



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 02:45 pm GMT

PDB ID : 2JGN  
Title : DDX3 helicase domain  
Authors : Rodamilans, B.; Montoya, G.  
Deposited on : 2007-02-13  
Resolution : 1.91 Å(reported)

This is a Full wwPDB X-ray Structure Validation 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

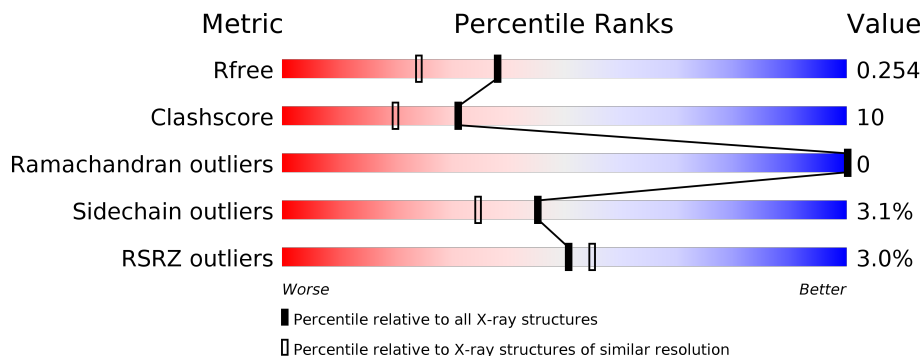
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 1.91 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	6276 (1.94-1.90)
Clashscore	112137	7025 (1.94-1.90)
Ramachandran outliers	110173	6947 (1.94-1.90)
Sidechain outliers	110143	6948 (1.94-1.90)
RSRZ outliers	101464	6332 (1.94-1.90)

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	185	<div> <div>3%</div> <div> <div></div> <div>63%</div> <div>17%</div> <div>•</div> <div>18%</div> </div> </div>
1	B	185	<div> <div>3%</div> <div> <div></div> <div>71%</div> <div>16%</div> <div></div> <div>13%</div> </div> </div>
1	C	185	<div> <div>2%</div> <div> <div></div> <div>70%</div> <div>15%</div> <div>••</div> <div>15%</div> </div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 3920 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 ATP-DEPENDENT RNA HELICASE DDX3X.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	151	Total	C	N	O	S	0	0	0
			1205	764	202	237	2			
1	B	161	Total	C	N	O	S	0	0	0
			1274	801	221	250	2			
1	C	158	Total	C	N	O	S	0	0	0
			1248	786	217	243	2			

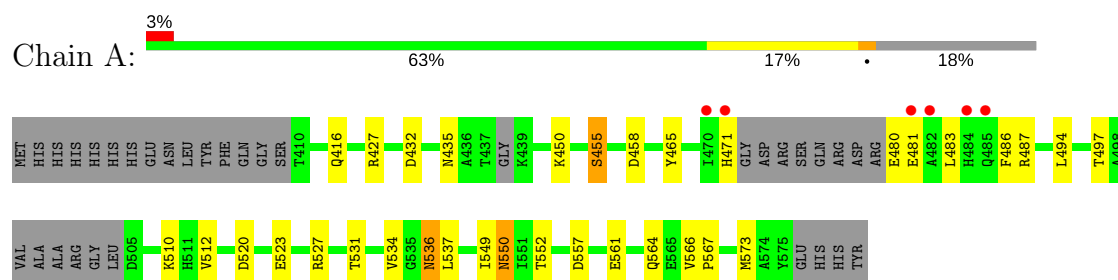
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	50	Total	O	0	0
			50	50		
2	B	63	Total	O	0	0
			63	63		
2	C	80	Total	O	0	0
			80	80		

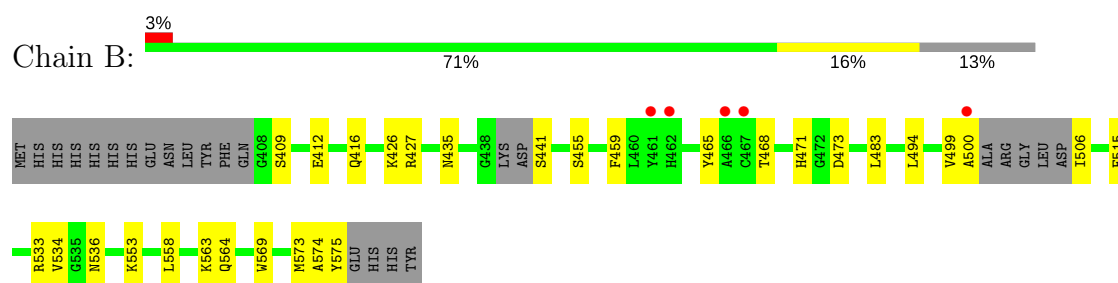
### 3 Residue-property plots

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.

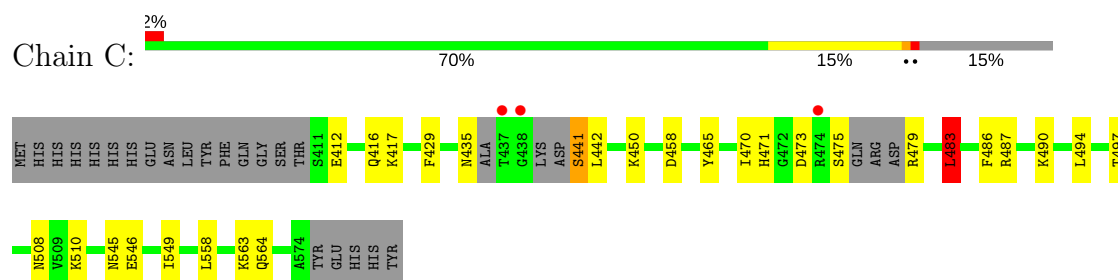
#### • Molecule 1: ATP-DEPENDENT RNA HELICASE DDX3X



#### • Molecule 1: ATP-DEPENDENT RNA HELICASE DDX3X



#### • Molecule 1: ATP-DEPENDENT RNA HELICASE DDX3X



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	44.44Å 61.03Å 89.11Å 90.00° 101.67° 90.00°	Depositor
Resolution (Å)	34.50 – 1.91 36.14 – 1.91	Depositor EDS
% Data completeness (in resolution range)	93.0 (34.50-1.91) 92.9 (36.14-1.91)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.93 (at 1.91Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.198 , 0.255 0.198 , 0.254	Depositor DCC
$R_{free}$ test set	1697 reflections (5.26%)	DCC
Wilson B-factor (Å <sup>2</sup> )	28.1	Xtriage
Anisotropy	0.043	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 46.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.019 for h,-k,-h-l	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	3920	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.94% 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	0.85	0/1224	0.80	0/1654
1	B	0.89	0/1294	0.82	0/1748
1	C	0.97	0/1266	0.88	1/1708 (0.1%)
All	All	0.90	0/3784	0.83	1/5110 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	C	483	LEU	CA-CB-CG	6.69	130.68	115.30

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	1205	0	1183	25	0
1	B	1274	0	1251	31	0
1	C	1248	0	1232	24	0
2	A	50	0	0	3	0
2	B	63	0	0	8	1
2	C	80	0	0	8	0
All	All	3920	0	3666	76	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 10.

All (76) 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:C:441:SER:HB2	1:C:510:LYS:HD2	1.23	1.18
1:C:412:GLU:HG2	2:C:2068:HOH:O	1.47	1.13
1:C:508:ASN:HB2	2:C:2044:HOH:O	1.62	0.99
1:C:450:LYS:HD3	1:C:497:THR:HG21	1.42	0.97
1:A:450:LYS:HD2	1:A:471:HIS:HB2	1.60	0.84
1:C:441:SER:HB2	1:C:510:LYS:CD	2.07	0.83
1:B:412:GLU:HG3	2:B:2004:HOH:O	1.79	0.82
1:C:508:ASN:OD1	2:C:2043:HOH:O	1.96	0.82
2:A:2043:HOH:O	1:B:536:ASN:HB2	1.83	0.78
1:B:471:HIS:HD2	1:B:473:ASP:H	1.31	0.74
1:C:508:ASN:ND2	2:C:2042:HOH:O	2.20	0.74
1:A:510:LYS:NZ	2:A:2026:HOH:O	2.19	0.73
1:C:471:HIS:HD2	1:C:473:ASP:H	1.36	0.73
1:A:483:LEU:O	1:A:487:ARG:HG2	1.89	0.71
1:A:432:ASP:HB3	1:B:534:VAL:HG21	1.74	0.70
1:B:569:TRP:O	1:B:573:MET:HG3	1.90	0.70
1:B:574:ALA:O	1:B:575:TYR:HB2	1.91	0.70
1:B:499:VAL:O	1:B:500:ALA:CB	2.40	0.70
1:A:561:GLU:HG3	2:A:2042:HOH:O	1.92	0.68
1:B:553:LYS:HE3	2:B:2020:HOH:O	1.95	0.67
1:A:573:MET:HG3	1:B:563:LYS:HD3	1.79	0.65
1:B:553:LYS:HB3	2:B:2053:HOH:O	1.96	0.65
1:A:450:LYS:HD3	1:A:497:THR:HG21	1.80	0.64
1:B:416:GLN:H	1:B:564:GLN:NE2	1.97	0.62
1:B:553:LYS:HG3	2:B:2020:HOH:O	1.99	0.62
1:B:435:ASN:ND2	1:B:465:TYR:OH	2.36	0.59
1:C:435:ASN:OD1	1:C:465:TYR:OH	2.21	0.59
1:A:536:ASN:OD1	1:A:536:ASN:C	2.42	0.58
1:C:563:LYS:NZ	2:C:2068:HOH:O	2.37	0.58
1:C:412:GLU:CG	2:C:2068:HOH:O	2.23	0.57
1:A:480:GLU:HG3	1:A:481:GLU:N	2.21	0.56
1:C:416:GLN:H	1:C:564:GLN:NE2	2.04	0.55
1:A:416:GLN:H	1:A:564:GLN:NE2	2.04	0.55
1:B:499:VAL:HG13	2:B:2026:HOH:O	2.07	0.54
1:C:470:ILE:HD11	1:C:483:LEU:HD13	1.91	0.53
1:A:534:VAL:HG13	1:C:429:PHE:CE2	2.43	0.53
1:C:479:ARG:O	1:C:483:LEU:HD22	2.08	0.53
1:B:416:GLN:H	1:B:564:GLN:HE21	1.58	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:480:GLU:HG3	1:A:481:GLU:H	1.75	0.52
1:A:550:ASN:H	1:A:550:ASN:ND2	2.08	0.51
1:A:427:ARG:NH2	1:A:455:SER:OG	2.43	0.51
1:B:427:ARG:NH2	1:B:455:SER:OG	2.36	0.51
1:B:536:ASN:C	1:B:536:ASN:OD1	2.50	0.50
1:C:416:GLN:H	1:C:564:GLN:HE21	1.59	0.50
1:B:499:VAL:O	1:B:500:ALA:HB3	2.13	0.49
1:B:499:VAL:O	1:B:500:ALA:HB2	2.13	0.48
1:A:549:ILE:HD12	1:A:552:THR:OG1	2.14	0.47
1:B:412:GLU:CG	2:B:2004:HOH:O	2.48	0.47
1:B:533:ARG:CZ	2:B:2038:HOH:O	2.65	0.45
1:B:553:LYS:CG	2:B:2020:HOH:O	2.59	0.45
1:A:480:GLU:CG	1:A:481:GLU:H	2.29	0.44
1:B:483:LEU:HD11	1:B:506:ILE:HD11	1.99	0.44
1:B:426:LYS:HB3	1:B:515:PHE:CZ	2.52	0.44
1:B:427:ARG:NH1	1:B:459:PHE:HB2	2.32	0.44
1:B:574:ALA:O	1:B:575:TYR:CB	2.63	0.44
1:B:409:SER:HB3	1:B:412:GLU:HG2	1.99	0.44
1:A:480:GLU:CG	1:A:481:GLU:N	2.81	0.43
1:C:546:GLU:O	1:C:549:ILE:HG13	2.18	0.43
1:B:468:THR:HG23	1:B:494:LEU:HD13	2.01	0.42
1:C:486:PHE:CD1	1:C:494:LEU:HB2	2.54	0.42
1:A:573:MET:HG3	1:B:563:LYS:CD	2.49	0.42
1:A:523:GLU:O	1:A:527:ARG:HG3	2.20	0.42
1:B:558:LEU:C	1:B:558:LEU:HD23	2.40	0.41
1:A:450:LYS:HB3	1:A:471:HIS:CD2	2.56	0.41
1:C:545:ASN:HB2	2:C:2006:HOH:O	2.19	0.41
1:B:468:THR:HG23	1:B:494:LEU:CD1	2.50	0.41
1:C:450:LYS:HD2	1:C:471:HIS:HB2	2.02	0.41
1:A:566:VAL:HA	1:A:567:PRO:HD3	1.79	0.41
1:C:475:SER:C	1:C:479:ARG:HB2	2.41	0.40
1:A:557:ASP:O	1:A:561:GLU:HG2	2.21	0.40
1:C:558:LEU:HD23	1:C:558:LEU:C	2.41	0.40
1:A:486:PHE:CD2	1:A:494:LEU:HD12	2.57	0.40
1:A:512:VAL:HG23	1:A:531:THR:HB	2.04	0.40
1:A:435:ASN:ND2	1:A:465:TYR:OH	2.55	0.40
1:C:417:LYS:HD2	2:C:2071:HOH:O	2.22	0.40
1:C:508:ASN:CG	1:C:508:ASN:O	2.60	0.40

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:B:2001:HOH:O	2:B:2026:HOH:O[2_546]	2.05	0.15

## 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	143/185 (77%)	142 (99%)	1 (1%)	0	100	100
1	B	155/185 (84%)	155 (100%)	0	0	100	100
1	C	150/185 (81%)	149 (99%)	1 (1%)	0	100	100
All	All	448/555 (81%)	446 (100%)	2 (0%)	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	135/163 (83%)	129 (96%)	6 (4%)	33	20
1	B	141/163 (86%)	140 (99%)	1 (1%)	87	86
1	C	138/163 (85%)	132 (96%)	6 (4%)	33	21
All	All	414/489 (85%)	401 (97%)	13 (3%)	45	35

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	455	SER
1	A	458	ASP
1	A	520	ASP
1	A	536	ASN
1	A	537	LEU
1	A	550	ASN
1	B	441	SER
1	C	441	SER
1	C	442	LEU
1	C	458	ASP
1	C	483	LEU
1	C	487	ARG
1	C	490	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	435	ASN
1	A	462	HIS
1	A	471	HIS
1	A	485	GLN
1	A	564	GLN
1	B	435	ASN
1	B	471	HIS
1	B	485	GLN
1	B	564	GLN
1	C	462	HIS
1	C	471	HIS
1	C	485	GLN
1	C	508	ASN
1	C	536	ASN
1	C	564	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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 ⓘ

### 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<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	151/185 (81%)	0.19	6 (3%)	39 43	21, 28, 39, 44	0
1	B	161/185 (87%)	0.26	5 (3%)	49 54	20, 26, 37, 50	0
1	C	158/185 (85%)	0.06	3 (1%)	67 71	14, 21, 35, 51	0
All	All	470/555 (84%)	0.17	14 (2%)	51 55	14, 25, 38, 51	0

All (14) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	482	ALA	6.6
1	B	461	TYR	5.0
1	B	467	CYS	3.4
1	C	474	ARG	3.4
1	A	471	HIS	3.1
1	A	481	GLU	2.7
1	A	485	GLN	2.6
1	A	470	ILE	2.6
1	B	500	ALA	2.6
1	A	484	HIS	2.5
1	B	462	HIS	2.5
1	B	466	ALA	2.4
1	C	438	GLY	2.3
1	C	437	THR	2.3

### 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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.