E:331:HOH:O	1.84	0.95
1:E:100:ALA:O	2:E:201:HOH:O	2.02	0.78
1:D:38:ARG:HH21	1:F:94:CYS:HA	1.52	0.73
1:F:16:PHE:N	2:F:259:HOH:O	2.22	0.72
1:E:38:ARG:NH1	2:E:329:HOH:O	2.22	0.71

All (1) 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:E:214:HOH:O	2:F:208:HOH:O[2_756]	2.08	0.12

## 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	143/161 (89%)	137 (96%)	6 (4%)	0	100	100
1	B	142/161 (88%)	133 (94%)	9 (6%)	0	100	100
1	C	143/161 (89%)	140 (98%)	3 (2%)	0	100	100
1	D	139/161 (86%)	131 (94%)	8 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	143/161 (89%)	138 (96%)	5 (4%)	0	100	100
1	F	142/161 (88%)	133 (94%)	9 (6%)	0	100	100
All	All	852/966 (88%)	812 (95%)	40 (5%)	0	100	100

There are no Ramachandran outliers to report.

### 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	132/145 (91%)	132 (100%)	0	100	100
1	B	131/145 (90%)	131 (100%)	0	100	100
1	C	132/145 (91%)	132 (100%)	0	100	100
1	D	129/145 (89%)	129 (100%)	0	100	100
1	E	132/145 (91%)	132 (100%)	0	100	100
1	F	132/145 (91%)	132 (100%)	0	100	100
All	All	788/870 (91%)	788 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 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	145/161 (90%)	-0.23	0 <span>100</span> <span>100</span>	27, 44, 78, 100	0
1	B	144/161 (89%)	-0.02	2 (1%) <span>75</span> <span>76</span>	31, 51, 94, 112	0
1	C	145/161 (90%)	-0.12	0 <span>100</span> <span>100</span>	30, 44, 79, 100	0
1	D	141/161 (87%)	-0.10	1 (0%) <span>87</span> <span>88</span>	28, 46, 84, 112	0
1	E	145/161 (90%)	-0.25	0 <span>100</span> <span>100</span>	26, 42, 74, 100	0
1	F	144/161 (89%)	-0.29	0 <span>100</span> <span>100</span>	25, 42, 78, 98	0
All	All	864/966 (89%)	-0.17	3 (0%) <span>93</span> <span>94</span>	25, 45, 83, 112	0

All (3) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	36	GLN	4.6
1	D	56	GLN	3.3
1	B	131	ARG	2.3

### 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.