wwPDB EM Validation Summary Report

Aug 4, 2025 – 07:24 PM EDT

PDB ID	:	9E12 / pdb_00009e12
EMDB ID	:	EMD-47381
Title	:	Full-length human dynein-1 in phi comformation under Lis1 condition
Authors	:	Yang, J.; Zhang, K.
Deposited on	:	2024-10-21
Resolution	:	4.50 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp
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:

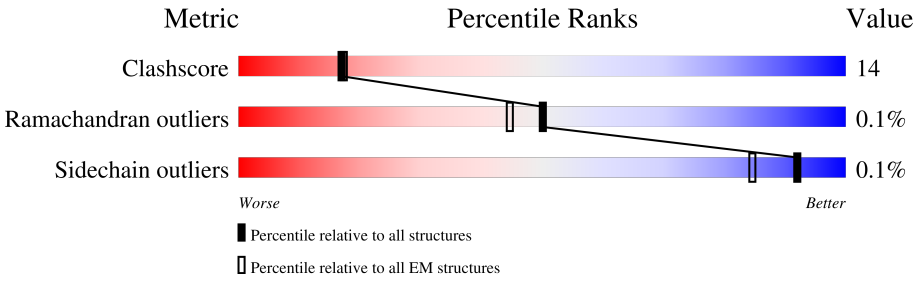
EMDB validation analysis	:	0.0.1.dev126
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 4.50 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)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	4646	74% 24%
1	B	4646	69% 28%
2	C	638	60% 38%
2	D	638	35% 27% 38%
3	E	492	61% 37%
3	F	492	38% 25% 37%
4	G	96	10% 63% 34%
4	H	96	10% 59% 38%

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Mol	Chain	Length	Quality of chain
5	I	89	25% 57% 43%
5	J	89	20% 56% 43%
6	K	113	85% 64% 36%
6	L	113	75% 72% 28%

2 Entry composition (i)

There are 9 unique types of molecules in this entry. The entry contains 89391 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Cytoplasmic dynein 1 heavy chain 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	4542	Total 36692	C 23323	N 6381	O 6822	S 166	0	0
1	B	4521	Total 36527	C 23221	N 6349	O 6791	S 166	0	0

- Molecule 2 is a protein called Cytoplasmic dynein 1 intermediate chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	C	394	Total 3112	C 1962	N 541	O 594	S 15	0	0
2	D	394	Total 3112	C 1962	N 541	O 594	S 15	0	0

- Molecule 3 is a protein called Cytoplasmic dynein 1 light intermediate chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	E	311	Total 2518	C 1614	N 425	O 468	S 11	0	0
3	F	311	Total 2518	C 1614	N 425	O 468	S 11	0	0

- Molecule 4 is a protein called Dynein light chain roadblock-type 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	G	93	Total 742	C 468	N 128	O 143	S 3	0	0
4	H	93	Total 742	C 468	N 128	O 143	S 3	0	0

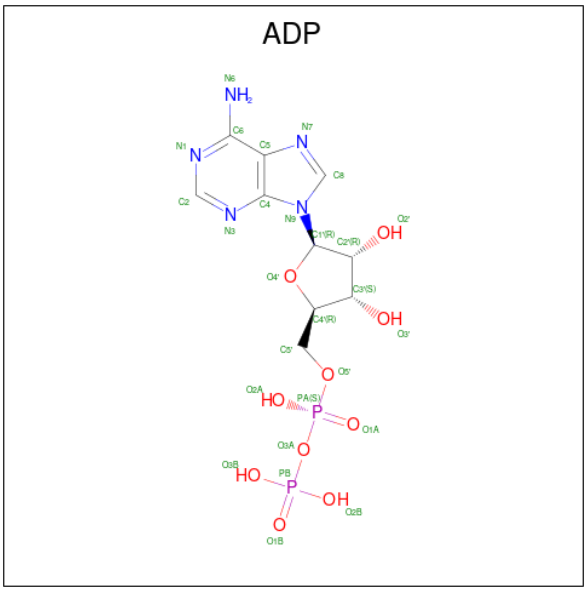
- Molecule 5 is a protein called Dynein light chain 1, cytoplasmic.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	I	89	Total	C	N	O	S	0	0
			728	465	122	135	6		
5	J	89	Total	C	N	O	S	0	0
			728	465	122	135	6		

- Molecule 6 is a protein called Dynein light chain Tctex-type 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	K	113	Total	C	N	O	S	0	0
			872	548	142	175	7		
6	L	113	Total	C	N	O	S	0	0
			872	548	142	175	7		

- Molecule 7 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
7	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
7	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
7	A	1	Total	C	N	O	P	0
			27	10	5	10	2	
7	B	1	Total	C	N	O	P	0
			27	10	5	10	2	
7	B	1	Total	C	N	O	P	0
			27	10	5	10	2	

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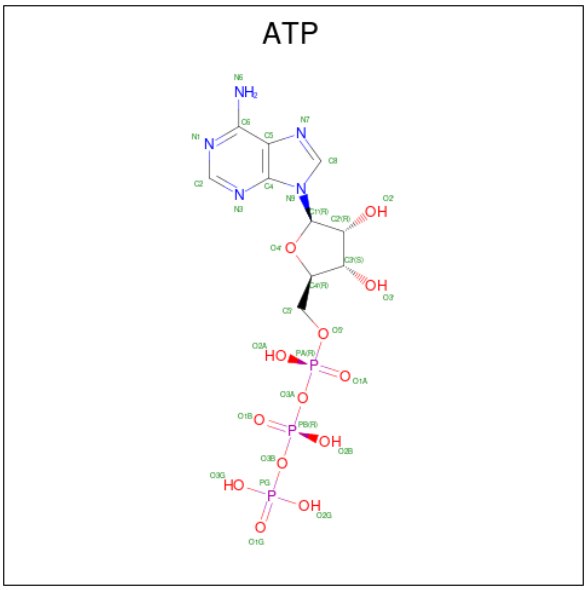
Mol	Chain	Residues	Atoms					AltConf
7	B	1	Total	C	N	O	P	0
			27	10	5	10	2	

- Molecule 8 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
8	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
8	B	1	Total	C	N	O	P	0
			31	10	5	13	3	

- Molecule 9 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

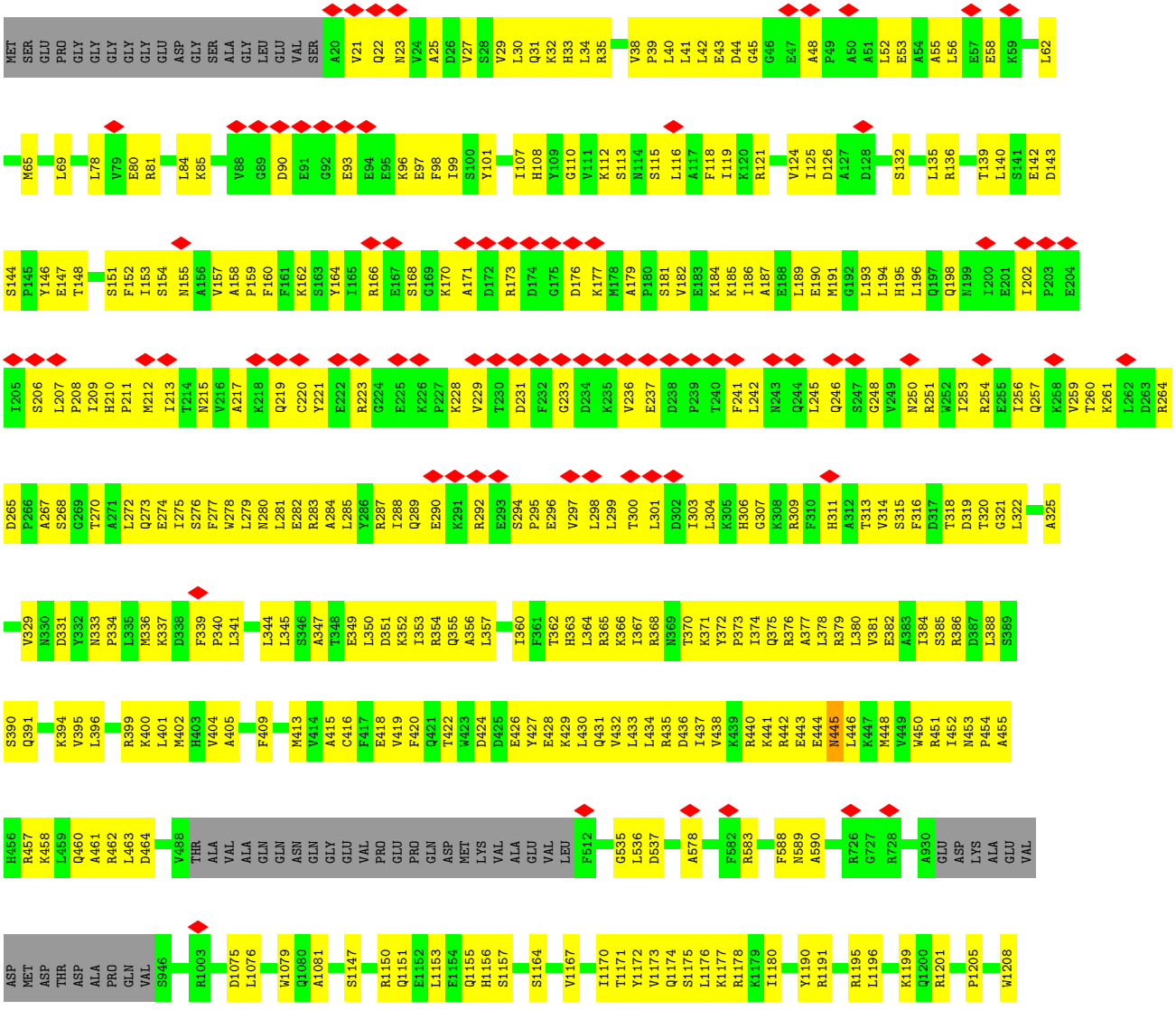
Mol	Chain	Residues	Atoms		AltConf
9	A	2	Total	Mg	0
			2	2	
9	B	2	Total	Mg	0
			2	2	

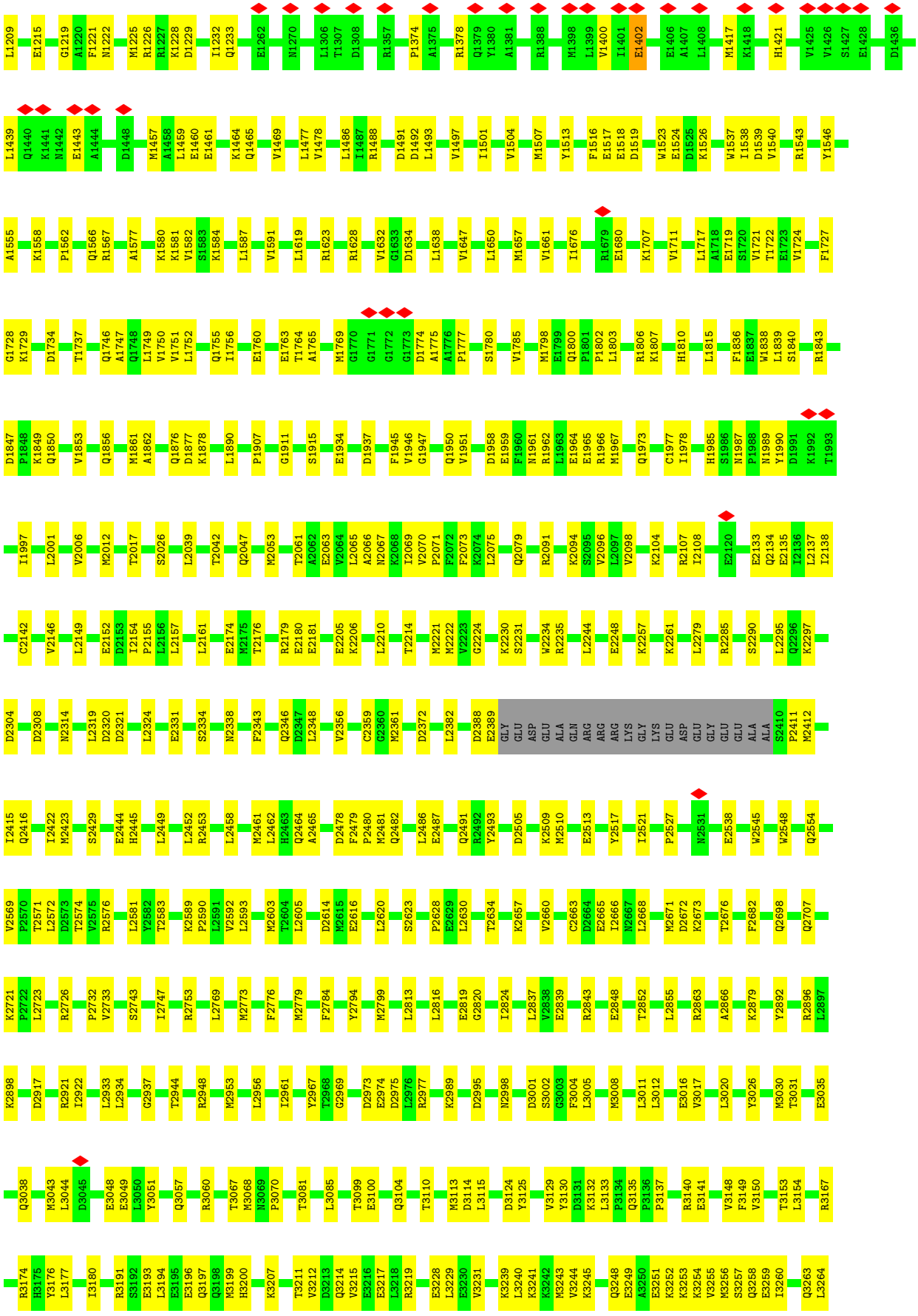
3 Residue-property plots (i)

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 and atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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: Cytoplasmic dynein 1 heavy chain 1

Chain A:

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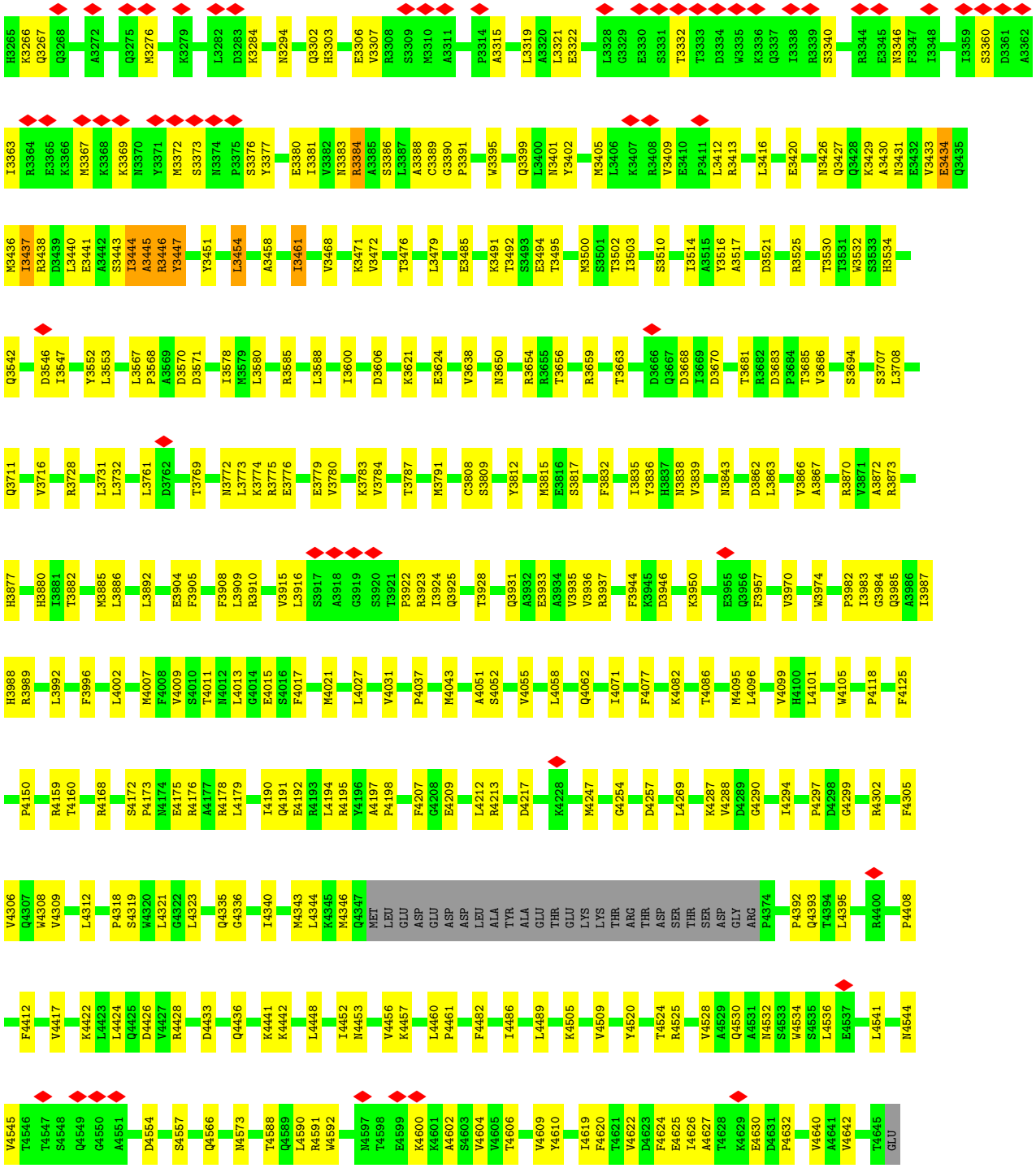
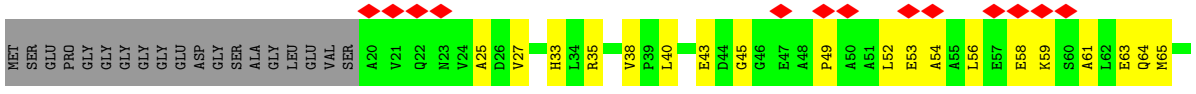
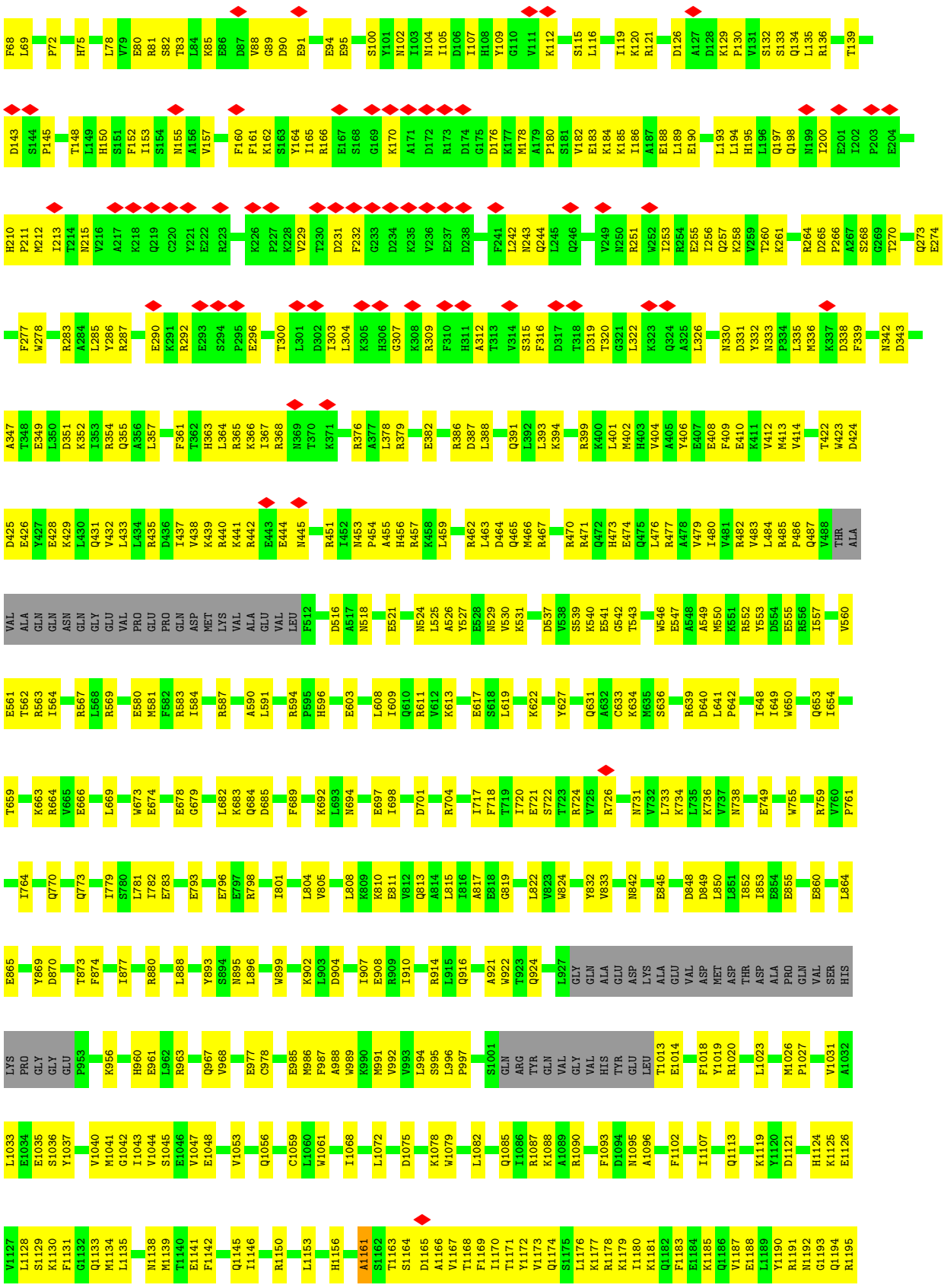
L1439 Q1440 K1441 N1442 E1443 A1444 D1448 M1457 A1458 L1459 E1460 E1461 K1464 Q1465 V1469 L1477 V1478 L1486 I1487 R1488 D1491 D1492 L1493 V1497 I1501 V1504 M1507 Y1513 F1516 E1517 E1518 D1519 W1523 E1524 D1525 K1526 W1537 I1538 D1539 V1540 R1543 Y1546
A1555 K1558 P1562 Q1566 R1567 A1577 K1580 K1581 V1582 S1583 K1584 L1587 V1591 L1619 R1623 R1628 V1632 G1633 D1634 L1638 V1647 L1650 M1657 V1661 I1676 R1679 E1680 K1707 V1711 L1717 A1718 E1719 S1720 V1721 T1722 E1723 V1724 F1727
G1728 K1729 D1734 T1737 Q1746 A1747 Q1748 L1749 V1750 V1751 L1752 Q1755 I1756 E1760 E1763 T1764 A1765 M1769 G1770 G1771 G1772 G1773 D1774 A1775 A1776 P1777 S1780 V1785 M1798 E1799 Q1800 P1801 P1802 L1803 R1806 K1807 H1810 L1815 F1836 E1837 W1838 L1839 S1840 R1843
D1847 P1848 K1849 Q1850 V1853 Q1856 M1861 A1862 Q1876 D1877 K1878 L1890 P1907 G1911 S1915 E1934 D1937 F1945 V1946 G1947 Q1950 V1951 D1958 E1959 F1960 N1961 R1962 L1963 E1964 E1965 R1966 M1967 Q1973 C1977 I1978 H1985 S1986 N1987 P1988 N1989 Y1990 D1991 K1992 T1993
I1997 L2001 V2006 M2012 T2017 S2026 L2039 T2042 Q2047 M2053 T2061 A2062 E2063 V2064 L2065 A2066 N2067 K2068 I2069 V2070 P2071 F2072 F2073 K2074 L2075 Q2079 R2091 K2094 S2095 V2096 L2097 V2098 K2104 R2107 I2108 E2120 E2133 Q2134 E2135 I2136 L2137 I2138
C2142 V2146 L2149 E2152 D2153 I2154 P2155 K2156 L2157 L2161 E2174 M2175 T2176 R2179 E2180 E2181 E2205 K2206 L2210 T2214 M2221 M2222 V2223 G2224 K2230 S2231 W2234 R2235 L2244 E2248 K2257 K2261 L2279 R2285 S2290 L2295 Q2296 K2297
D2304 D2308 N2314 L2319 D2320 D2321 L2324 E2331 S2334 N2338 F2343 Q2346 D2347 L2348 V2356 C2359 G2360 M2361 D2372 L2382 D2388 E2389 GLY GLU ASP GLU ALA GLN ARG ARG LYS GLY LYS GLU ASP GLU GLY GLU GLU ALA ALA S2410 P2411 M2412
I2415 Q2416 I2422 M2423 S2429 E2444 H2445 L2449 L2452 R2453 L2458 M2461 L2462 H2463 Q2464 A2465 D2478 F2479 P2480 M2481 Q2482 L2486 E2487 Q2491 R2492 Y2493 D2505 K2509 M2510 E2513 Y2517 I2521 P2527 N2531 E2538 W2545 W2548 Q2554
V2569 P2570 T2571 L2572 D2573 T2574 V2575 R2576 L2581 Y2582 T2583 K2589 P2590 L2591 V2592 L2593 M2603 T2604 L2605 D2614 M2615 E2616 L2620 S2623 P2628 E2629 L2630 T2634 K2657 V2660 C2663 D2664 E2665 I2666 W2667 L2668 M2671 D2672 K2673 T2676 F2682 Q2698 Q2707
K2721 P2722 L2723 R2726 P2732 V2733 S2743 I2747 R2753 L2769 M2773 F2776 M2779 F2784 Y2794 M2799 L2813 L2816 E2819 G2820 I2824 L2837 V2838 E2839 R2843 E2848 T2852 L2855 R2863 A2866 K2879 Y2892 R2896 L2897
K2898 D2917 R2921 I2922 L2933 L2934 G2937 T2944 R2948 M2953 L2956 I2961 Y2967 T2968 G2969 D2973 E2974 D2975 L2976 R2977 K2989 D2995 N2998 D3001 S3002 G3003 F3004 L3005 M3008 L3011 L3012 E3016 V3017 L3020 Y3026 M3030 T3031 E3035
Q3038 M3043 L3044 D3045 E3048 E3049 L3050 Y3051 Q3057 R3060 T3067 M3068 N3069 P3070 T3081 L3085 T3099 E3100 Q3104 T3110 M3113 D3114 L3115 D3124 Y3125 V3129 Y3130 D3131 K3132 L3133 P3134 Q3135 P3136 P3137 R3140 E3141 V3148 F3149 V3150 T3153 L3154 R3167
R3174 H3175 Y3176 L3177 I3180 R3191 S3192 E3193 L3194 E3195 E3196 Q3197 Q3198 M3199 H3200 K3207 T3211 V3212 D3213 Q3214 V3215 E3216 E3217 L3218 R3219 E3228 L3229 E3230 V3231 K3239 L3240 K3241 K3242 M3243 V3244 K3245 Q3248 E3249 A3250 E3251 K3252 K3253 K3254 V3255 M3256 S3257 Q3258 E3259 I3260 Q3263 L3264



• Molecule 1: Cytoplasmic dynein 1 heavy chain 1

Chain B:

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D143 S144 P145 T148 L149 H150 S151 F152 I153 S154 N155 A156 V157 F160 F161 K162 S163 Y164 I165 R166 E167 S168 G169 K170 A171 D172 R173 D174 G175 D176 K177 M178 A179 P180 S181 V182 E183 K184 K185 I186 A187 E188 L189 E190 L193 L194 H195 L196 Q197 Q198 N199 I200 E201 I202 P203 E204
H210 P211 M212 I213 T214 N215 V216 A217 K218 Q219 C220 Y221 E222 R223 K226 P227 K228 V229 T230 D231 F232 G233 D234 K235 V236 E237 D238 F241 L242 N243 Q244 L245 Q246 V249 N250 R251 W252 I253 R254 E255 I256 Q257 K258 V259 T260 K261 R264 D265 P266 A267 S268 G269 T270 Q273 E274
F277 W278 R283 A284 L285 Y286 R287 E290 K291 R292 E293 S294 P295 E296 T300 L301 D302 I303 L304 K305 H306 G307 K308 R309 F310 H311 A312 T313 V314 S315 F316 D317 T318 D319 T320 G321 L322 K323 Q324 A325 L326 N330 D331 Y332 N333 P334 L335 M336 K337 D338 F339 N342 D343
A347 T348 E349 L350 D351 K352 I353 R354 Q355 A356 L357 F361 T362 H363 L364 R365 K366 I367 R368 N369 T370 K371 R376 A377 L378 R379 E382 R386 D387 L388 Q391 L392 L393 K394 R399 K400 L401 M402 H403 V404 A405 Y406 E407 E408 F409 E410 K411 V412 M413 V414 T422 W423 D424
D425 E426 Y427 E428 K429 L430 Q431 V432 L433 L434 R435 D436 I437 Y438 K439 R440 K441 R442 E443 E444 N445 R451 I452 N453 P454 A455 H456 R457 K458 L459 R462 L463 D464 Q465 M466 R467 R470 R471 Q472 H473 E474 Q475 L476 R477 A478 V479 I480 V481 R482 V483 L484 R485 P486 Q487 V488 THR ALA
VAL ALA GLN GLN ASN GLN GLY GLU VAL PRO GLU PRO GLN ASP MET LYS VAL ALA GLU VAL LEU F512 D516 A517 N518 E521 N524 L525 A526 Y527 E528 N529 V530 K531 D537 V538 S539 K540 E541 G542 T543 W546 E547 A548 A549 M550 K551 R552 Y553 D554 E555 R556 I557 V560
E561 T562 R563 I564 R567 L568 R569 E580 M581 F582 R583 I584 R587 A590 L591 R594 P595 H596 E603 L608 I609 Q610 R611 V612 K613 E617 S618 L619 K622 Y627 Q631 A632 C633 K634 M635 S636 R639 D640 L641 P642 I648 I649 W650 Q653 I654
T659 K663 R664 V665 E666 L669 W673 E674 E678 G679 L682 K683 Q684 D685 F689 K692 L693 N694 E697 I698 D701 R704 I717 F718 T719 I720 E721 S722 T723 R724 V725 R726 N731 V732 L733 K734 L735 K736 V737 N738 E749 W755 R759 V760 P761
I764 Q770 Q773 I779 S780 L781 I782 E783 E793 E796 E797 R798 I801 L804 V805 L808 K809 K810 E811 V812 Q813 A814 L815 I816 A817 E818 G819 L822 W823 W824 Y832 V833 N842 E845 D848 D849 L850 L851 I852 I853 E854 E855 E860 L864
E865 Y869 D870 T873 F874 I877 R880 L888 Y893 S894 N895 L896 W899 K902 L903 D904 I907 E908 R909 I910 R914 L915 Q916 A921 W922 T923 Q924 L927 GLY GLN ALA GLU ASP LYS ALA GLU VAL ASP MET ASP THR ASP ALA PRO GLN VAL SER HIS
LYS PRO GLY GLY GLU P953 K956 H960 E961 L962 R963 Q967 V968 E977 C978 E985 M986 F987 A988 W989 K990 M991 V992 V993 L994 S995 L996 P997 S1001 GLN ARG TYR GLN VAL GLY VAL HIS TYR GLU LEU T1013 E1014 F1018 Y1019 R1020 L1023 M1026 P1027 V1031 A1032
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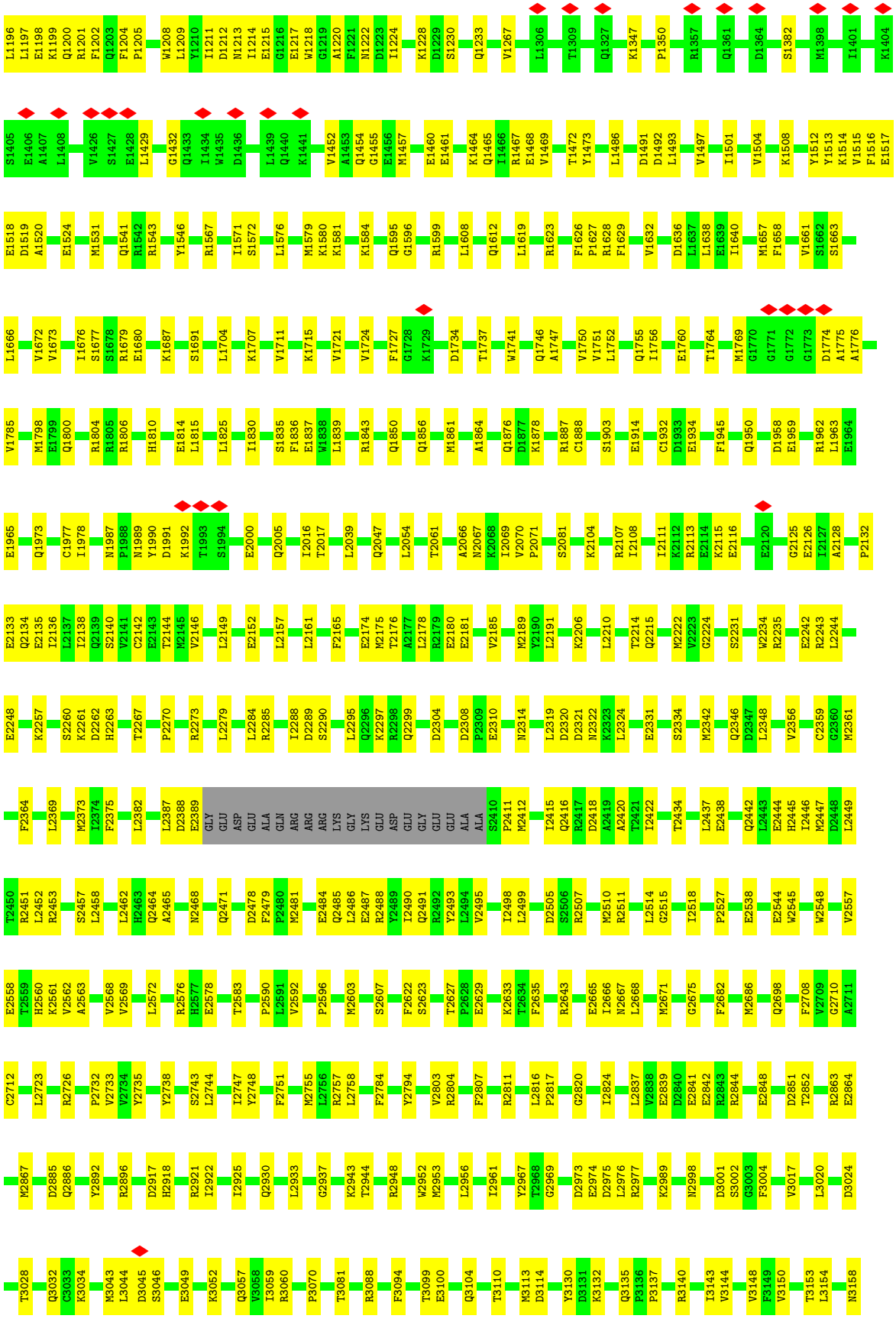
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S1405 E1406 A1407 L1408 V1426 S1427 E1428 L1429 G1432 Q1433 I1434 W1435 D1436 L1439 Q1440 K1441 V1452 A1453 Q1454 G1455 E1456 M1457 E1460 E1461 K1464 Q1465 I1466 R1467 E1468 V1469 T1472 Y1473 L1486 D1491 D1492 L1493 V1497 I1501 V1504 K1508 Y1512 Y1513 K1514 V1515 F1516 E1517
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E1965 Q1973 C1977 I1978 N1987 P1988 N1989 Y1990 D1991 K1992 T1993 S1994 E2000 Q2005 I2016 T2017 L2039 Q2047 L2054 T2061 A2066 N2067 K2068 I2069 V2070 P2071 S2081 K2104 R2107 I2108 I2111 K2112 R2113 E2114 K2115 E2116 E2120 G2125 E2126 I2127 A2128 P2132
E2133 Q2134 E2135 I2136 L2137 I2138 Q2139 S2140 V2141 C2142 E2143 T2144 M2145 V2146 L2149 E2152 L2157 L2161 F2165 E2174 M2175 T2176 A2177 L2178 R2179 E2180 E2181 V2185 M2189 Y2190 L2191 K2206 L2210 T2214 Q2215 M2222 V2223 G2224 S2231 W2234 R2235 E2242 R2243 L2244
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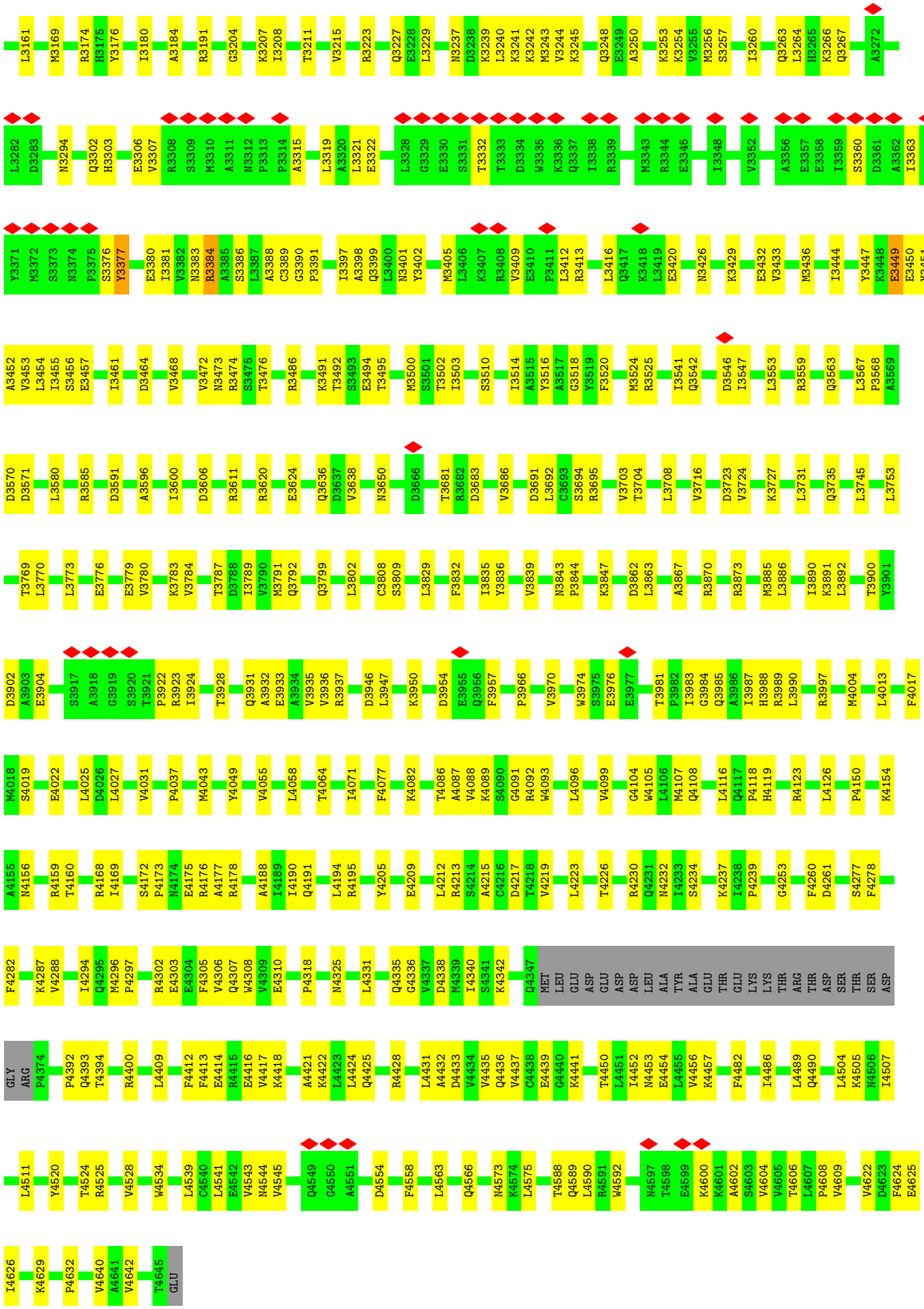
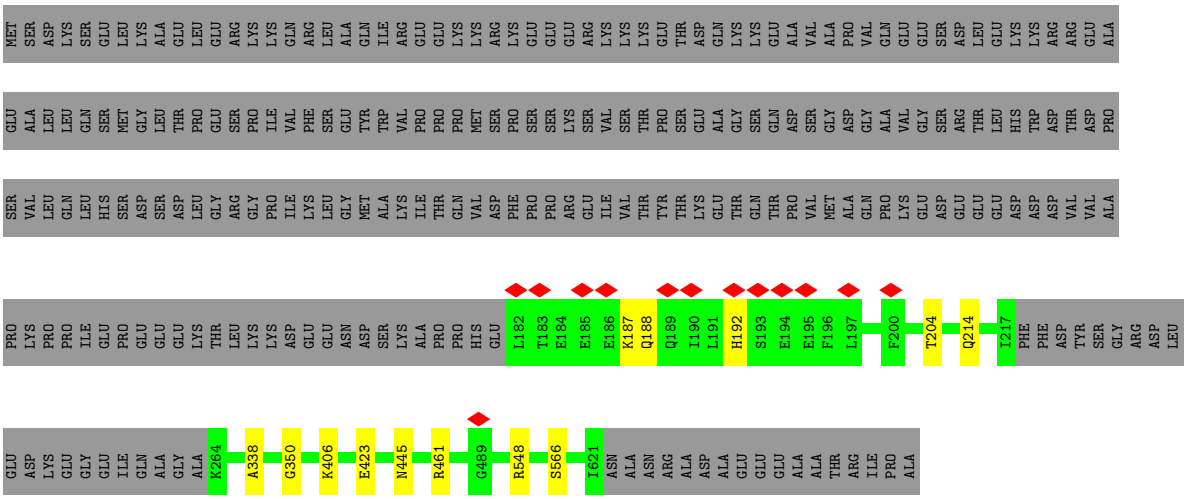
F2364 L2369 M2373 I2374 F2375 L2382 L2387 D2388 E2389 GLY GLU ASP GLU ALA GLN ARG ARG ARG LYS GLY LYS GLU ASP GLU GLY GLU GLU ALA ALA S2410 P2411 M2412 I2415 Q2416 R2417 D2418 A2419 A2420 T2421 I2422 T2434 L2437 E2438 Q2442 L2443 E2444 H2445 I2446 M2447 D2448 L2449
T2450 R2451 L2452 R2453 S2457 L2458 L2462 H2463 Q2464 A2465 N2468 Q2471 D2478 F2479 P2480 M2481 E2484 Q2485 L2486 E2487 R2488 Y2489 I2490 Q2491 R2492 Y2493 L2494 V2495 I2498 L2499 D2505 S2506 R2507 M2510 R2511 L2514 G2515 I2518 P2527 E2538 E2544 W2545 W2548 V2557
E2558 T2559 H2560 K2561 V2562 A2563 V2568 V2569 L2572 R2576 H2577 E2578 T2583 P2590 L2591 V2592 P2596 M2603 S2607 F2622 S2623 T2627 P2628 E2629 K2633 T2634 F2635 R2643 E2665 I2666 N2667 L2668 M2671 G2675 F2682 M2686 Q2698 F2708 V2709 G2710 A2711
C2712 L2723 R2726 P2732 V2733 Y2734 Y2735 Y2738 S2743 L2744 I2747 Y2748 F2751 M2755 L2756 R2757 L2758 F2784 Y2794 V2803 R2804 F2807 R2811 L2816 P2817 G2820 I2824 L2837 V2838 E2839 D2840 E2841 E2842 R2843 R2844 E2848 D2851 T2852 R2863 E2864
M2867 D2885 Q2886 Y2892 R2896 D2917 H2918 R2921 I2922 I2925 Q2930 L2933 G2937 K2943 T2944 R2948 W2952 M2953 L2956 I2961 Y2967 T2968 G2969 D2973 E2974 D2975 L2976 R2977 K2989 N2998 D3001 S3002 G3003 F3004 V3017 L3020 D3024
T3028 Q3032 C3033 K3034 M3043 L3044 D3045 S3046 E3049 K3052 Q3057 V3058 I3059 R3060 P3070 T3081 R3088 F3094 T3099 E3100 Q3104 T3110 M3113 D3114 Y3130 D3131 K3132 Q3135 P3136 P3137 R3140 I3143 V3144 V3148 F3149 V3150 T3153 L3154 N3158



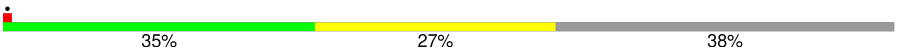
• Molecule 2: Cytoplasmic dynein 1 intermediate chain 2

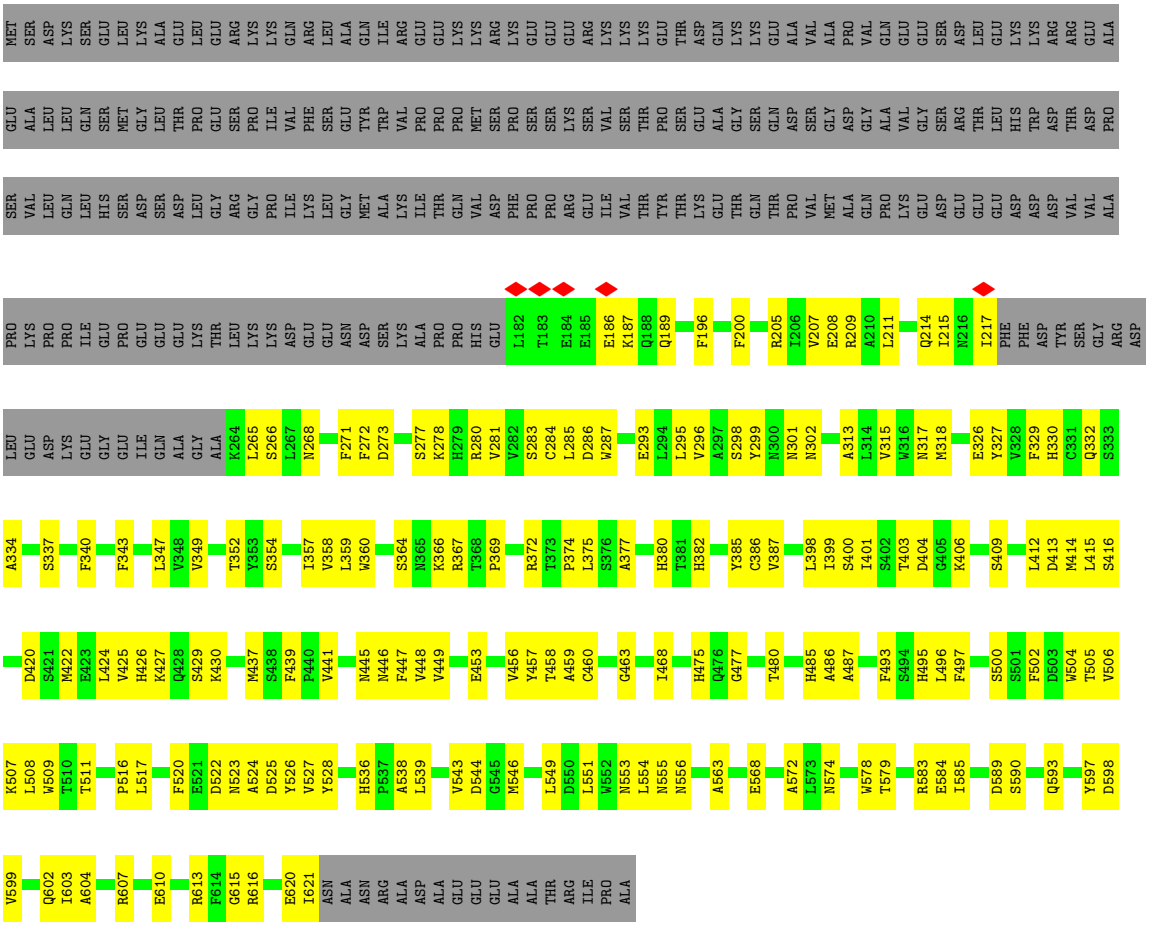
Chain C:



• Molecule 2: Cytoplasmic dynein 1 intermediate chain 2

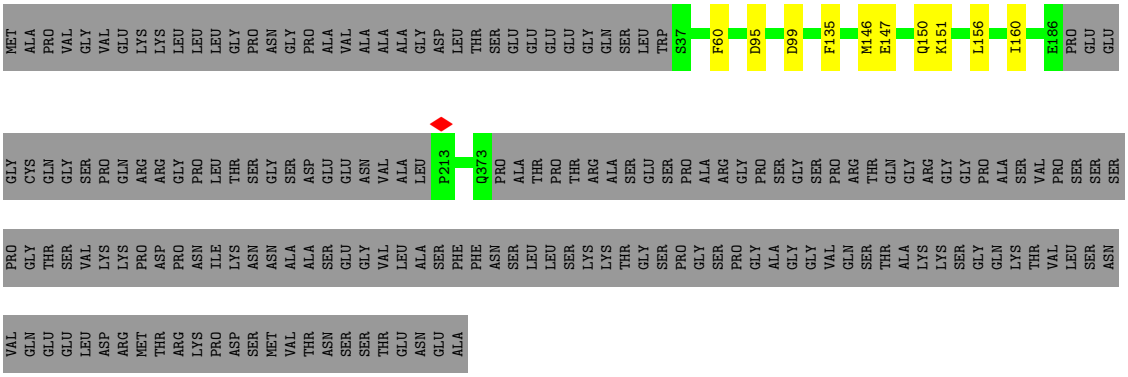
Chain D:





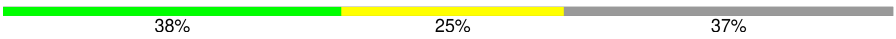
• Molecule 3: Cytoplasmic dynein 1 light intermediate chain 2

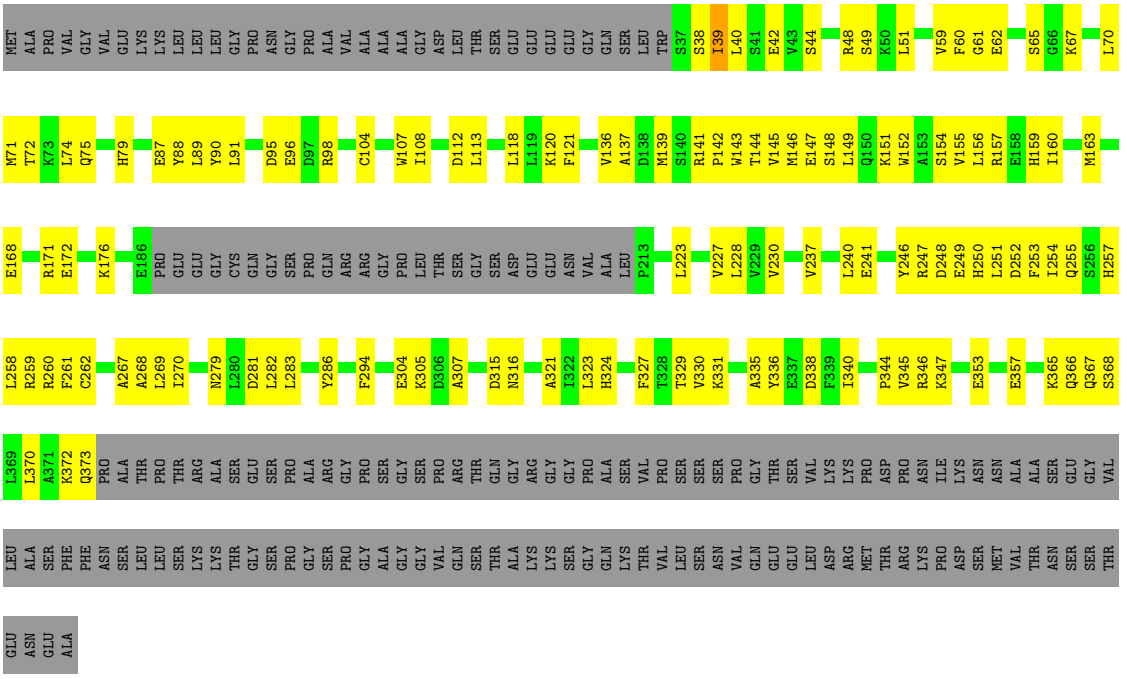
Chain E:



• Molecule 3: Cytoplasmic dynein 1 light intermediate chain 2

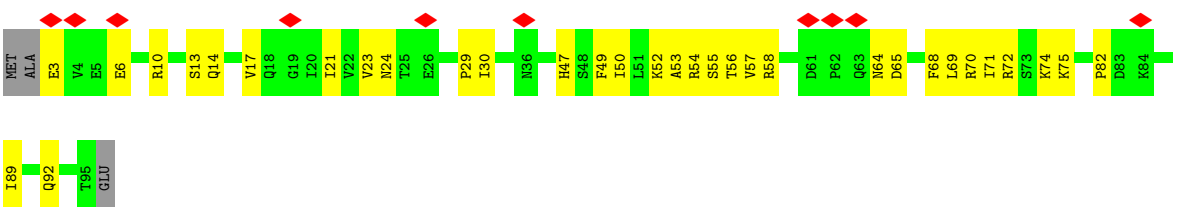
Chain F:





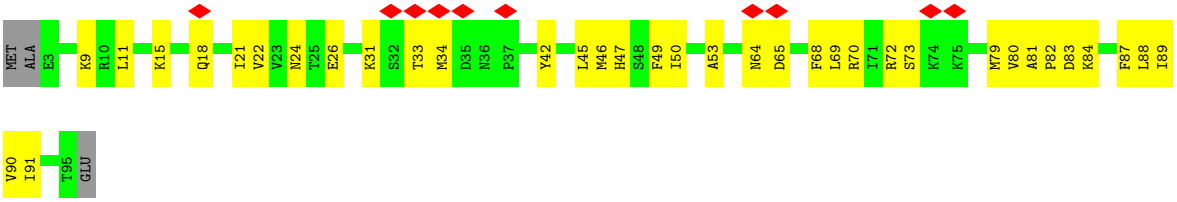
• Molecule 4: Dynein light chain roadblock-type 1

Chain G:

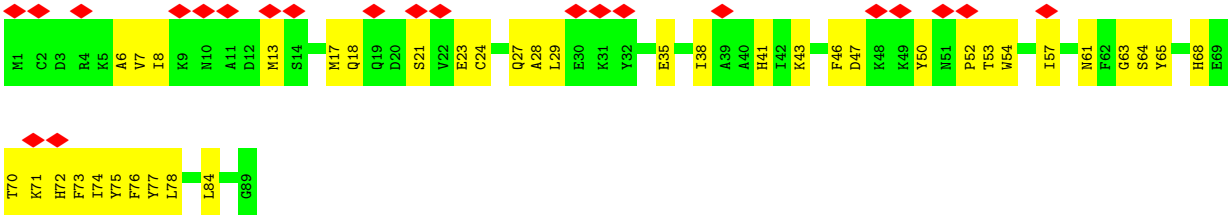


• Molecule 4: Dynein light chain roadblock-type 1

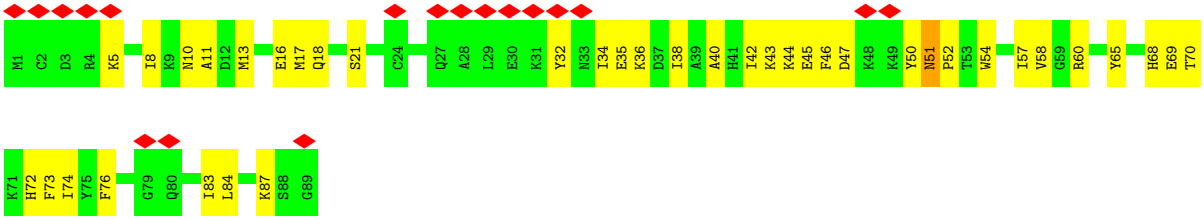
Chain H:



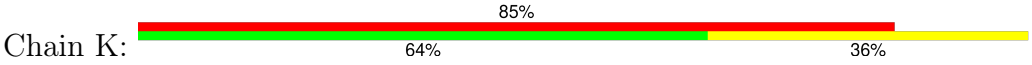
• Molecule 5: Dynein light chain 1, cytoplasmic



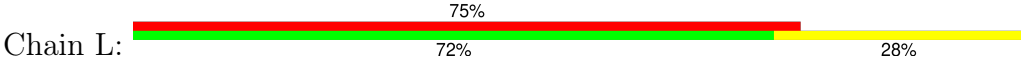
• Molecule 5: Dynein light chain 1, cytoplasmic

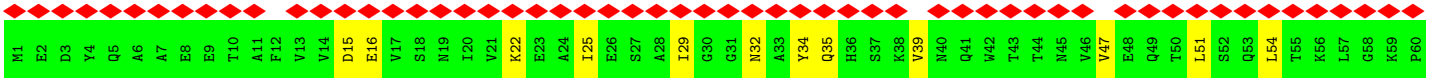


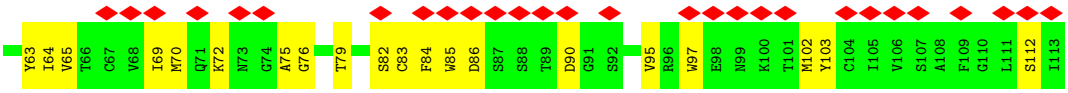
• Molecule 6: Dynein light chain Tctex-type 1



• Molecule 6: Dynein light chain Tctex-type 1






Y63
I64
V65
T66
C67
V68
I69
M70
Q71
K72
N73
G74
A75
G76
T79
S82
C83
F84
W85
D86
S87
S88
T89
D90
G91
S92
V95
R96
W97
E98
N99
K100
T101
M102
Y103
C104
I105
V106
S107
A108
F109
G110
L111
S112
I113

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	103097	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2600	Depositor
Magnification	45000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	2.240	Depositor
Minimum map value	0.000	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.017	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	729.12, 729.12, 729.12	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.736, 1.736, 1.736	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ADP, ATP, MG

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	0.19	0/37419	0.42	1/50625 (0.0%)
1	B	0.15	0/37249	0.37	2/50395 (0.0%)
2	C	0.18	0/3195	0.40	0/4351
2	D	0.15	0/3195	0.41	0/4351
3	E	0.16	0/2573	0.38	0/3473
3	F	0.16	0/2573	0.38	0/3473
4	G	0.14	0/752	0.37	0/1017
4	H	0.15	0/752	0.42	0/1017
5	I	0.21	0/744	0.48	0/997
5	J	0.17	0/744	0.47	0/997
6	K	0.15	0/888	0.40	0/1203
6	L	0.15	0/888	0.38	0/1203
All	All	0.17	0/90972	0.40	3/123102 (0.0%)

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	A	0	1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	3449	GLU	CA-C-N	-7.56	108.82	120.31
1	B	3449	GLU	C-N-CA	-7.56	108.82	120.31
1	A	1402	GLU	N-CA-C	-6.67	106.35	114.75

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	3438	ARG	Sidechain

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	36692	0	36962	848	0
1	B	36527	0	36809	988	0
2	C	3112	0	2964	10	0
2	D	3112	0	2964	129	0
3	E	2518	0	2525	5	0
3	F	2518	0	2525	99	0
4	G	742	0	768	29	0
4	H	742	0	768	32	0
5	I	728	0	714	41	0
5	J	728	0	714	51	0
6	K	872	0	846	37	0
6	L	872	0	846	32	0
7	A	81	0	36	2	0
7	B	81	0	36	2	0
8	A	31	0	12	0	0
8	B	31	0	12	0	0
9	A	2	0	0	0	0
9	B	2	0	0	0	0
All	All	89391	0	89501	2182	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 14.

The worst 5 of 2182 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:A:3257:SER:HA	1:A:3260:ILE:HD12	1.20	1.10
1:A:185:LYS:HE3	1:B:189:LEU:HD13	1.52	0.89

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:3441:GLU:HA	1:A:3444:ILE:HD12	1.54	0.89
1:B:333:ASN:HA	1:B:336:MET:HE3	1.56	0.88
1:A:457:ARG:O	1:A:461:ALA:N	2.08	0.87

There are no symmetry-related clashes.

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 PDB entries followed by that with respect to all EM entries.

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	4530/4646 (98%)	4360 (96%)	165 (4%)	5 (0%)	48 83
1	B	4509/4646 (97%)	4383 (97%)	122 (3%)	4 (0%)	48 83
2	C	390/638 (61%)	364 (93%)	26 (7%)	0	100 100
2	D	390/638 (61%)	367 (94%)	23 (6%)	0	100 100
3	E	307/492 (62%)	292 (95%)	15 (5%)	0	100 100
3	F	307/492 (62%)	291 (95%)	14 (5%)	2 (1%)	19 56
4	G	91/96 (95%)	87 (96%)	4 (4%)	0	100 100
4	H	91/96 (95%)	85 (93%)	6 (7%)	0	100 100
5	I	87/89 (98%)	83 (95%)	4 (5%)	0	100 100
5	J	87/89 (98%)	82 (94%)	4 (5%)	1 (1%)	12 46
6	K	111/113 (98%)	107 (96%)	4 (4%)	0	100 100
6	L	111/113 (98%)	109 (98%)	2 (2%)	0	100 100
All	All	11011/12148 (91%)	10610 (96%)	389 (4%)	12 (0%)	50 83

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	589	ASN
1	A	3384	ARG

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Mol	Chain	Res	Type
1	B	540	LYS
1	B	3384	ARG
1	A	3444	ILE

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 PDB entries followed by that with respect to all EM entries.

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	4044/4125 (98%)	4038 (100%)	6 (0%)	92 94
1	B	4028/4125 (98%)	4028 (100%)	0	100 100
2	C	344/557 (62%)	344 (100%)	0	100 100
2	D	344/557 (62%)	344 (100%)	0	100 100
3	E	279/422 (66%)	279 (100%)	0	100 100
3	F	279/422 (66%)	279 (100%)	0	100 100
4	G	87/89 (98%)	87 (100%)	0	100 100
4	H	87/89 (98%)	87 (100%)	0	100 100
5	I	78/78 (100%)	78 (100%)	0	100 100
5	J	78/78 (100%)	78 (100%)	0	100 100
6	K	97/97 (100%)	97 (100%)	0	100 100
6	L	97/97 (100%)	97 (100%)	0	100 100
All	All	9842/10736 (92%)	9836 (100%)	6 (0%)	92 94

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	3447	TYR
1	A	3454	LEU
1	A	3461	ILE
1	A	3437	ILE
1	A	3434	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 94

such sidechains are listed below:

Mol	Chain	Res	Type
1	B	2476	HIS
1	B	3563	GLN
1	B	2560	HIS
1	B	3104	GLN
1	B	4156	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 oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
8	ATP	B	4702	9	28,33,33	0.71	0	34,52,52	0.59	1 (2%)
7	ADP	B	4703	-	24,29,29	0.86	0	29,45,45	1.23	2 (6%)
7	ADP	A	4704	-	24,29,29	0.86	0	29,45,45	1.17	2 (6%)
7	ADP	B	4701	9	24,29,29	0.88	0	29,45,45	1.18	2 (6%)
7	ADP	A	4703	-	24,29,29	0.88	0	29,45,45	1.22	2 (6%)
7	ADP	A	4701	9	24,29,29	0.89	0	29,45,45	1.20	2 (6%)
8	ATP	A	4702	9	28,33,33	0.71	0	34,52,52	0.60	1 (2%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
7	ADP	B	4704	-	24,29,29	0.87	0	29,45,45	1.18	2 (6%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	ATP	B	4702	9	-	6/18/38/38	0/3/3/3
7	ADP	B	4703	-	-	0/12/32/32	0/3/3/3
7	ADP	A	4704	-	-	2/12/32/32	0/3/3/3
7	ADP	B	4701	9	-	3/12/32/32	0/3/3/3
7	ADP	A	4703	-	-	2/12/32/32	0/3/3/3
7	ADP	A	4701	9	-	3/12/32/32	0/3/3/3
8	ATP	A	4702	9	-	6/18/38/38	0/3/3/3
7	ADP	B	4704	-	-	3/12/32/32	0/3/3/3

There are no bond length outliers.

The worst 5 of 14 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	B	4703	ADP	N3-C2-N1	-3.74	123.60	128.67
7	A	4703	ADP	N3-C2-N1	-3.72	123.63	128.67
7	A	4701	ADP	N3-C2-N1	-3.64	123.73	128.67
7	B	4701	ADP	N3-C2-N1	-3.64	123.74	128.67
7	B	4704	ADP	N3-C2-N1	-3.58	123.81	128.67

There are no chirality outliers.

5 of 25 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	4701	ADP	C5'-O5'-PA-O1A
7	A	4701	ADP	C5'-O5'-PA-O2A
7	A	4701	ADP	C5'-O5'-PA-O3A
7	A	4704	ADP	C5'-O5'-PA-O1A
7	B	4701	ADP	C5'-O5'-PA-O1A

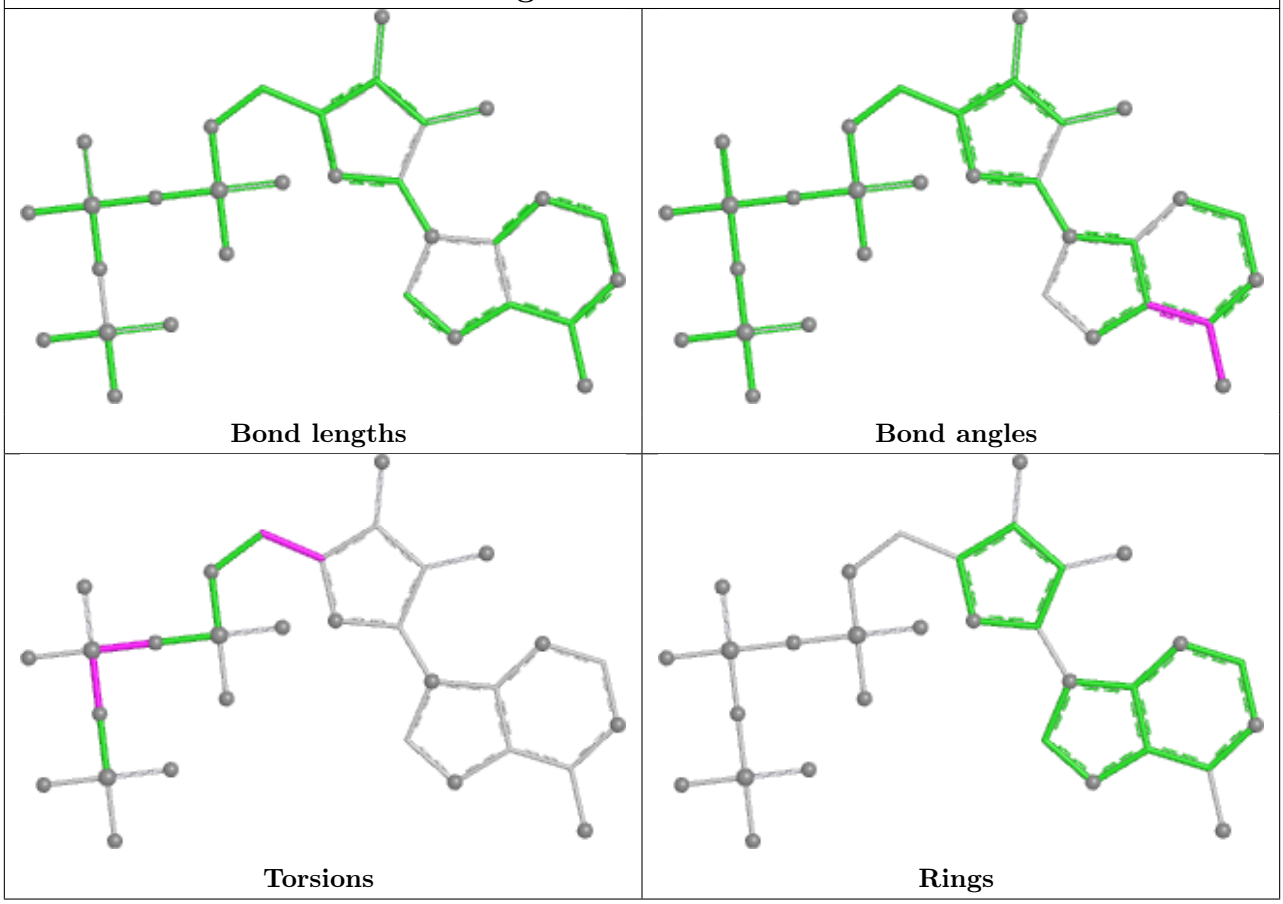
There are no ring outliers.

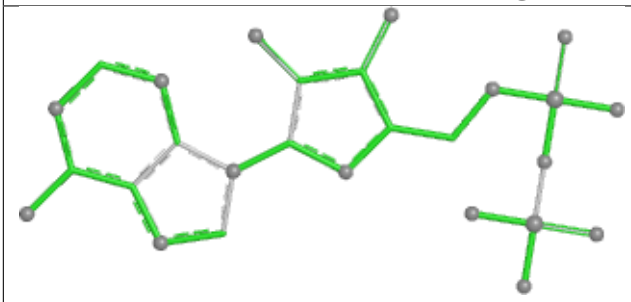
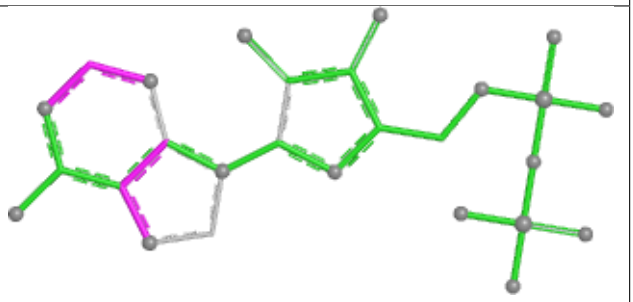
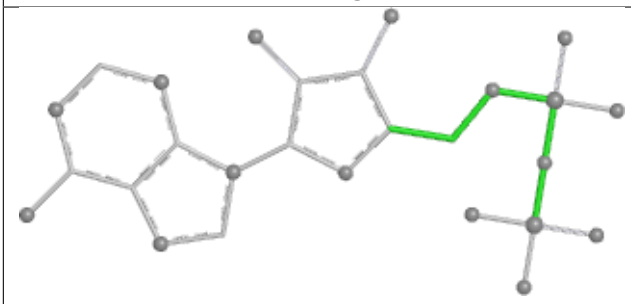
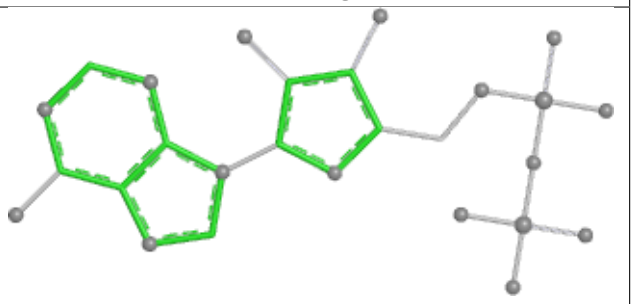
4 monomers are involved in 4 short contacts:

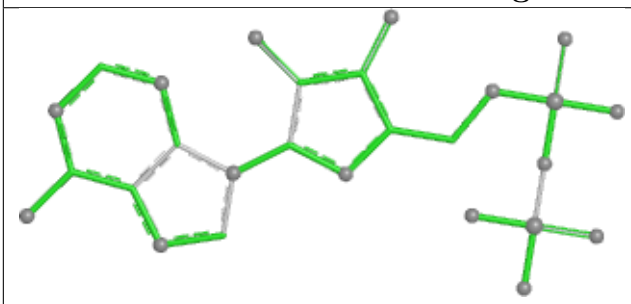
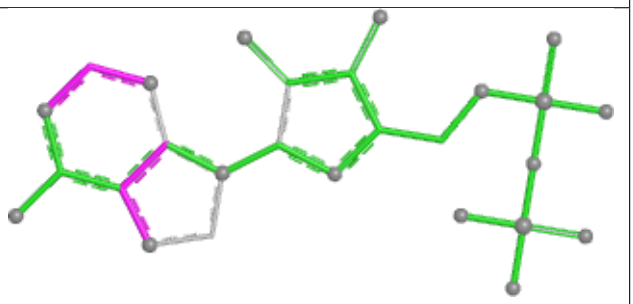
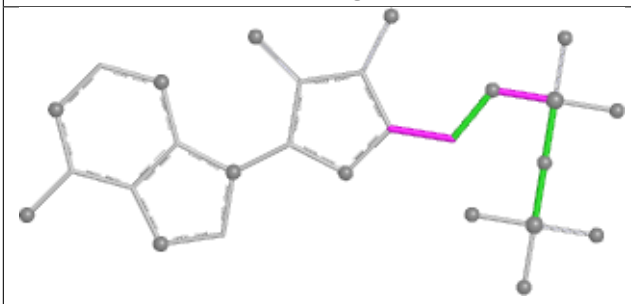
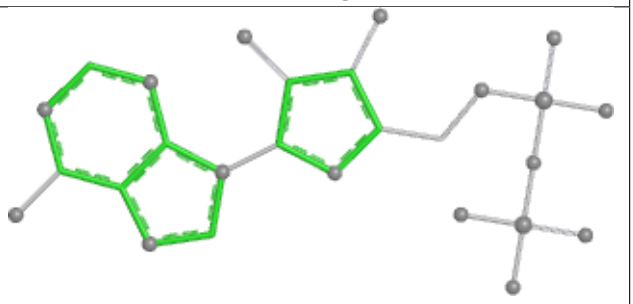
Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	4701	ADP	1	0
7	A	4703	ADP	1	0
7	A	4701	ADP	1	0
7	B	4704	ADP	1	0

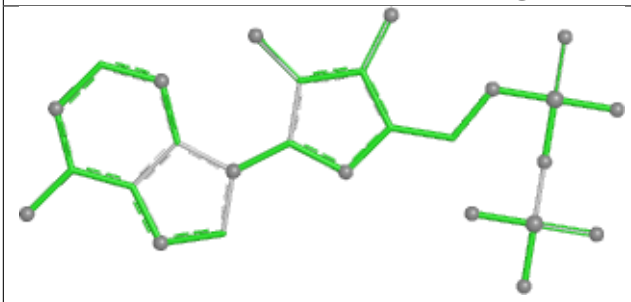
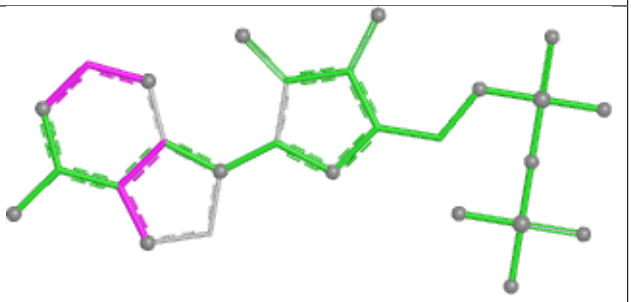
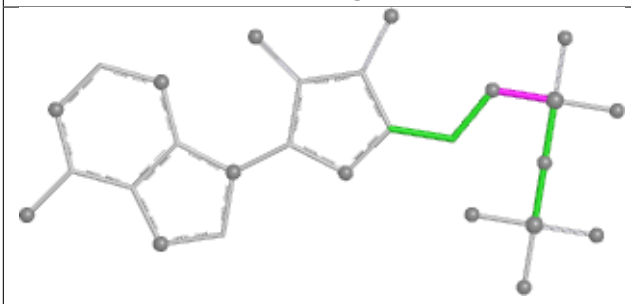
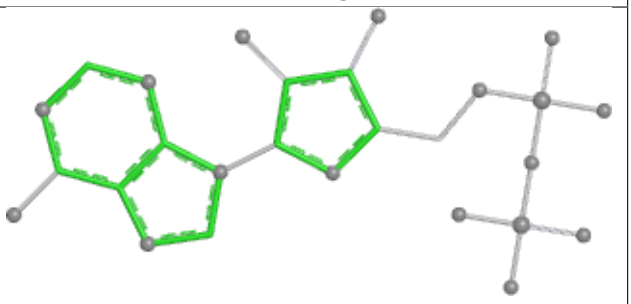
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

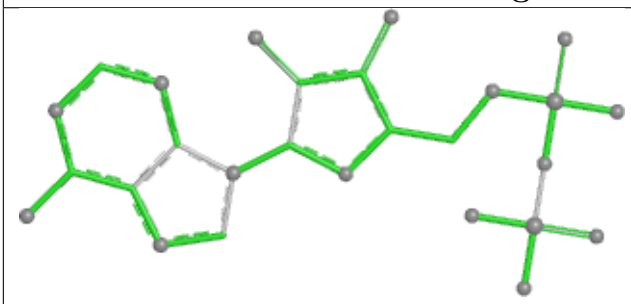
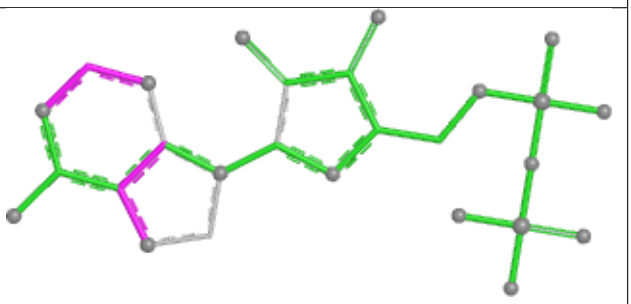
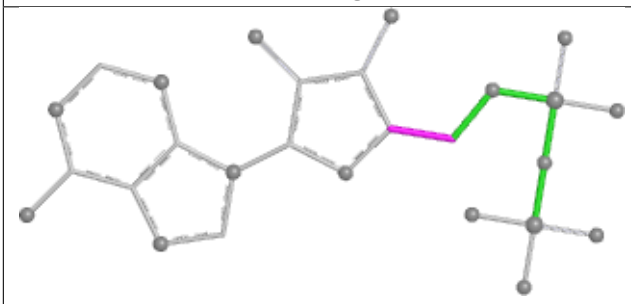
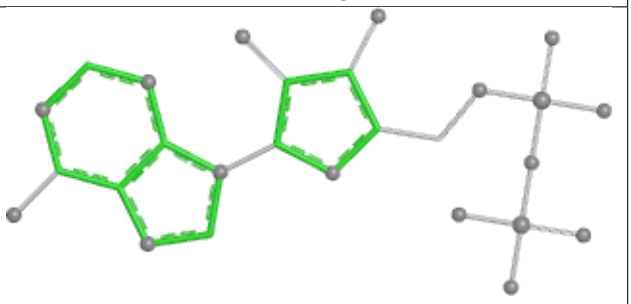
Ligand ATP B 4702



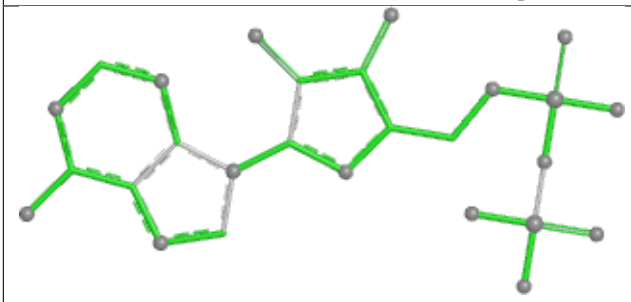
Ligand ADP B 4703	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand ADP A 4704	
 Bond lengths	 Bond angles
 Torsions	 Rings

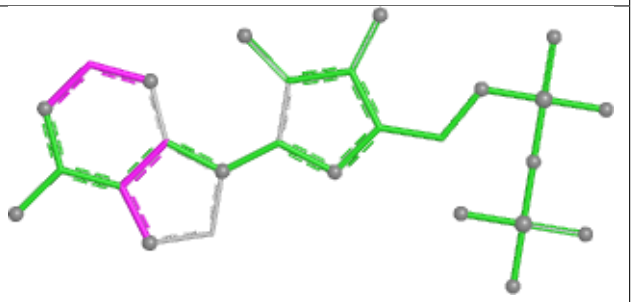
Ligand ADP B 4701	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand ADP A 4703	
 Bond lengths	 Bond angles
 Torsions	 Rings

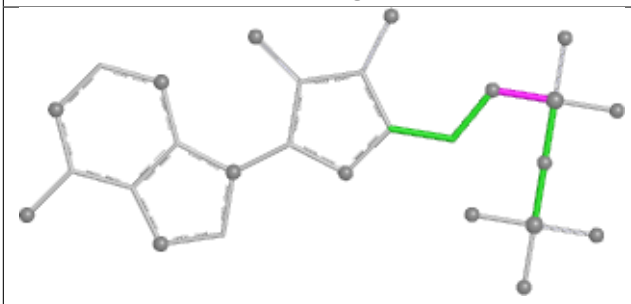
Ligand ADP A 4701



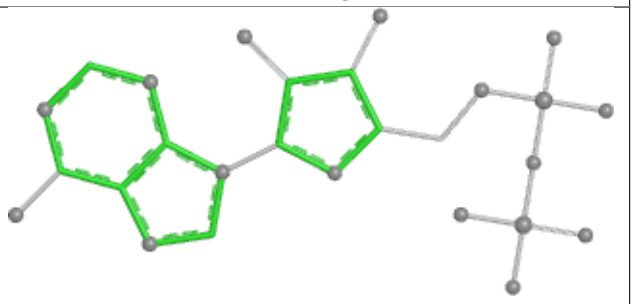
Bond lengths



Bond angles

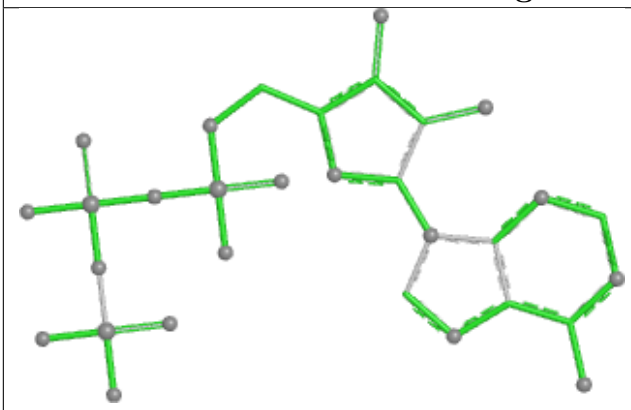


Torsions

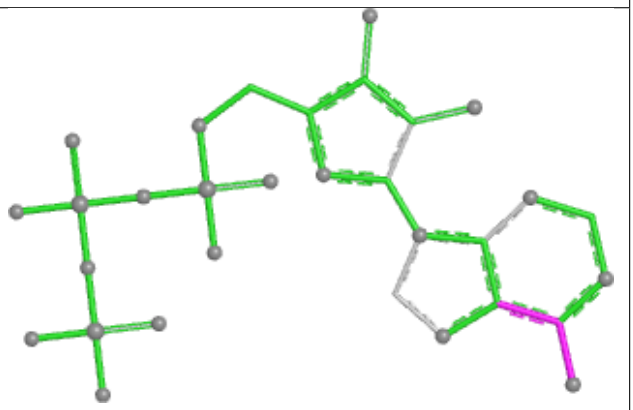


Rings

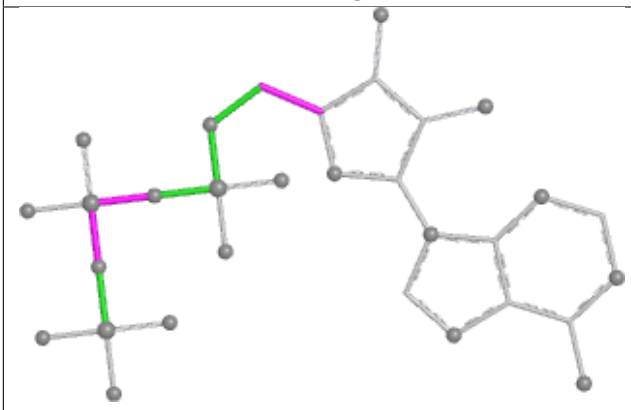
Ligand ATP A 4702



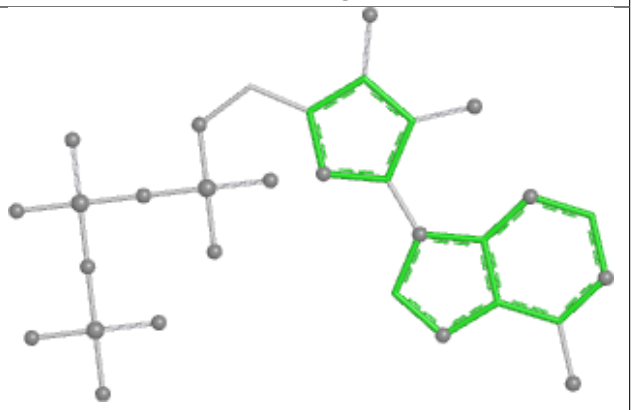
Bond lengths



Bond angles

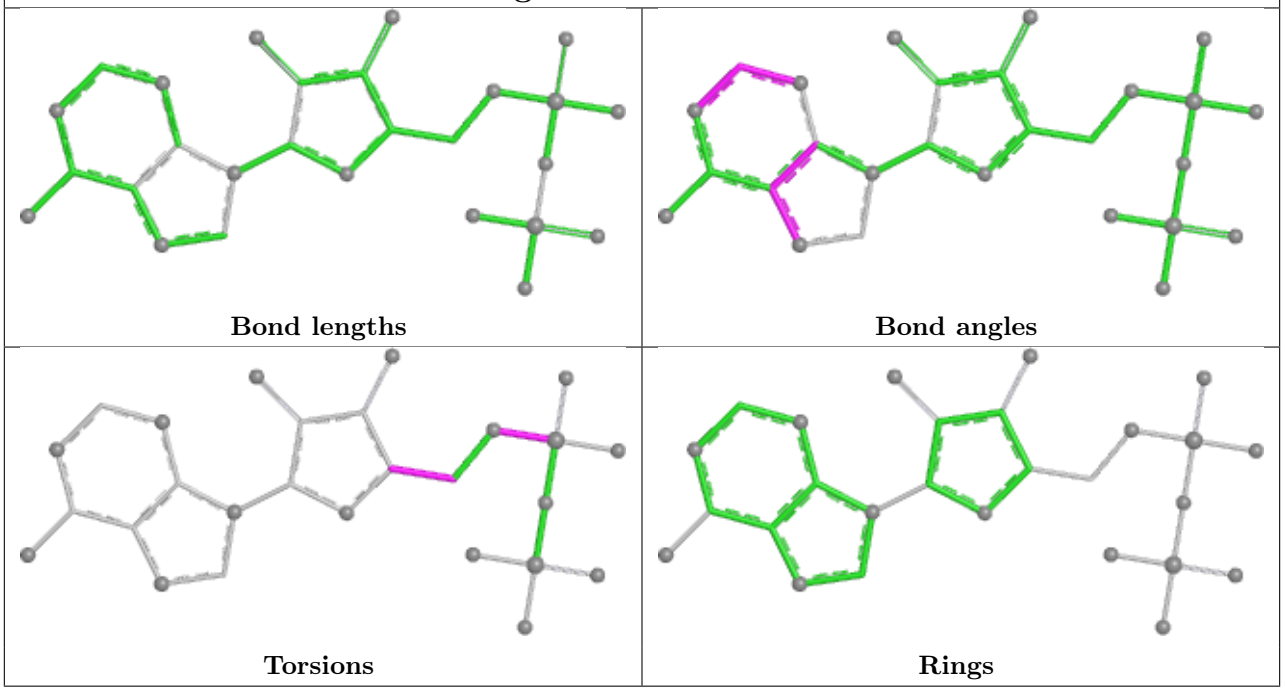


Torsions



Rings

Ligand ADP B 4704



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	A	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	1456:GLU	C	1457:MET	N	2.96

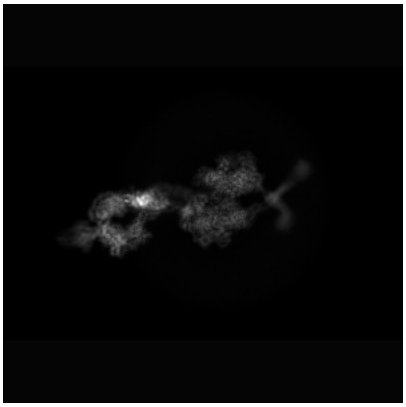
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-47381. These allow visual inspection of the internal detail of the map and identification of artifacts.

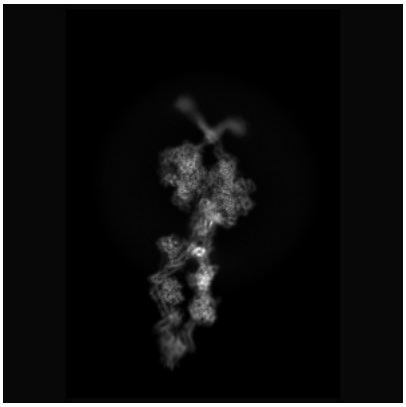
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

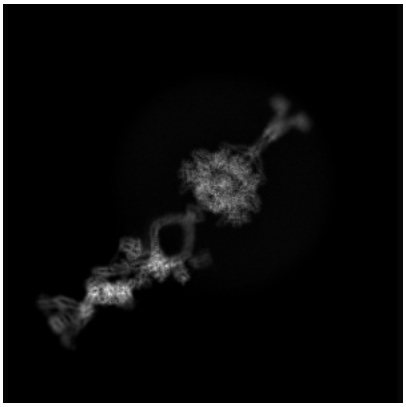
6.1.1 Primary map



X



Y

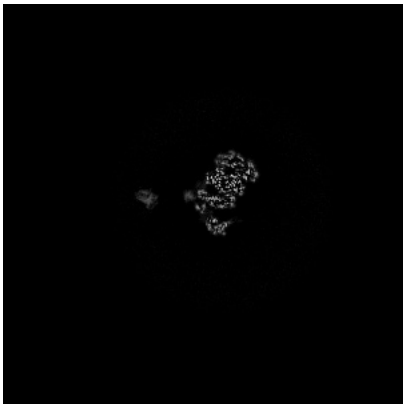


Z

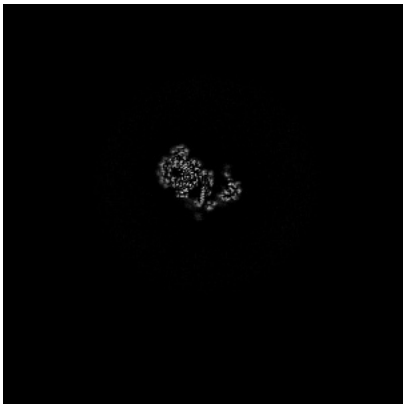
The images above show the map projected in three orthogonal directions.

6.2 Central slices

6.2.1 Primary map



X Index: 210



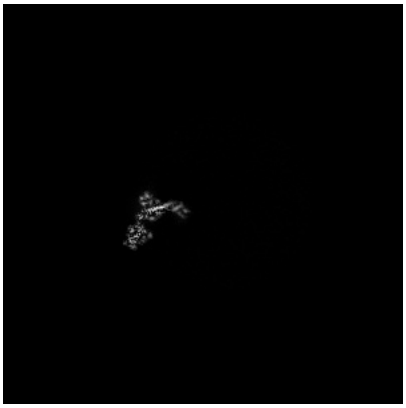
Y Index: 210

Z Index: 210

The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

6.3.1 Primary map



X Index: 162

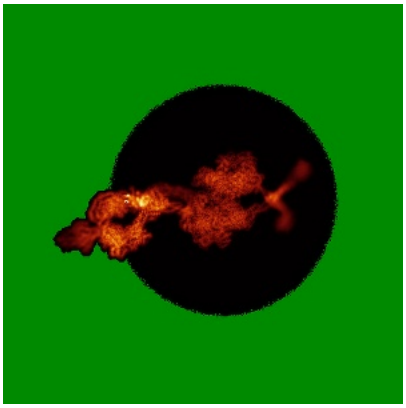
Y Index: 144

Z Index: 212

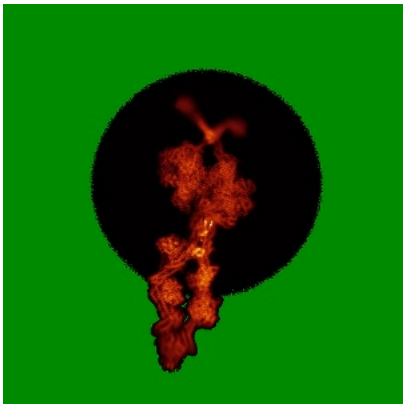
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

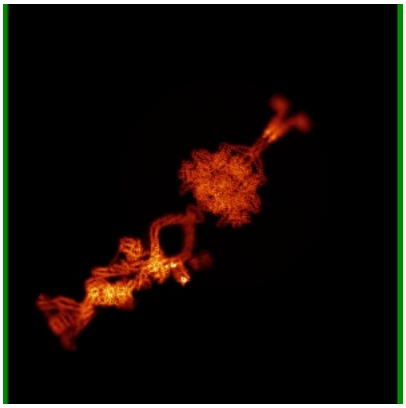
6.4.1 Primary map



X



Y



Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.15. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

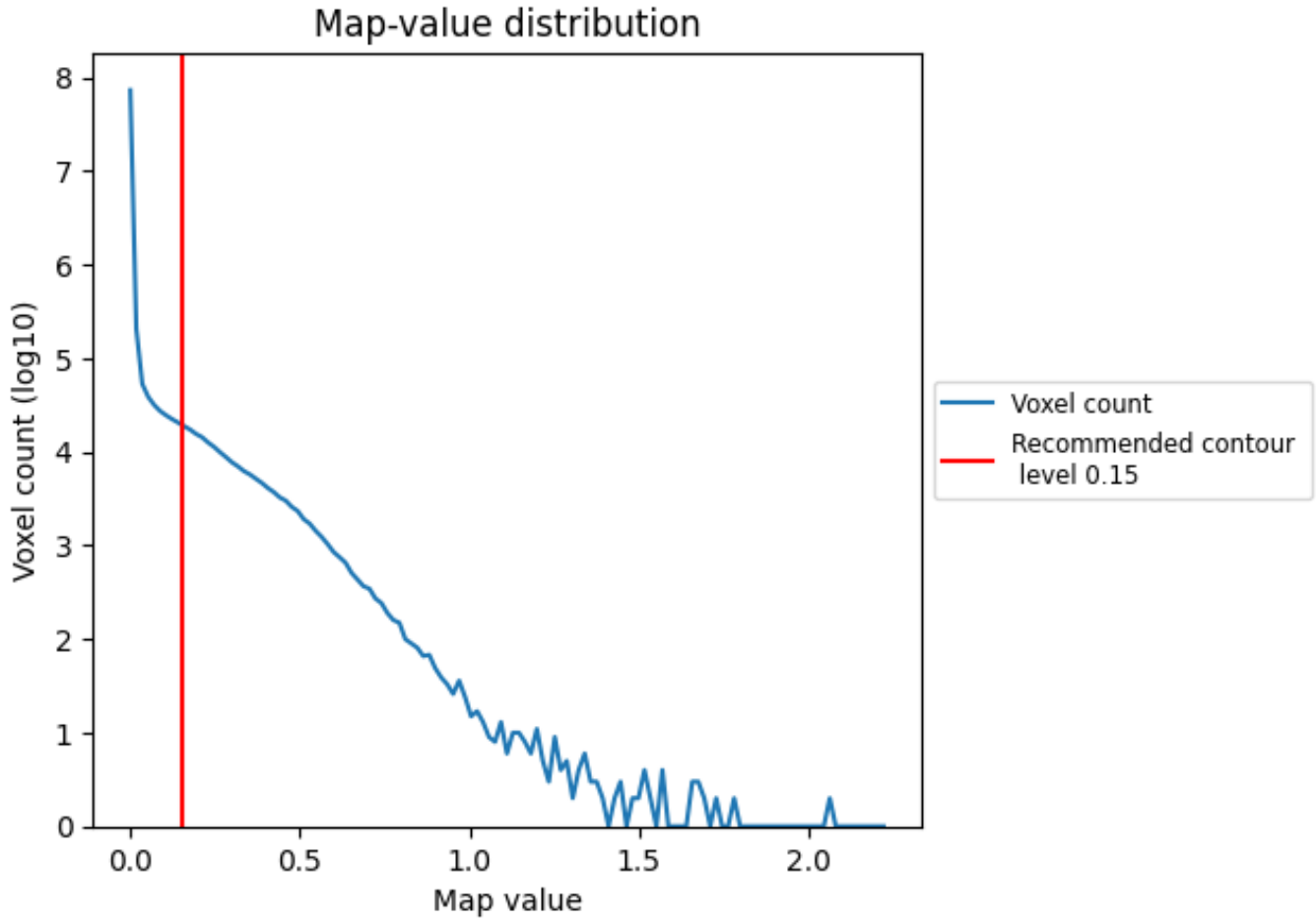
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

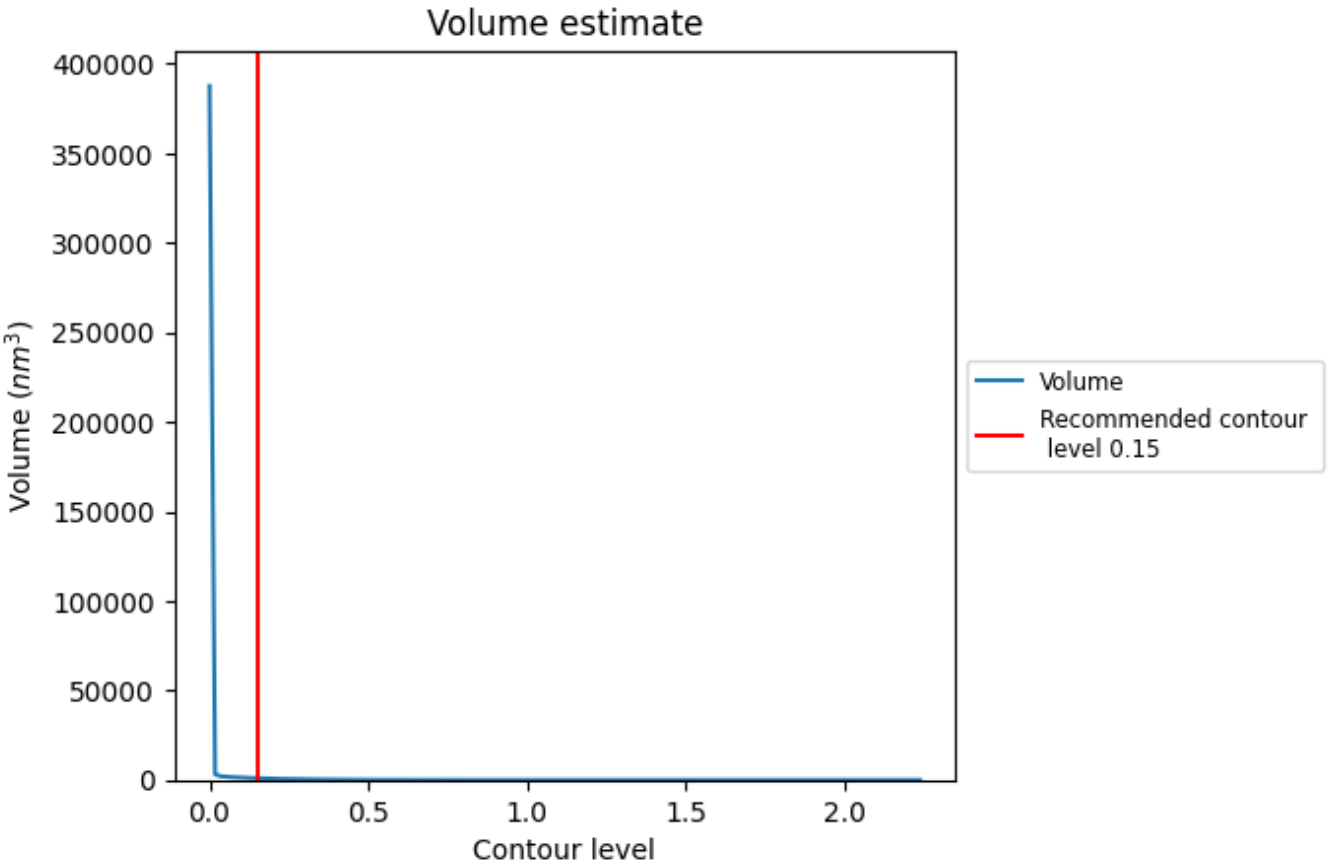
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

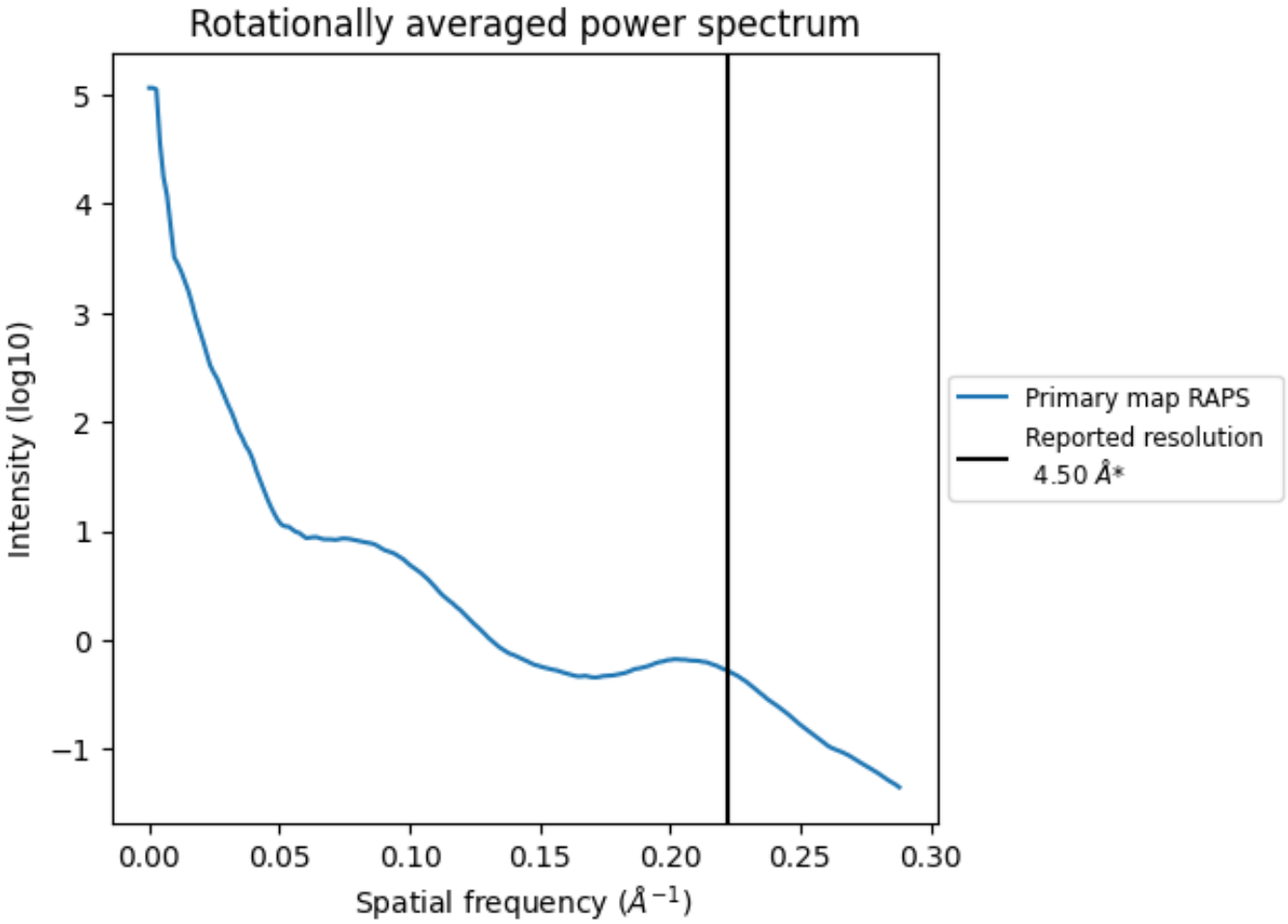
7.2 Volume estimate (i)



The volume at the recommended contour level is 984 nm^3; this corresponds to an approximate mass of 888 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)



*Reported resolution corresponds to spatial frequency of 0.222 Å^{-1}

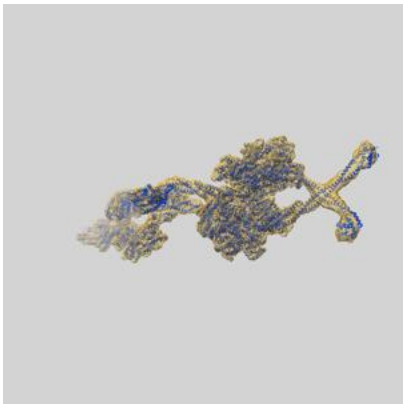
8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.

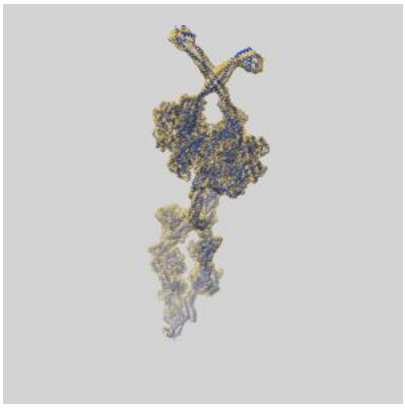
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-47381 and PDB model 9E12. Per-residue inclusion information can be found in section 3 on page 7.

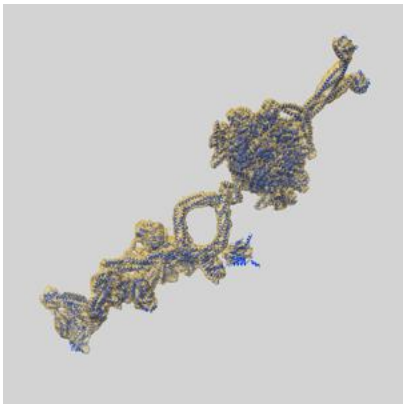
9.1 Map-model overlay



X



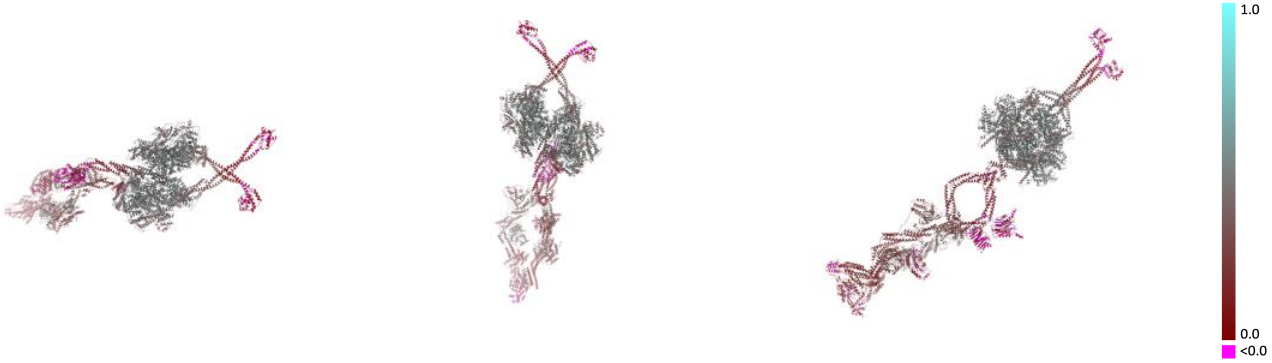
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

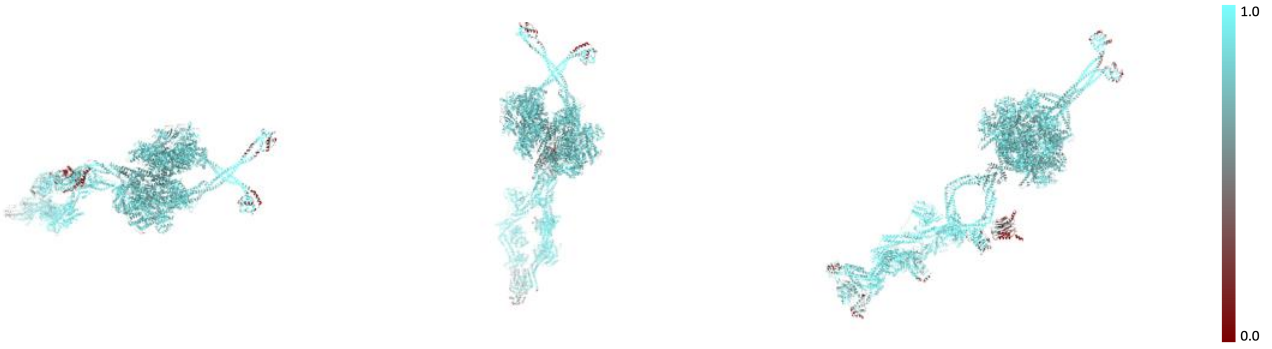
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

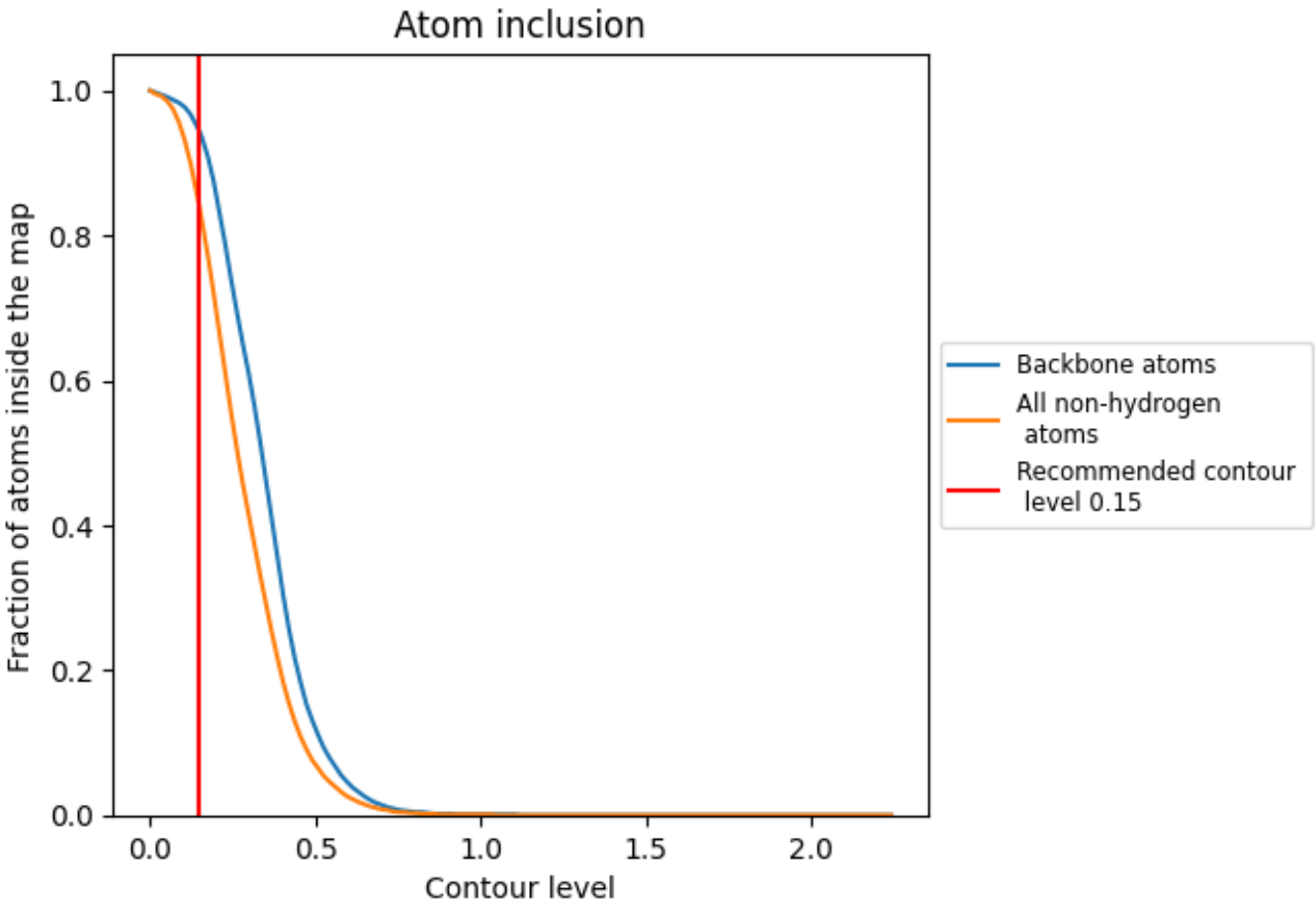
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.15).

9.4 Atom inclusion (i)



At the recommended contour level, 94% of all backbone atoms, 84% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.15) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8380	0.3430
A	0.8390	0.3700
B	0.8430	0.3640
C	0.9250	0.3340
D	0.9340	0.2750
E	0.9430	0.3160
F	0.9380	0.2850
G	0.7930	0.1060
H	0.7960	0.1400
I	0.6740	0.0410
J	0.7800	0.0680
K	0.1630	0.0320
L	0.2470	0.0410