# wwPDB X-ray Structure Validation Summary Report (i)

May 13, 2020 – 03:42 am BST

| | | |
|---|---|---|
| PDB ID | : | 4BQ7 |
| Title | : | Crystal structure of the RGMB-Neo1 complex form 2 |
| Authors | : | Bell, C.H.; Healey, E.; van Erp, S.; Bishop, B.; Tang, C.; Gilbert, R.J.C.; Aricescu, A.R.; Pasterkamp, R.J.; Siebold, C. |
| Deposited on | : | 2013-05-30 |
| Resolution | : | 6.60 Å(reported) |

The following versions of software and data (see references (1)) were used in the production of this report:

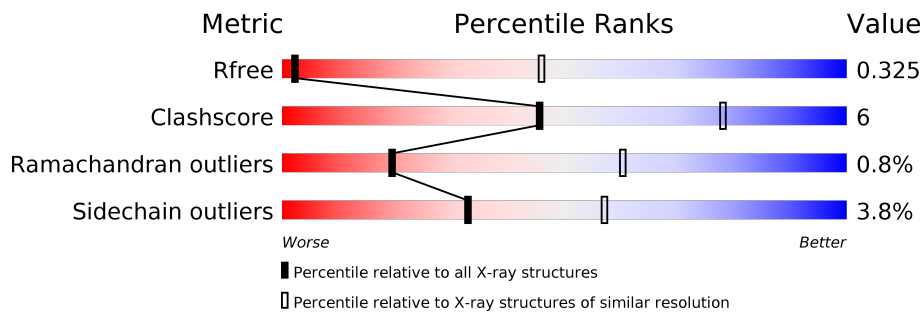| | | |
|---|---|---|
| MolProbity | : | 4.02b-467 |
| Xtriage (Phenix) | : | 1.13 |
| EDS | : | 2.11 |
| Percentile statistics | : | 20191225.v01 (using entries in the PDB archive December 25th 2019) |
| Refmac | : | 5.8.0158 |
| CCP4 | : | 7.0.044 (Gargrove) |
| Ideal geometry (proteins) | : | Engh & Huber (2001) |
| Ideal geometry (DNA, RNA) | : | Parkinson et al. (1996) |
| Validation Pipeline (wwPDB-VP) | : | 2.11 |

# 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 6.60 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 | Percentile Ranks | Value |
|---|---|---|
| Rfree | | 0.325 |
| Clashscore | | 6 |
| Ramachandran outliers | | 0.8% |
| Sidechain outliers | | 3.8% |

*Worse*        *Better*

▌ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

| Metric | Whole archive (#Entries) | Similar resolution (#Entries, resolution range(Å)) |
|---|---|---|
| $R_{free}$ | 130704 | 1000 (9.00-3.90) |
| Clashscore | 141614 | 1064 (9.00-3.90) |
| Ramachandran outliers | 138981 | 1012 (9.00-3.88) |
| Sidechain outliers | 138945 | 1010 (9.00-3.84) |

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 >=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%

| Mol | Chain | Length | Quality of chain |
|---|---|---|---|
| 1 | A | 264 | 64%    11% • 23% |
| 1 | B | 264 | 67%    8% • 23% |
| 2 | C | 122 | 10% •• 88% |
| 2 | E | 122 | 10% •• 88% |
| 3 | D | 251 | 50%   8% 41% |
| 3 | F | 251 | 51%   7% 41% |

# 2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 5714 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 NEOGENIN.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A | 202 | Total<br>1591 | C<br>1017 | N<br>270 | O<br>298 | S<br>6 | 0 | 0 | 0 |
| 1 | B | 202 | Total<br>1591 | C<br>1017 | N<br>270 | O<br>298 | S<br>6 | 0 | 0 | 0 |

There are 26 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| A | 880 | GLU | - | expression tag | UNP P97798 |
| A | 881 | THR | - | expression tag | UNP P97798 |
| A | 882 | GLY | - | expression tag | UNP P97798 |
| A | 1134 | ASN | - | expression tag | UNP P97798 |
| A | 1135 | GLY | - | expression tag | UNP P97798 |
| A | 1136 | THR | - | expression tag | UNP P97798 |
| A | 1137 | LYS | - | expression tag | UNP P97798 |
| A | 1138 | HIS | - | expression tag | UNP P97798 |
| A | 1139 | HIS | - | expression tag | UNP P97798 |
| A | 1140 | HIS | - | expression tag | UNP P97798 |
| A | 1141 | HIS | - | expression tag | UNP P97798 |
| A | 1142 | HIS | - | expression tag | UNP P97798 |
| A | 1143 | HIS | - | expression tag | UNP P97798 |
| B | 880 | GLU | - | expression tag | UNP P97798 |
| B | 881 | THR | - | expression tag | UNP P97798 |
| B | 882 | GLY | - | expression tag | UNP P97798 |
| B | 1134 | ASN | - | expression tag | UNP P97798 |
| B | 1135 | GLY | - | expression tag | UNP P97798 |
| B | 1136 | THR | - | expression tag | UNP P97798 |
| B | 1137 | LYS | - | expression tag | UNP P97798 |
| B | 1138 | HIS | - | expression tag | UNP P97798 |
| B | 1139 | HIS | - | expression tag | UNP P97798 |
| B | 1140 | HIS | - | expression tag | UNP P97798 |
| B | 1141 | HIS | - | expression tag | UNP P97798 |
| B | 1142 | HIS | - | expression tag | UNP P97798 |

*Continued on next page...*

*Continued from previous page...*

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| B | 1143 | HIS | - | expression tag | UNP P97798 |

- Molecule 2 is a protein called RGM DOMAIN FAMILY MEMBER B.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | C | 15 | Total<br>118 | C<br>79 | N<br>16 | O<br>21 | S<br>2 | 0 | 0 | 0 |
| 2 | E | 15 | Total<br>118 | C<br>79 | N<br>16 | O<br>21 | S<br>2 | 0 | 0 | 0 |

There are 6 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| C | 47 | GLU | - | expression tag | UNP Q6NW40 |
| C | 48 | THR | - | expression tag | UNP Q6NW40 |
| C | 49 | GLY | - | expression tag | UNP Q6NW40 |
| E | 47 | GLU | - | expression tag | UNP Q6NW40 |
| E | 48 | THR | - | expression tag | UNP Q6NW40 |
| E | 49 | GLY | - | expression tag | UNP Q6NW40 |

- Molecule 3 is a protein called RGM DOMAIN FAMILY MEMBER B.

| Mol | Chain | Residues | Atoms | | | | | ZeroOcc | AltConf | Trace |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | D | 148 | Total<br>1148 | C<br>721 | N<br>197 | O<br>223 | S<br>7 | 0 | 0 | 0 |
| 3 | F | 148 | Total<br>1148 | C<br>721 | N<br>197 | O<br>223 | S<br>7 | 0 | 0 | 0 |

There are 20 discrepancies between the modelled and reference sequences:

| Chain | Residue | Modelled | Actual | Comment | Reference |
|---|---|---|---|---|---|
| D | 411 | GLY | - | expression tag | UNP Q6NW40 |
| D | 412 | THR | - | expression tag | UNP Q6NW40 |
| D | 413 | LYS | - | expression tag | UNP Q6NW40 |
| D | 414 | HIS | - | expression tag | UNP Q6NW40 |
| D | 415 | HIS | - | expression tag | UNP Q6NW40 |
| D | 416 | HIS | - | expression tag | UNP Q6NW40 |
| D | 417 | HIS | - | expression tag | UNP Q6NW40 |
| D | 418 | HIS | - | expression tag | UNP Q6NW40 |
| D | 419 | HIS | - | expression tag | UNP Q6NW40 |
| D | 225 | GLY | GLU | conflict | UNP Q6NW40 |
| F | 411 | GLY | - | expression tag | UNP Q6NW40 |

*Continued on next page...*

*Continued from previous page...*

| Chain | Residue | Modelled | Actual | Comment | Reference |
|-------|---------|----------|--------|---------|-----------|
| F | 412 | THR | - | expression tag | UNP Q6NW40 |
| F | 413 | LYS | - | expression tag | UNP Q6NW40 |
| F | 414 | HIS | - | expression tag | UNP Q6NW40 |
| F | 415 | HIS | - | expression tag | UNP Q6NW40 |
| F | 416 | HIS | - | expression tag | UNP Q6NW40 |
| F | 417 | HIS | - | expression tag | UNP Q6NW40 |
| F | 418 | HIS | - | expression tag | UNP Q6NW40 |
| F | 419 | HIS | - | expression tag | UNP Q6NW40 |
| F | 225 | GLY | GLU | conflict | UNP Q6NW40 |

# 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. 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.

• Molecule 1: NEOGENIN

Chain A:

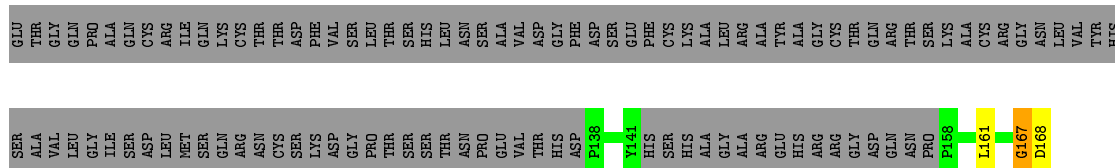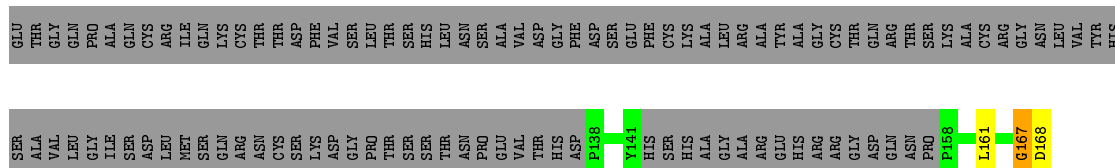64%    11%  ·    23%
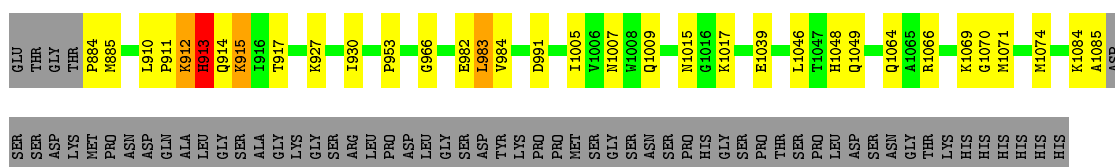
• Molecule 1: NEOGENIN
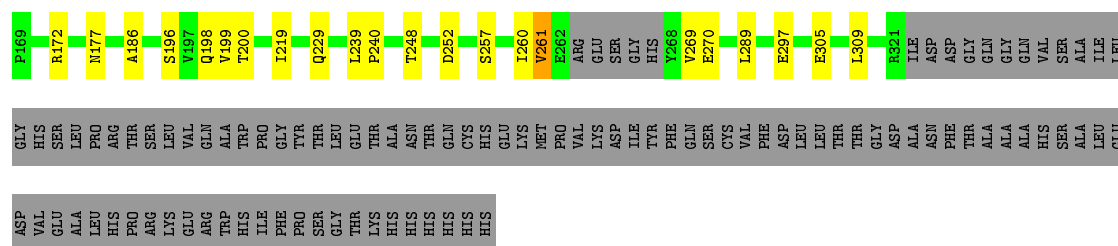
Chain B:

67%    8%  ·    23%
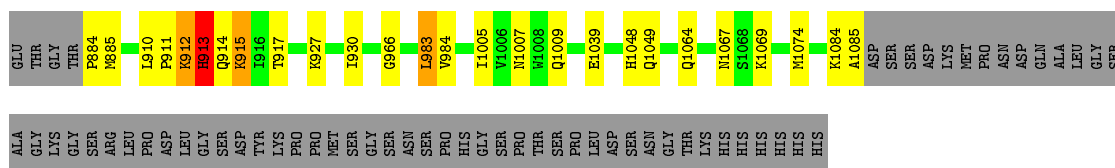
• Molecule 2: RGM DOMAIN FAMILY MEMBER B

Chain C:  10%  ··    88%

• Molecule 2: RGM DOMAIN FAMILY MEMBER B

Chain E:  10%  ··    88%

• Molecule 3: RGM DOMAIN FAMILY MEMBER B

**Chain D:**

50%        8%        41%

P169 R172 N177 A186 S196 V197 Q198 V199 T200 I219 Q229 L239 P240 T248 D252 S257 I260 V261 E262 ARG GLU SER GLY HIS Y268 V269 E270 L289 E297 E305 L309 R321 ILE ASP ASP GLY GLN GLY GLN VAL SER ALA ILE LEU

GLY HIS SER LEU PRO ARG THR SER LEU VAL GLN ALA TRP PRO GLY TYR THR LEU GLU THR ALA ASN THR GLN CYS HIS GLU LYS MET PRO VAL LYS ASP ILE TYR PHE GLN SER CYS VAL PHE ASP LEU LEU THR THR GLY ASP ALA ASN PHE THR ALA ALA ALA HIS SER ALA LEU GLU

ASP VAL GLU ALA LEU HIS PRO ARG LYS GLU ARG TRP HIS ILE PHE PRO SER GLY THR LYS HIS HIS HIS HIS HIS HIS

• **Molecule 3: RGM DOMAIN FAMILY MEMBER B**

**Chain F:**

51%        7%        41%

P169 R172 N177 A186 S196 T200 I219 H223 H224 L239 A242 T248 D252 S257 I260 V261 E262 ARG GLU SER GLY HIS Y268 V269 E270 L289 E297 R321 ILE ASP ASP GLY GLN GLY GLN VAL SER ALA ILE LEU GLY HIS SER LEU

PRO ARG THR SER LEU VAL GLN ALA TRP PRO GLY TYR THR LEU GLU THR ALA ASN THR GLN CYS HIS GLU LYS MET PRO VAL LYS ASP ILE TYR PHE GLN SER CYS VAL PHE ASP LEU LEU THR THR GLY ASP ALA ASN PHE THR ALA ALA ALA HIS SER ALA LEU GLU GLU ASP VAL GLU ALA

LEU HIS PRO ARG LYS GLU ARG TRP HIS ILE PHE PRO SER GLY THR LYS HIS HIS HIS HIS HIS HIS

# 4　Data and refinement statistics ⓘ

| Property | Value | Source |
|---|---|---|
| Space group | P 32 1 2 | Depositor |
| Cell constants <br> a, b, c, $\alpha$, $\beta$, $\gamma$ | 109.69Å　　109.69Å　　187.93Å <br> 90.00°　　90.00°　　120.00° | Depositor |
| Resolution (Å) | 84.78　–　6.60 <br> 94.99　–　6.60 | Depositor <br> EDS |
| % Data completeness <br> (in resolution range) | 97.2 (84.78-6.60) <br> 97.3 (94.99-6.60) | Depositor <br> EDS |
| $R_{merge}$ | 0.23 | Depositor |
| $R_{sym}$ | (Not available) | Depositor |
| $< I/\sigma(I) >$ [1] | 2.72 (at 6.73Å) | Xtriage |
| Refinement program | PHENIX (PHENIX.REFINE) | Depositor |
| R, $R_{free}$ | 0.254　,　0.280 <br> 0.306　,　0.325 | Depositor <br> DCC |
| $R_{free}$ test set | 231 reflections (9.27%) | wwPDB-VP |
| Wilson B-factor (Å$^2$) | 128.1 | Xtriage |
| Anisotropy | 0.133 | Xtriage |
| Bulk solvent $k_{sol}$(e/Å$^3$), $B_{sol}$(Å$^2$) | 0.33 , 152.8 | EDS |
| L-test for twinning[2] | $< |L| > = 0.42, < L^2 > = 0.25$ | Xtriage |
| Estimated twinning fraction | 0.077 for -h,-k,l | Xtriage |
| $F_o,F_c$ correlation | 0.75 | EDS |
| Total number of atoms | 5714 | wwPDB-VP |
| Average B, all atoms (Å$^2$) | 165.0 | wwPDB-VP |

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.05% 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 ⓘ

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 | 0.68 | 1/1635 (0.1%) | 0.80 | 4/2234 (0.2%) |
| 1 | B | 0.82 | 1/1635 (0.1%) | 0.71 | 1/2234 (0.0%) |
| 2 | C | 0.46 | 0/122 | 1.01 | 1/162 (0.6%) |
| 2 | E | 0.46 | 0/122 | 1.01 | 1/162 (0.6%) |
| 3 | D | 0.51 | 0/1170 | 0.73 | 0/1590 |
| 3 | F | 0.51 | 0/1170 | 0.74 | 0/1590 |
| All | All | 0.65 | 2/5854 (0.0%) | 0.76 | 7/7972 (0.1%) |

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 |
|-----|-------|---------------------|---------------------|
| 2 | C | 0 | 1 |
| 2 | E | 0 | 1 |
| All | All | 0 | 2 |

All (2) bond length outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(Å) | Ideal(Å) |
|-----|-------|-----|------|-------|-----|-------------|----------|
| 1 | B | 983 | LEU | C-N | 26.18 | 1.94 | 1.34 |
| 1 | A | 983 | LEU | C-N | -18.64 | 0.91 | 1.34 |

The worst 5 of 7 bond angle outliers are listed below:

| Mol | Chain | Res | Type | Atoms | Z | Observed(°) | Ideal(°) |
|-----|-------|-----|------|-------|-----|-------------|----------|
| 1 | A | 983 | LEU | O-C-N | 13.56 | 144.39 | 122.70 |
| 1 | A | 983 | LEU | CA-C-N | -9.95 | 95.31 | 117.20 |
| 2 | E | 167 | GLY | C-N-CA | 8.68 | 143.40 | 121.70 |
| 2 | C | 167 | GLY | C-N-CA | 8.63 | 143.28 | 121.70 |
| 1 | A | 983 | LEU | C-N-CA | -6.70 | 104.95 | 121.70 |

There are no chirality outliers.

All (2) planarity outliers are listed below:

| Mol | Chain | Res | Type | Group |
|-----|-------|-----|------|-------|
| 2 | C | 167 | GLY | Peptide |
| 2 | E | 167 | GLY | Peptide |

## 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 | 1591 | 0 | 1585 | 46 | 0 |
| 1 | B | 1591 | 0 | 1585 | 16 | 0 |
| 2 | C | 118 | 0 | 101 | 1 | 0 |
| 2 | E | 118 | 0 | 101 | 1 | 0 |
| 3 | D | 1148 | 0 | 1122 | 33 | 1 |
| 3 | F | 1148 | 0 | 1122 | 14 | 0 |
| All | All | 5714 | 0 | 5616 | 72 | 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 6.

The worst 5 of 72 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:B:983:LEU:C | 1:B:984:VAL:N | 1.94 | 1.21 |
| 1:A:1009:GLN:HG3 | 3:D:200:THR:OG1 | 1.68 | 0.94 |
| 1:A:991:ASP:OD2 | 3:D:200:THR:HG21 | 1.68 | 0.93 |
| 1:A:1009:GLN:HG3 | 3:D:200:THR:HG1 | 1.35 | 0.92 |
| 1:A:1009:GLN:HG2 | 3:D:186:ALA:HB2 | 1.55 | 0.86 |

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) |
|--------|--------|--------------------------|-------------------|
| 3:D:305:GLU:OE1 | 3:D:305:GLU:OE1[4_445] | 1.91 | 0.29 |

## 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 | 200/264 (76%) | 187 (94%) | 10 (5%) | 3 (2%) | 10 | 46 |
| 1 | B | 200/264 (76%) | 187 (94%) | 10 (5%) | 3 (2%) | 10 | 46 |
| 2 | C | 11/122 (9%) | 11 (100%) | 0 | 0 | 100 | 100 |
| 2 | E | 11/122 (9%) | 11 (100%) | 0 | 0 | 100 | 100 |
| 3 | D | 144/251 (57%) | 134 (93%) | 10 (7%) | 0 | 100 | 100 |
| 3 | F | 144/251 (57%) | 133 (92%) | 11 (8%) | 0 | 100 | 100 |
| All | All | 710/1274 (56%) | 663 (93%) | 41 (6%) | 6 (1%) | 19 | 60 |

5 of 6 Ramachandran outliers are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | A | 912 | LYS |
| 1 | A | 913 | HIS |
| 1 | B | 912 | LYS |
| 1 | B | 913 | HIS |
| 1 | B | 966 | GLY |

### 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 | 178/232 (77%) | 173 (97%) | 5 (3%) | 43 | 65 |
| 1 | B | 178/232 (77%) | 173 (97%) | 5 (3%) | 43 | 65 |
| 2 | C | 13/103 (13%) | 12 (92%) | 1 (8%) | 13 | 37 |

*Continued from previous page...*

| Mol | Chain | Analysed | Rotameric | Outliers | Percentiles | |
|-----|-------|----------|-----------|----------|-------------|---|
| 2 | E | 13/103 (13%) | 12 (92%) | 1 (8%) | 13 | 37 |
| 3 | D | 128/215 (60%) | 122 (95%) | 6 (5%) | 26 | 51 |
| 3 | F | 128/215 (60%) | 122 (95%) | 6 (5%) | 26 | 51 |
| All | All | 638/1100 (58%) | 614 (96%) | 24 (4%) | 33 | 57 |

5 of 24 residues with a non-rotameric sidechain are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 2 | C | 168 | ASP |
| 3 | D | 252 | ASP |
| 3 | F | 261 | VAL |
| 3 | D | 172 | ARG |
| 3 | D | 177 | ASN |

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

| Mol | Chain | Res | Type |
|-----|-------|-----|------|
| 1 | A | 1009 | GLN |
| 3 | D | 229 | GLN |
| 3 | F | 224 | HIS |

### 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)

The following chains have linkage breaks:

| Mol | Chain | Number of breaks |
|-----|-------|------------------|
| 1 | B | 1 |
| 1 | A | 1 |

All chain breaks are listed below:

| Model | Chain | Residue-1 | Atom-1 | Residue-2 | Atom-2 | Distance (Å) |
|-------|-------|-----------|--------|-----------|--------|--------------|
| 1 | B | 983:LEU | C | 984:VAL | N | 1.94 |
| 1 | A | 983:LEU | C | 984:VAL | N | 0.91 |

# 6 Fit of model and data (i)

## 6.1 Protein, DNA and RNA chains (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

## 6.3 Carbohydrates (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

## 6.4 Ligands (i)

Unable to reproduce the depositors R factor - this section is therefore empty.

## 6.5 Other polymers (i)

Unable to reproduce the depositors R factor - this section is therefore empty.