



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 12, 2026 – 02:02 PM UTC

PDB ID : 1E9S / pdb_00001e9s
Title : Bacterial conjugative coupling protein TrwBdeltaN70. Unbound monoclinic form.
Authors : Gomis-Rueth, F.X.; Moncalian, G.; Cabezon, E.; de la Cruz, F.; Coll, M.
Deposited on : 2000-10-26
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

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

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>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

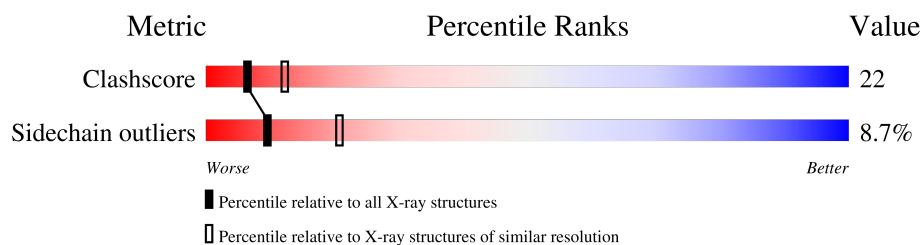
1 Overall quality at a glance

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))
Clashscore	190562	6492 (2.50-2.50)
Sidechain outliers	187428	6380 (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 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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	437	 63% 30% 5% .
1	B	437	 62% 29% 6% .
1	D	437	 59% 31% 5% 5%
1	E	437	 61% 30% 5% .
1	F	437	 61% 32% 5% .
1	G	437	 54% 38% 5% .
1	H	437	 55% 37% 5% .
1	I	437	 57% 35% . .
1	J	437	 56% 35% 5% .

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	K	437	54%38%
1	L	437	51%41%5%
1	M	437	56%35%5%

2 Entry composition [i](#)

There are 2 unique types of molecules in this entry. The entry contains 41513 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 CONJUGAL TRANSFER PROTEIN TRWB.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	427	Total	C	N	O	S	0	0	0
			3353	2118	602	623	10			
1	B	422	Total	C	N	O	S	0	0	0
			3318	2097	596	615	10			
1	D	417	Total	C	N	O	S	0	0	0
			3279	2075	586	608	10			
1	E	425	Total	C	N	O	S	0	0	0
			3340	2110	600	620	10			
1	F	427	Total	C	N	O	S	0	0	0
			3348	2114	602	622	10			
1	G	427	Total	C	N	O	S	0	0	0
			3352	2116	603	623	10			
1	H	424	Total	C	N	O	S	0	0	0
			3329	2103	598	618	10			
1	I	424	Total	C	N	O	S	0	0	0
			3328	2102	598	618	10			
1	J	424	Total	C	N	O	S	0	0	0
			3328	2102	598	618	10			
1	K	422	Total	C	N	O	S	0	0	0
			3316	2096	595	615	10			
1	L	426	Total	C	N	O	S	0	0	0
			3344	2112	601	621	10			
1	M	425	Total	C	N	O	S	0	0	0
			3332	2104	599	619	10			

- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	157	Total	O	0	0
			157	157		
2	B	135	Total	O	0	0
			135	135		

Continued on next page...

Continued from previous page...

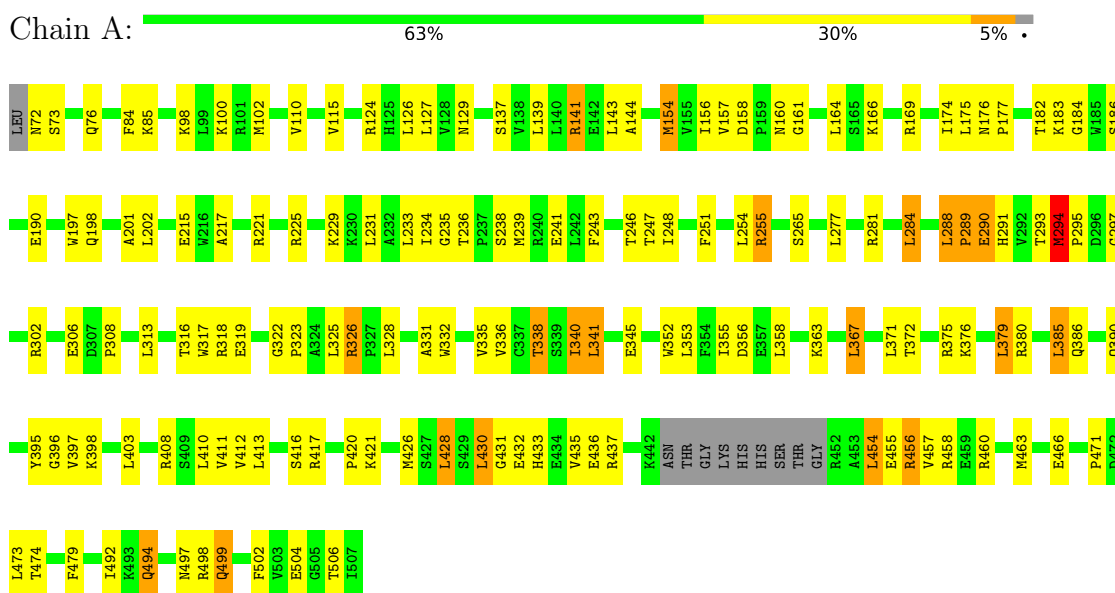
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	D	139	Total 139	O 139	0	0
2	E	133	Total 133	O 133	0	0
2	F	193	Total 193	O 193	0	0
2	G	167	Total 167	O 167	0	0
2	H	124	Total 124	O 124	0	0
2	I	113	Total 113	O 113	0	0
2	J	102	Total 102	O 102	0	0
2	K	84	Total 84	O 84	0	0
2	L	86	Total 86	O 86	0	0
2	M	113	Total 113	O 113	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.

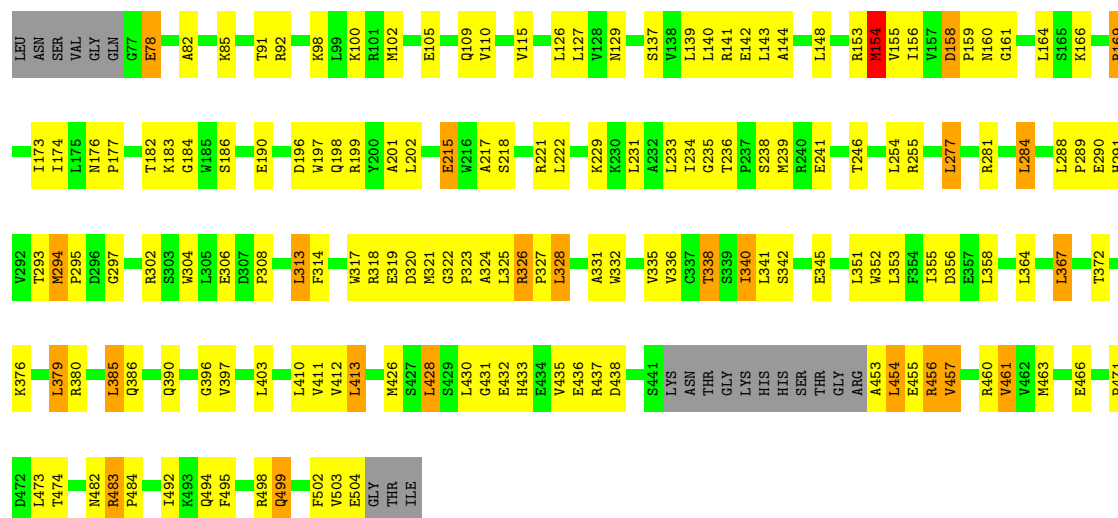
Note EDS was not executed.

• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB



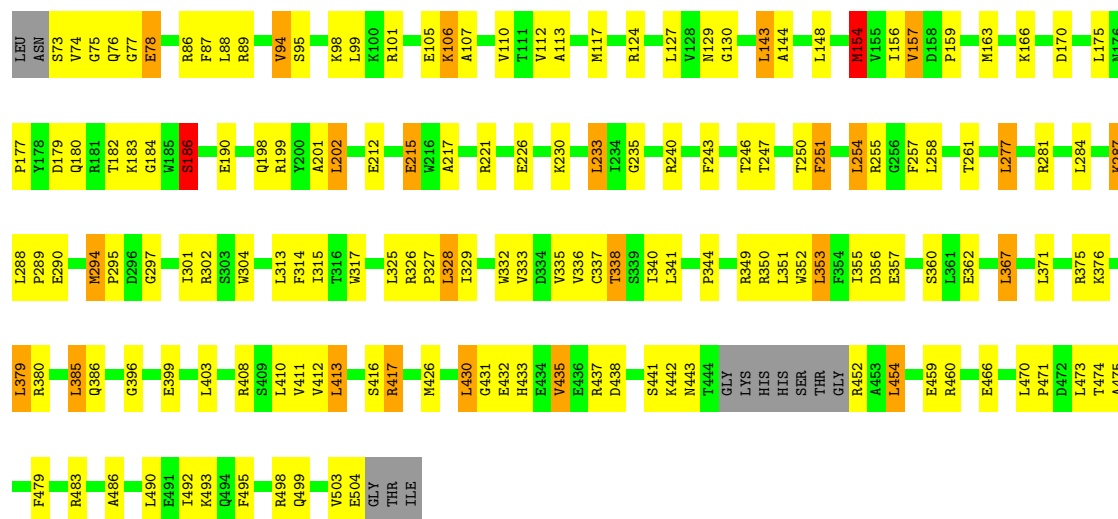
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

Chain D: 



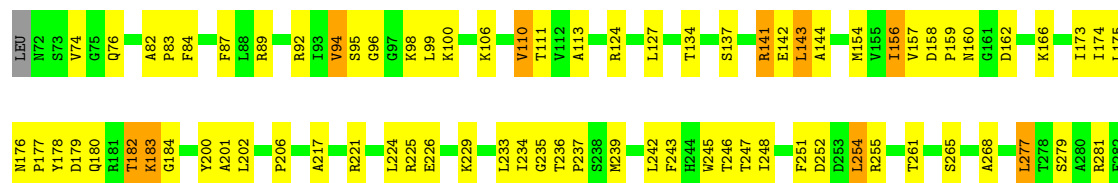
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

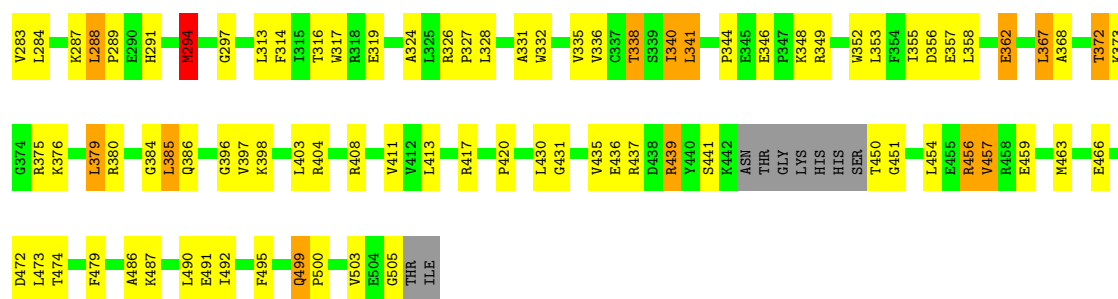
Chain E: 



• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

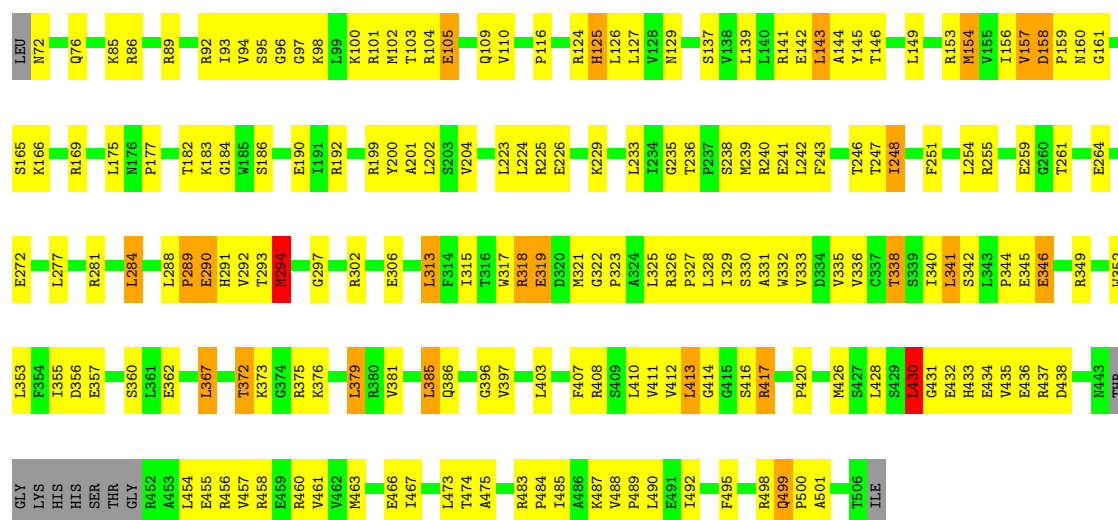
Chain F: 





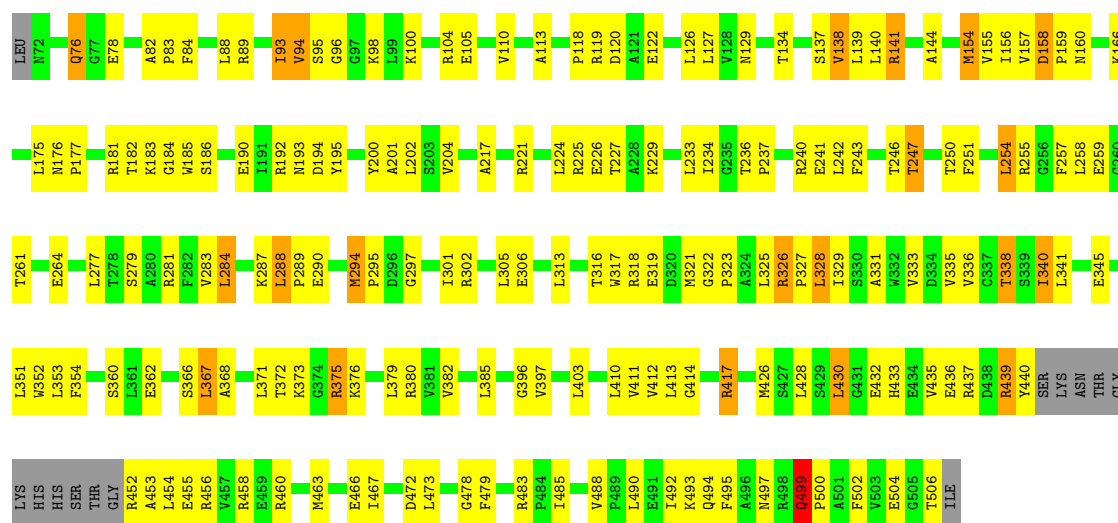
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

Chain G: 54% 38% 5% .



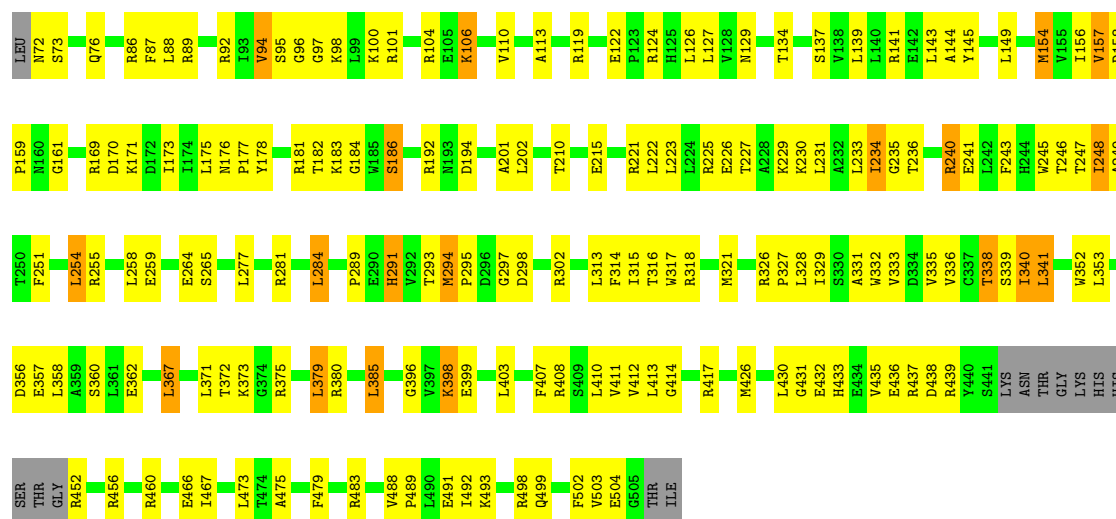
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

Chain H: 55% 37% 5% .



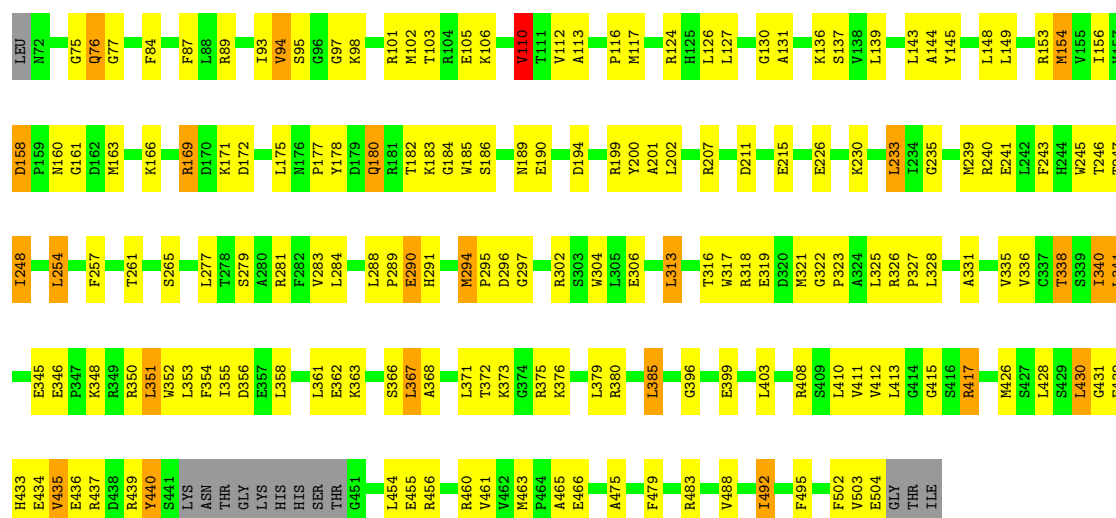
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

Chain I:  57% 35%



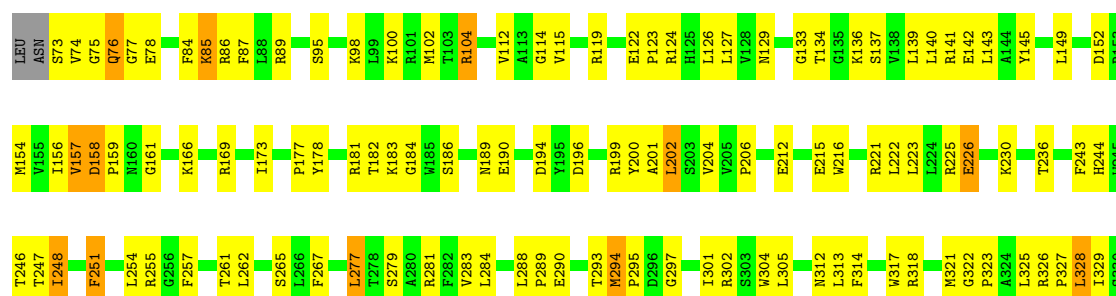
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

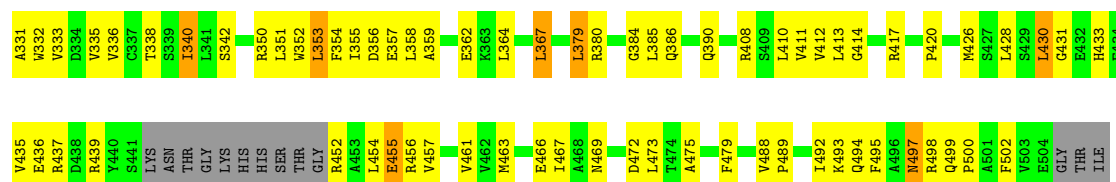
Chain J:  56% 35% 5%



• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

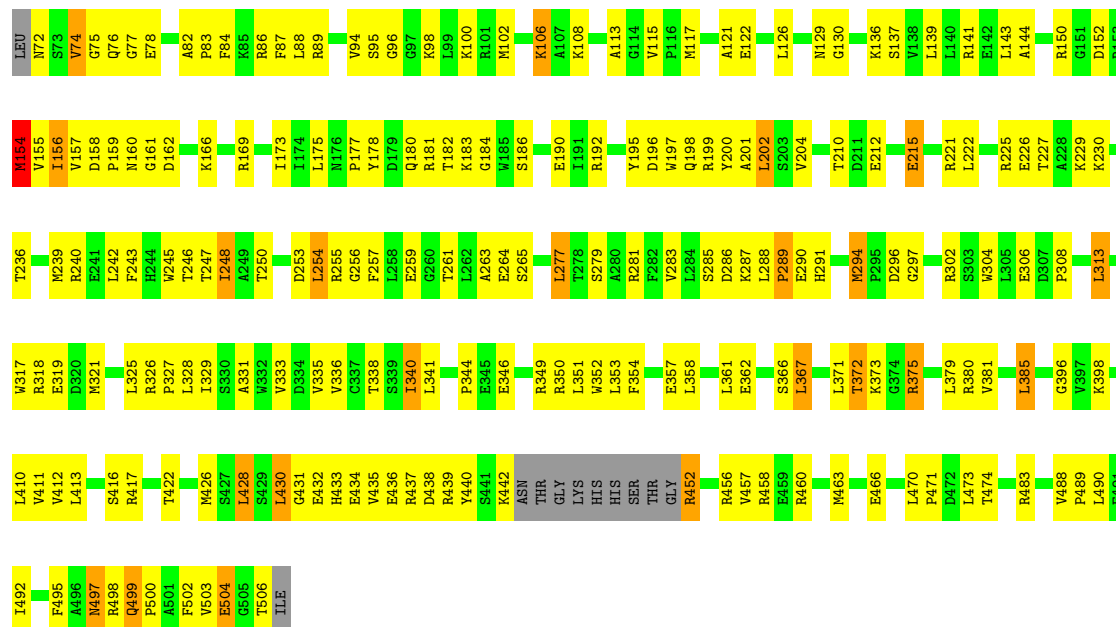
Chain K:  54% 38%





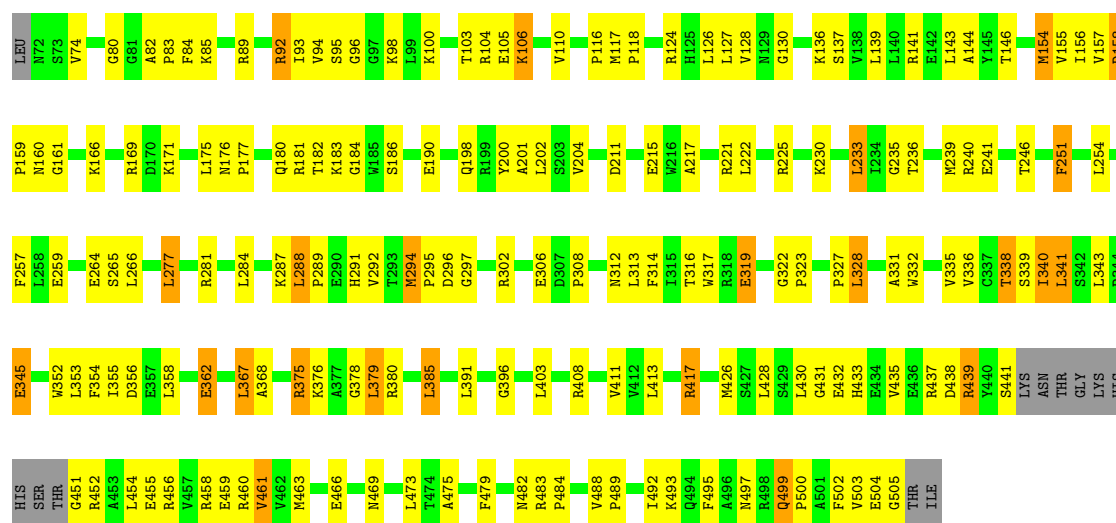
• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

Chain L: 51% 41% 5% .



• Molecule 1: CONJUGAL TRANSFER PROTEIN TRWB

Chain M: 56% 35% 5% .



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	107.40Å 153.40Å 162.50Å 90.00° 94.20° 90.00°	Depositor
Resolution (Å)	50.00 – 2.50	Depositor
% Data completeness (in resolution range)	97.2 (50.00-2.50)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.209 , 0.267	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	41513	wwPDB-VP
Average B, all atoms (Å ²)	40.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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	0.52	1/3418 (0.0%)	0.91	8/4617 (0.2%)
1	B	0.51	0/3383	0.94	10/4572 (0.2%)
1	D	0.52	0/3344	1.00	15/4520 (0.3%)
1	E	0.50	0/3405	0.95	10/4601 (0.2%)
1	F	0.54	1/3413 (0.0%)	0.97	10/4611 (0.2%)
1	G	0.51	1/3417 (0.0%)	0.96	12/4617 (0.3%)
1	H	0.48	0/3394	0.95	8/4587 (0.2%)
1	I	0.47	0/3393	0.95	10/4585 (0.2%)
1	J	0.47	0/3393	0.95	10/4585 (0.2%)
1	K	0.46	0/3381	0.95	10/4569 (0.2%)
1	L	0.47	0/3409	0.95	13/4606 (0.3%)
1	M	0.48	0/3397	0.95	11/4590 (0.2%)
All	All	0.49	3/40747 (0.0%)	0.95	127/55060 (0.2%)

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
1	F	0	1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	294	MET	SD-CE	-5.92	1.64	1.79
1	F	294	MET	SD-CE	-5.60	1.65	1.79
1	G	294	MET	SD-CE	-5.27	1.66	1.79

The worst 5 of 127 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	201	ALA	N-CA-C	-9.59	101.00	112.89

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	J	201	ALA	N-CA-C	-8.92	101.48	111.82
1	H	201	ALA	N-CA-C	-8.20	101.90	112.23
1	F	396	GLY	N-CA-C	-7.87	102.96	112.48
1	M	201	ALA	N-CA-C	-7.75	102.46	112.23

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	F	200	TYR	Sidechain

5.2 Too-close contacts

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	3353	0	3385	120	0
1	B	3318	0	3346	158	0
1	D	3279	0	3307	120	0
1	E	3340	0	3371	143	0
1	F	3348	0	3377	134	0
1	G	3352	0	3380	161	0
1	H	3329	0	3356	154	0
1	I	3328	0	3354	145	0
1	J	3328	0	3354	149	0
1	K	3316	0	3345	199	0
1	L	3344	0	3374	186	0
1	M	3332	0	3357	170	0
2	A	157	0	0	9	0
2	B	135	0	0	7	0
2	D	139	0	0	10	0
2	E	133	0	0	8	0
2	F	193	0	0	9	0
2	G	167	0	0	10	0
2	H	124	0	0	8	0
2	I	113	0	0	9	0
2	J	102	0	0	6	0
2	K	84	0	0	5	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	L	86	0	0	4	0
2	M	113	0	0	4	0
All	All	41513	0	40306	1759	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 22.

The worst 5 of 1759 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:154:MET:HE3	1:E:156:ILE:HD11	1.27	1.17
1:J:76:GLN:HG2	1:J:77:GLY:H	1.07	1.16
1:I:106:LYS:HD3	1:I:106:LYS:H	1.04	1.15
1:A:154:MET:HE3	1:A:156:ILE:HD11	1.22	1.10
1:E:127:LEU:HD11	1:E:385:LEU:HD22	1.27	1.09

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

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	356/364 (98%)	322 (90%)	34 (10%)	8	17
1	B	352/364 (97%)	318 (90%)	34 (10%)	8	17
1	D	348/364 (96%)	320 (92%)	28 (8%)	11	24
1	E	355/364 (98%)	327 (92%)	28 (8%)	11	24

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	F	355/364 (98%)	323 (91%)	32 (9%)	9	19
1	G	356/364 (98%)	323 (91%)	33 (9%)	8	18
1	H	353/364 (97%)	320 (91%)	33 (9%)	8	18
1	I	353/364 (97%)	324 (92%)	29 (8%)	10	23
1	J	353/364 (97%)	318 (90%)	35 (10%)	7	16
1	K	352/364 (97%)	331 (94%)	21 (6%)	17	36
1	L	355/364 (98%)	322 (91%)	33 (9%)	8	18
1	M	353/364 (97%)	324 (92%)	29 (8%)	10	23
All	All	4241/4368 (97%)	3872 (91%)	369 (9%)	9	21

5 of 369 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	I	251	PHE
1	K	76	GLN
1	I	338	THR
1	J	202	LEU
1	K	367	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 83 such sidechains are listed below:

Mol	Chain	Res	Type
1	J	180	GLN
1	L	291	HIS
1	J	244	HIS
1	K	291	HIS
1	L	497	ASN

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 oligosaccharides 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.