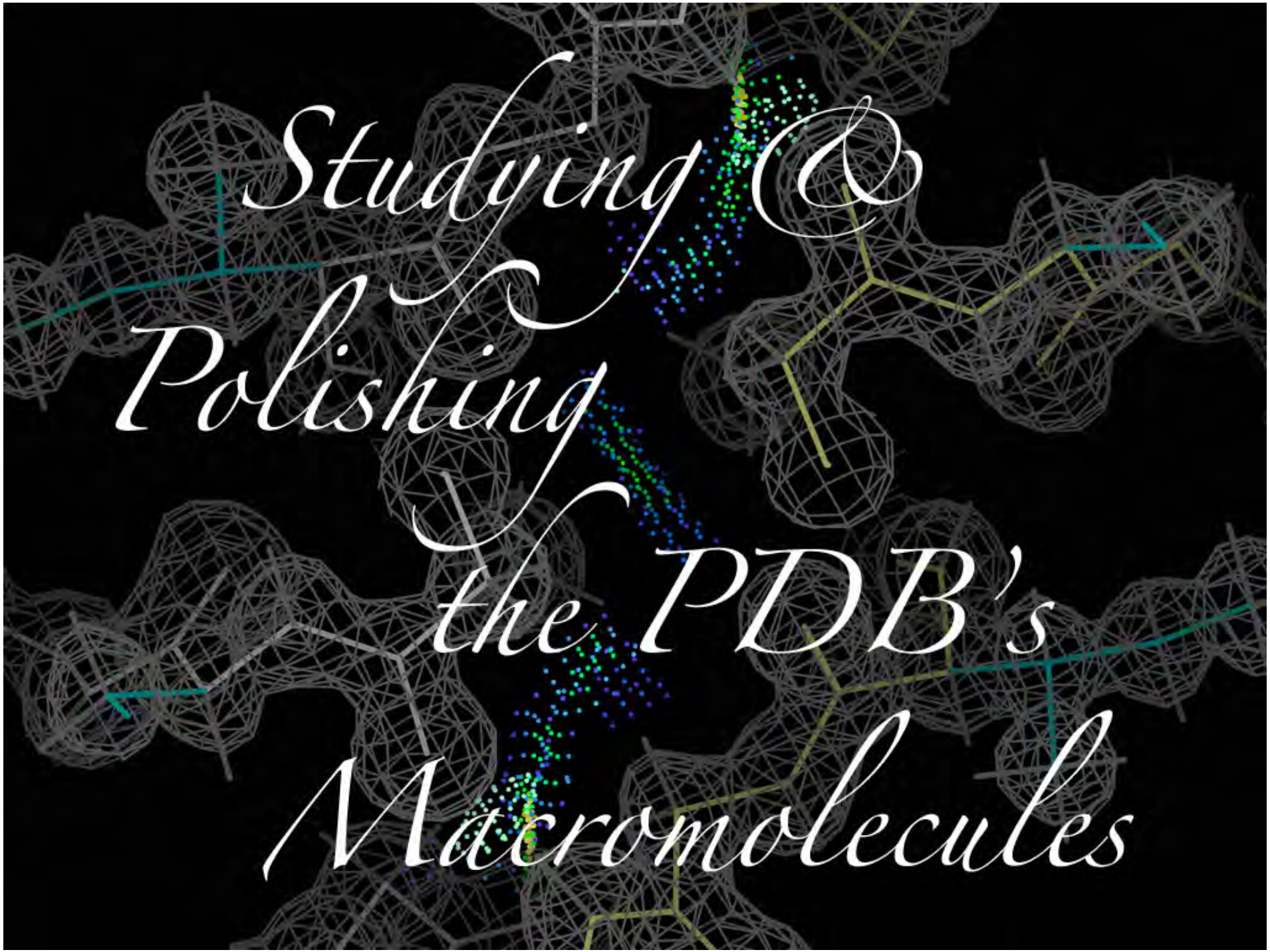
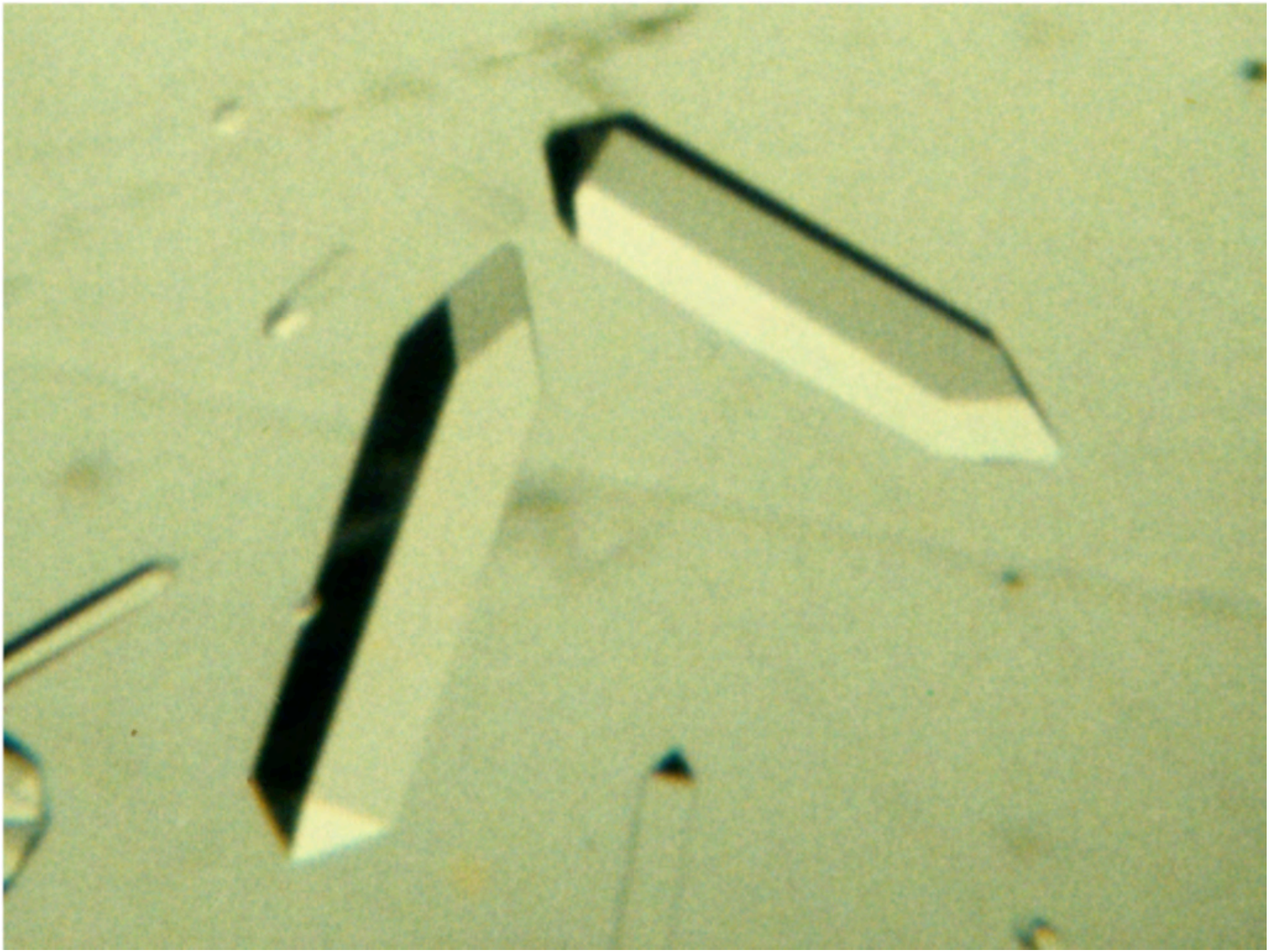
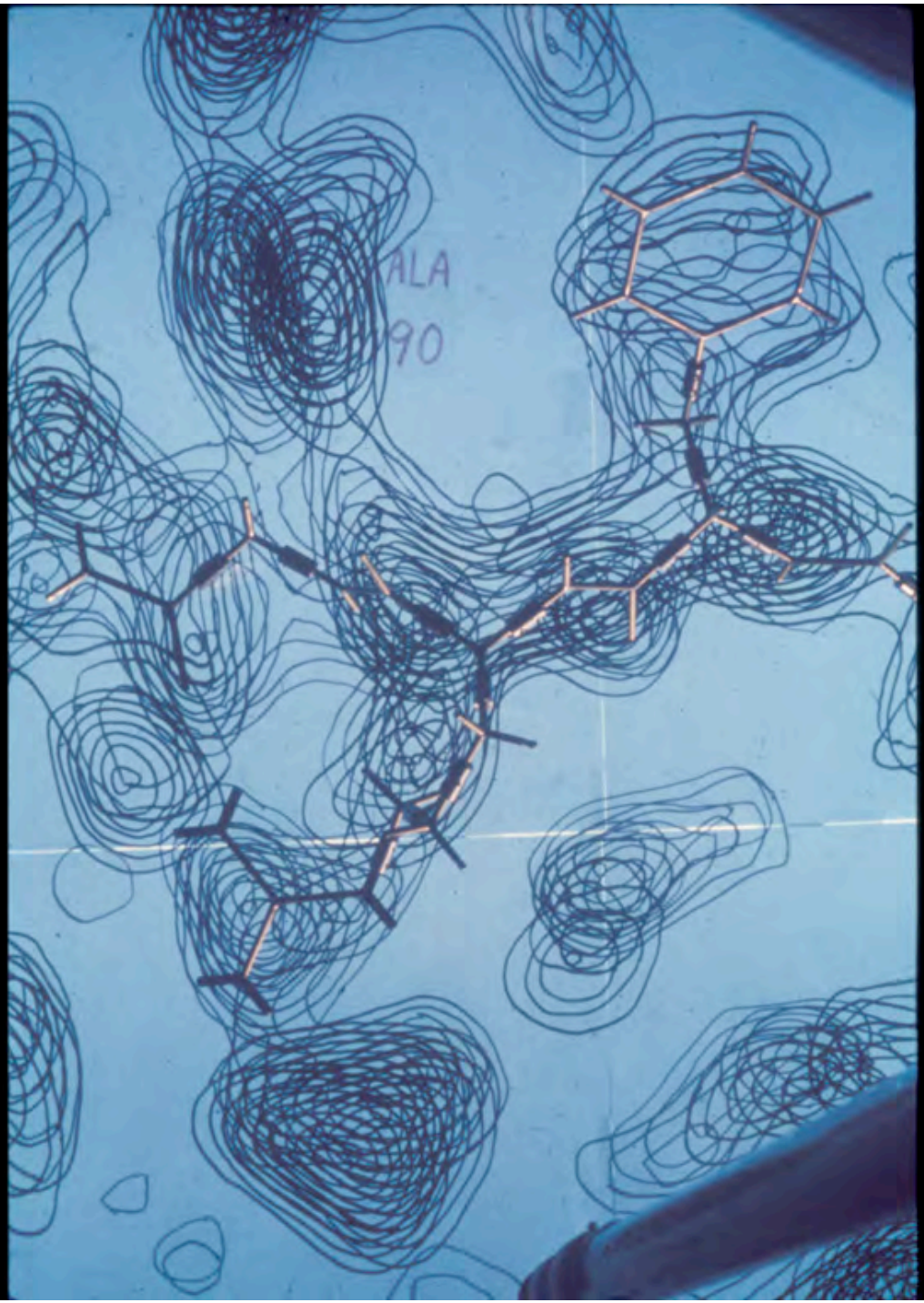

Studying &
Polishing
the PDB's
Macromolecules




ALA
190

THE JOURNAL OF BIOLOGICAL CHEMISTRY
Vol. 246, No. 7, Issue of April 10, pp. 2302-2316, 1971
Printed in U.S.A.

A High Resolution Structure of an Inhibitor Complex of the Extracellular Nuclease of *Staphylococcus aureus*

I. EXPERIMENTAL PROCEDURES AND CHAIN TRACING*

(Received for publication, November 27, 1970)

A. ARNONE,‡ C. J. BIER, F. A. COTTON,§ V. W. DAY,¶ E. E. HAZEN, JR., D. C. RICHARDSON,‖ J. S. RICHARDSON,‖ AND, IN PART, A. YONATH**

From the Department of Chemistry, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

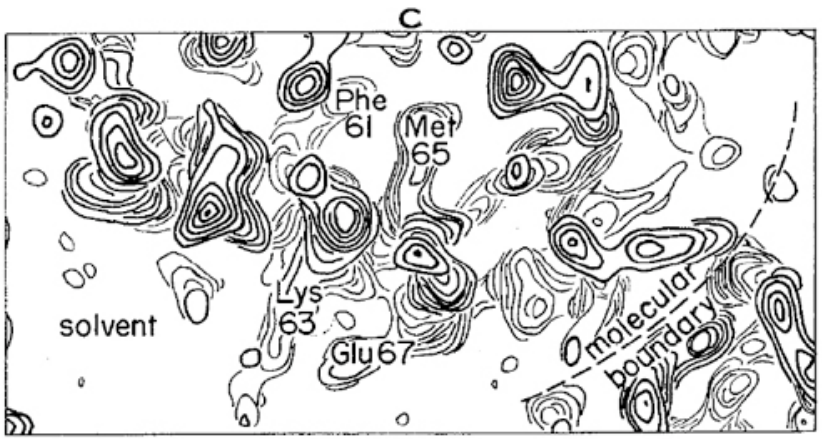
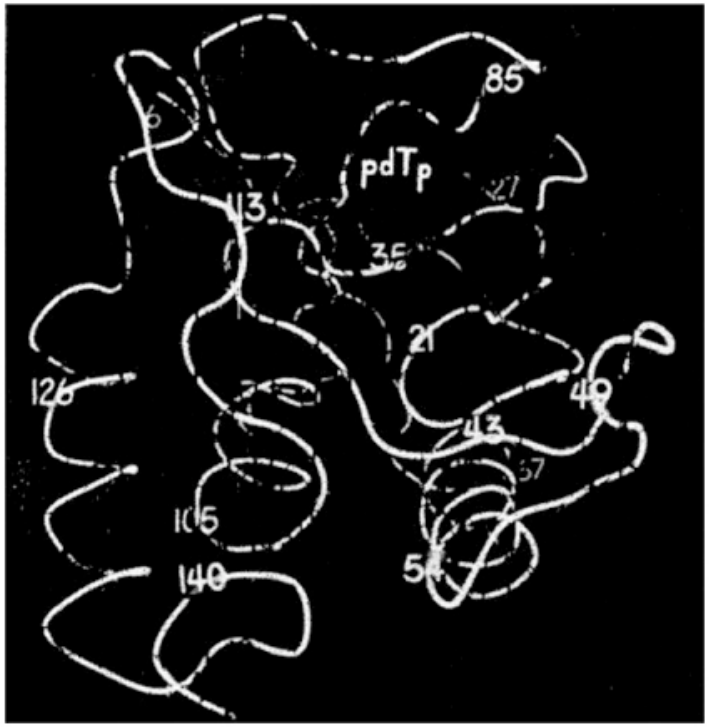


FIG. 1. A portion of the high resolution electron density map showing the helical region of residues 54 to 67. The heaviest lines represent contours closest to the eye of the viewer. (*A*) Map phased with only the iodine derivative. (*B*) Map phased with only the Ba^{2+} derivative. (*C*) Map phased with both derivatives.



STAPHYLOCOCCAL NUCLEASE. PROPOSED MECHANISM OF ACTION BASED ON STRUCTURE OF ENZYME-THYMIDINE 3*,5*-BIPHOSPHATE-CALCIUM ION COMPLEX AT 1.5-*ANGSTROMS RESOLUTION

1SNS

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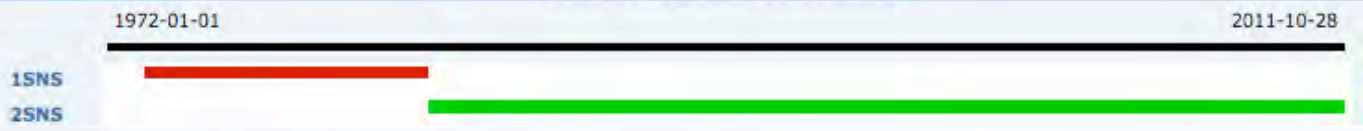
Obsolete Structure Summary Page

1SNS was obsoleted on 1982-07-29 and superseded by 2SNS

Archive of Obsolete PDB Structures

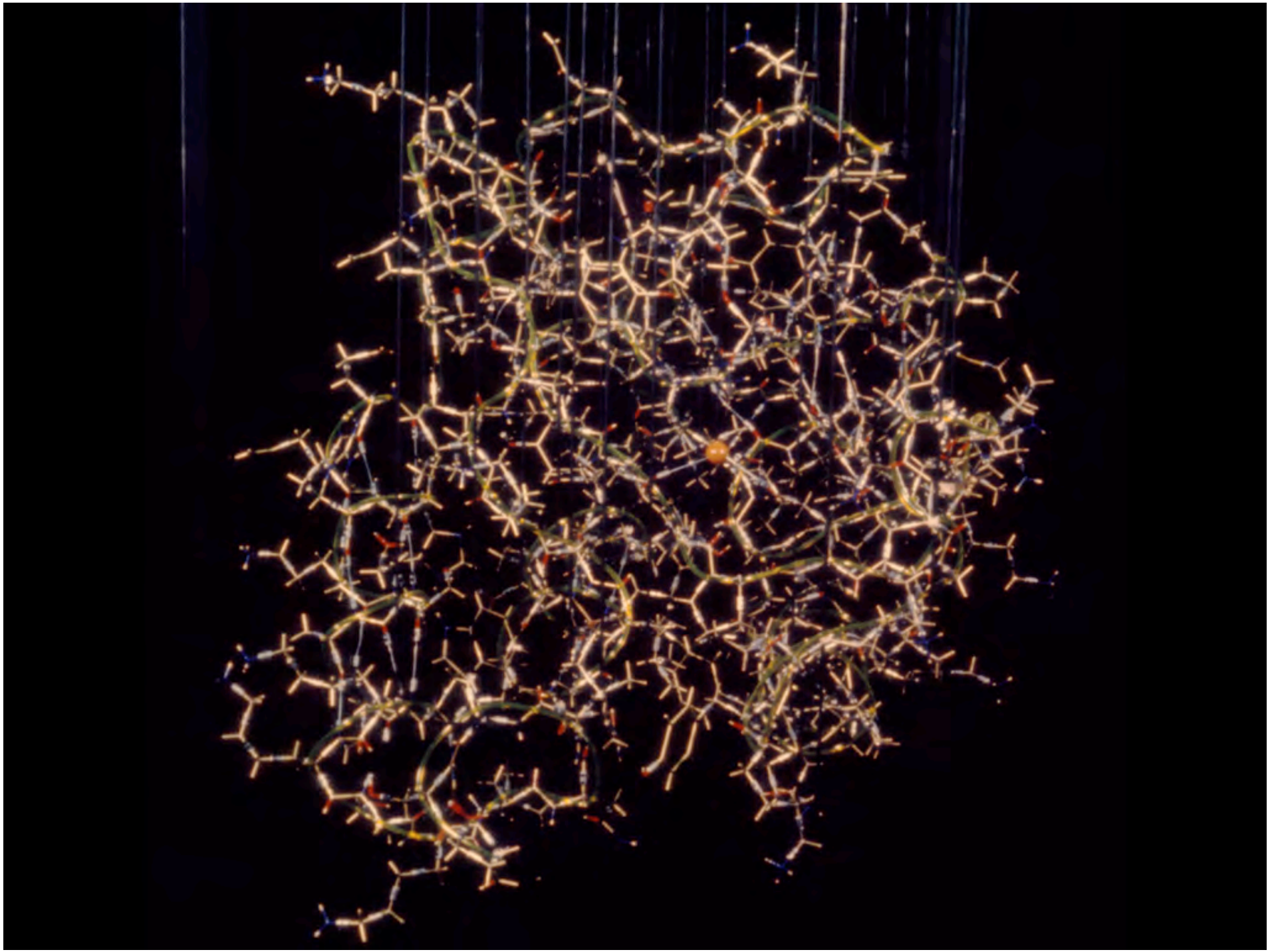


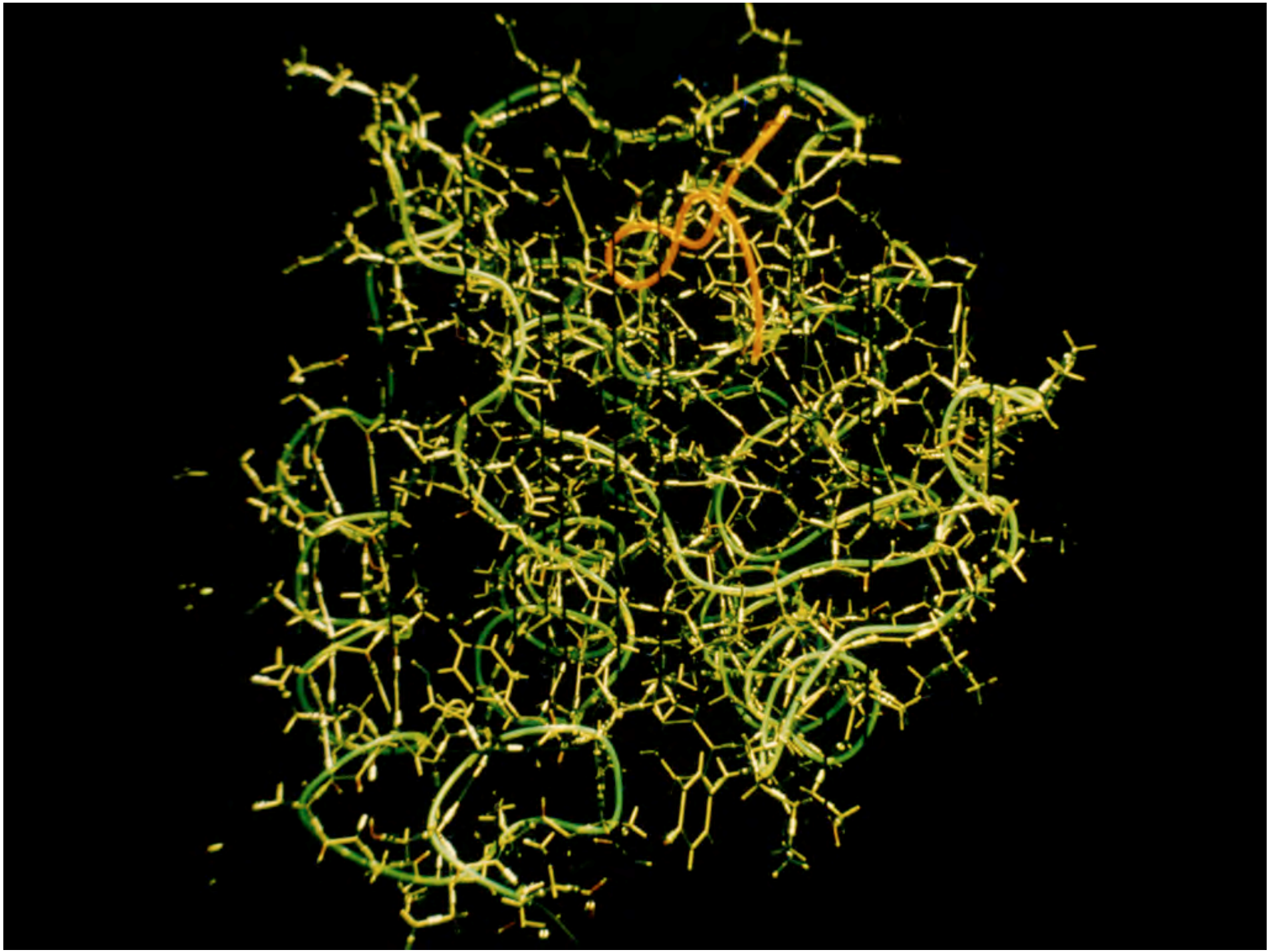
Note: Mouse over colored bars for date info, mouse over PDB IDs for file download or Structure Explorer link.

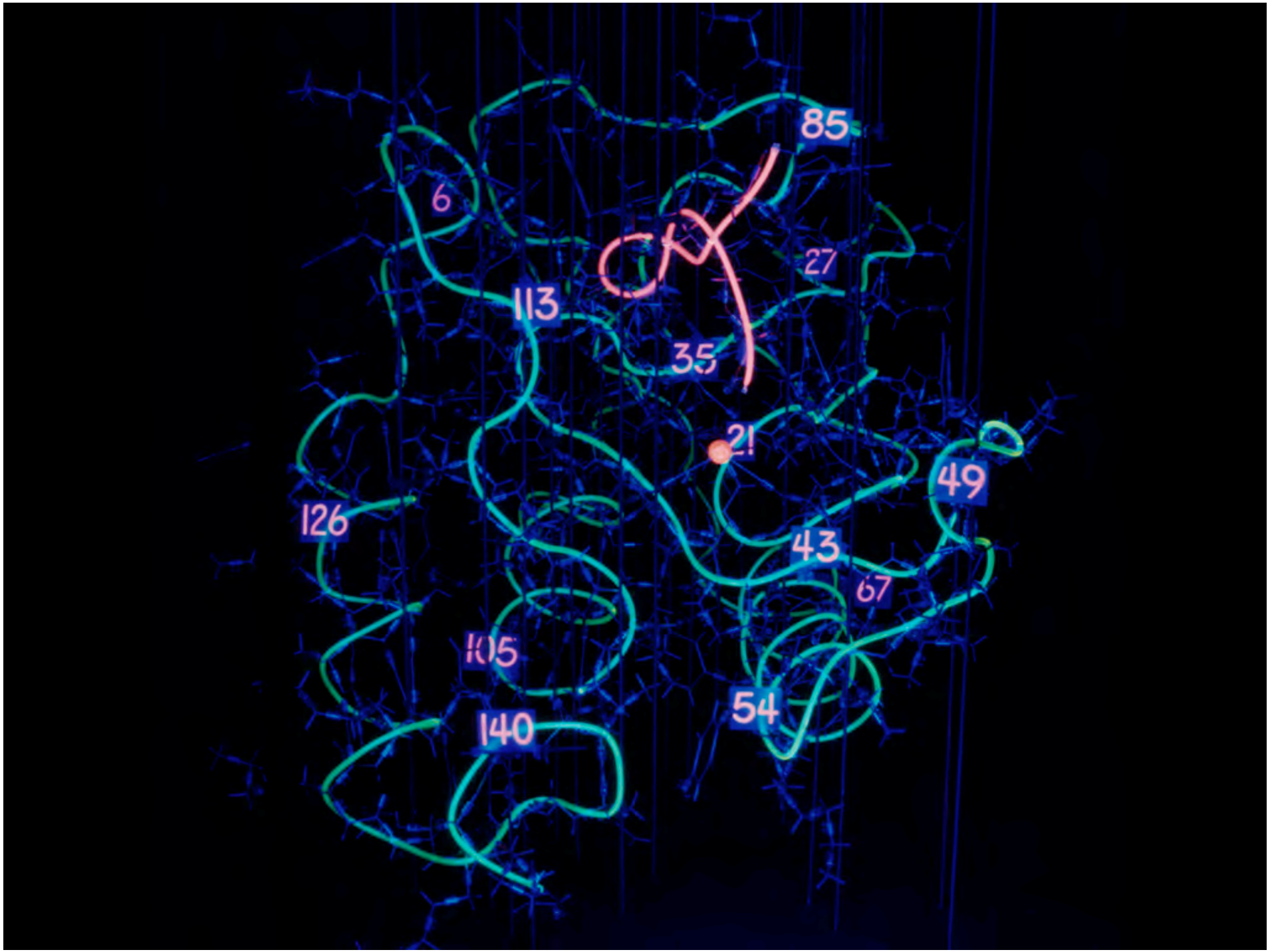
Image of 1SNS

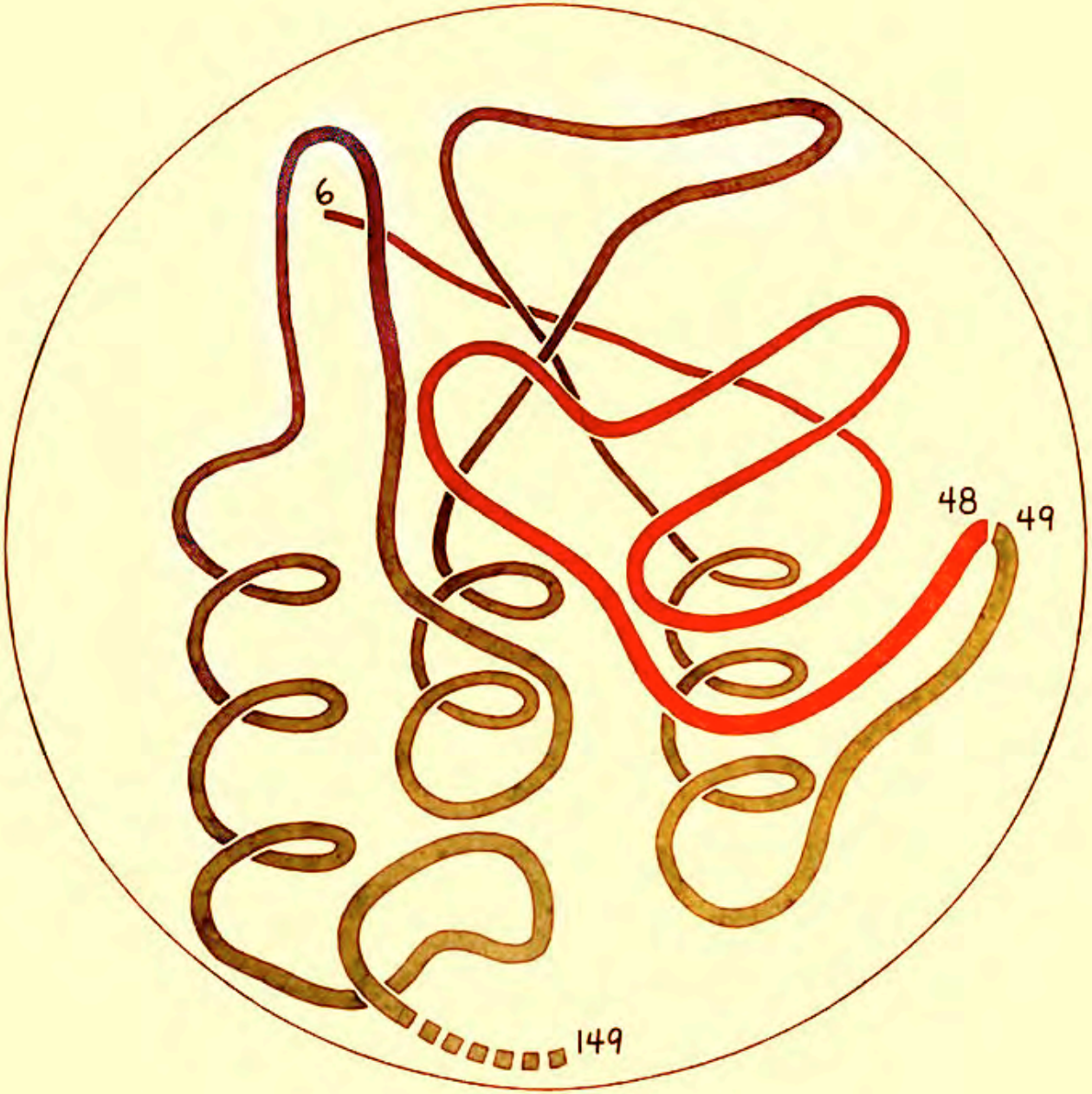
Textual Comparison

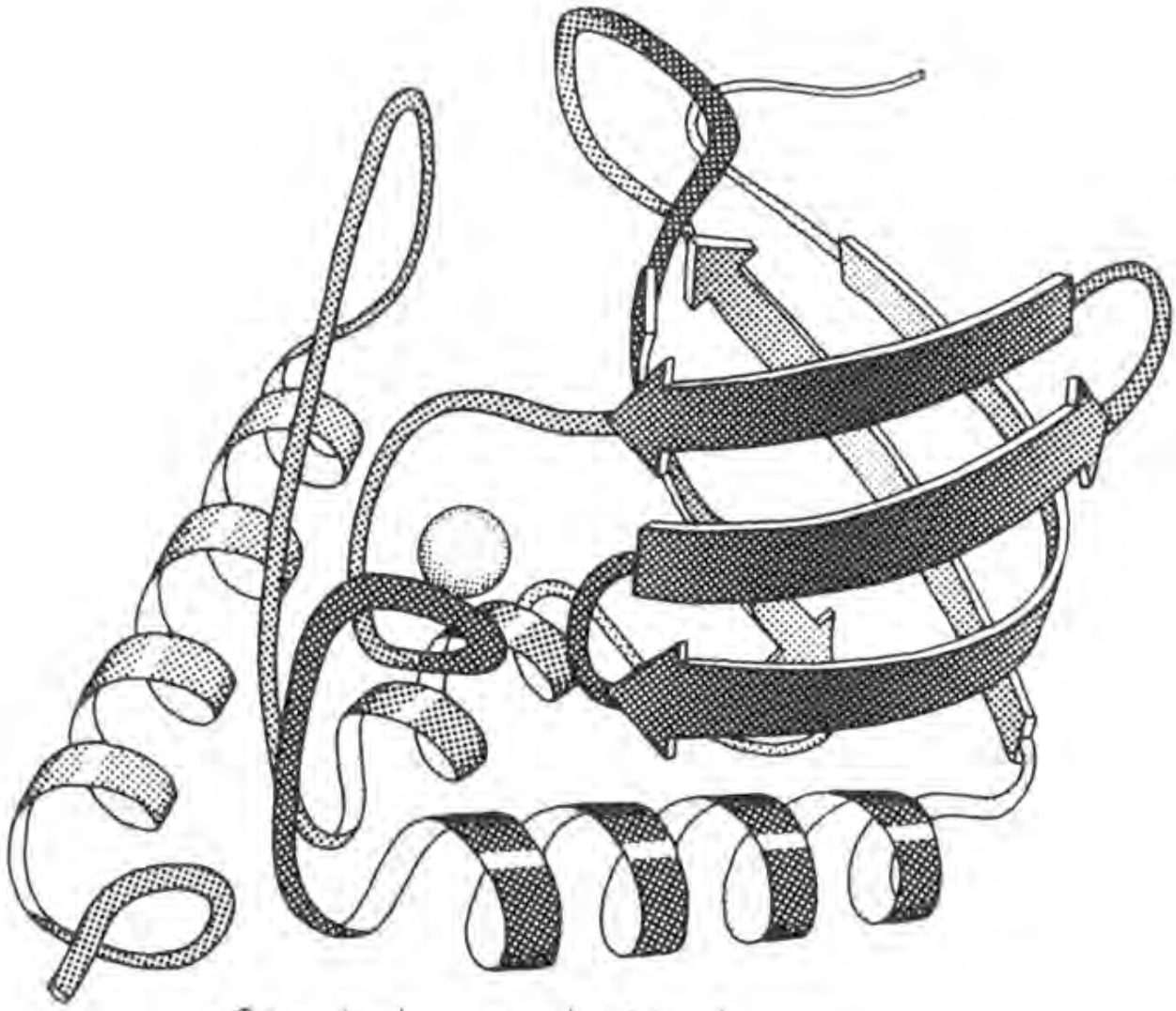
	1SNS	2SNS
Title	STAPHYLOCOCCAL NUCLEASE. PROPOSED MECHANISM OF ACTION BASED ON STRUCTURE OF ENZYME-THYMIDINE 3*,5*-BIPHOSPHATE-CALCIUM ION COMPLEX AT 1.5-*ANGSTROMS RESOLUTION	STAPHYLOCOCCAL NUCLEASE. PROPOSED MECHANISM OF ACTION BASED ON STRUCTURE OF ENZYME-THYMIDINE 3(PRIME),5(PRIME)-BIPHOSPHATE-CALCIUM ION COMPLEX AT 1.5-ANGSTROMS RESOLUTION
Authors	Cotton, F.A., Hazenjunior, E.E.	Legg, M.J., Cotton, F.A., Hazen Jr., E.E.
Residues per chain	A: 149	A: 149
Number of Atoms	1172	1151
Non-polymer entities	CA, PTP	CA, THP
Source	Polymer 1: n/a	Polymer 1: Staphylococcus aureus
Exp. Method	X-RAY DIFFRACTION	X-RAY DIFFRACTION
Unit cell Length [Å]: a b c Angle: alpha beta gamma	48.20 48.20 63.30 90.00 90.00 90.00	48.19 48.19 63.40 90.00 90.00 90.00
Space Group	$P\,4_1$	$P\,4_1$
Resolution	n/a	1.50
R-value	n/a	n/a
Deposited	1973-04-20	1982-05-14
Released	n/a	1982-07-29
Obsoleted	1982-07-29	
Replaced by	2SNS	



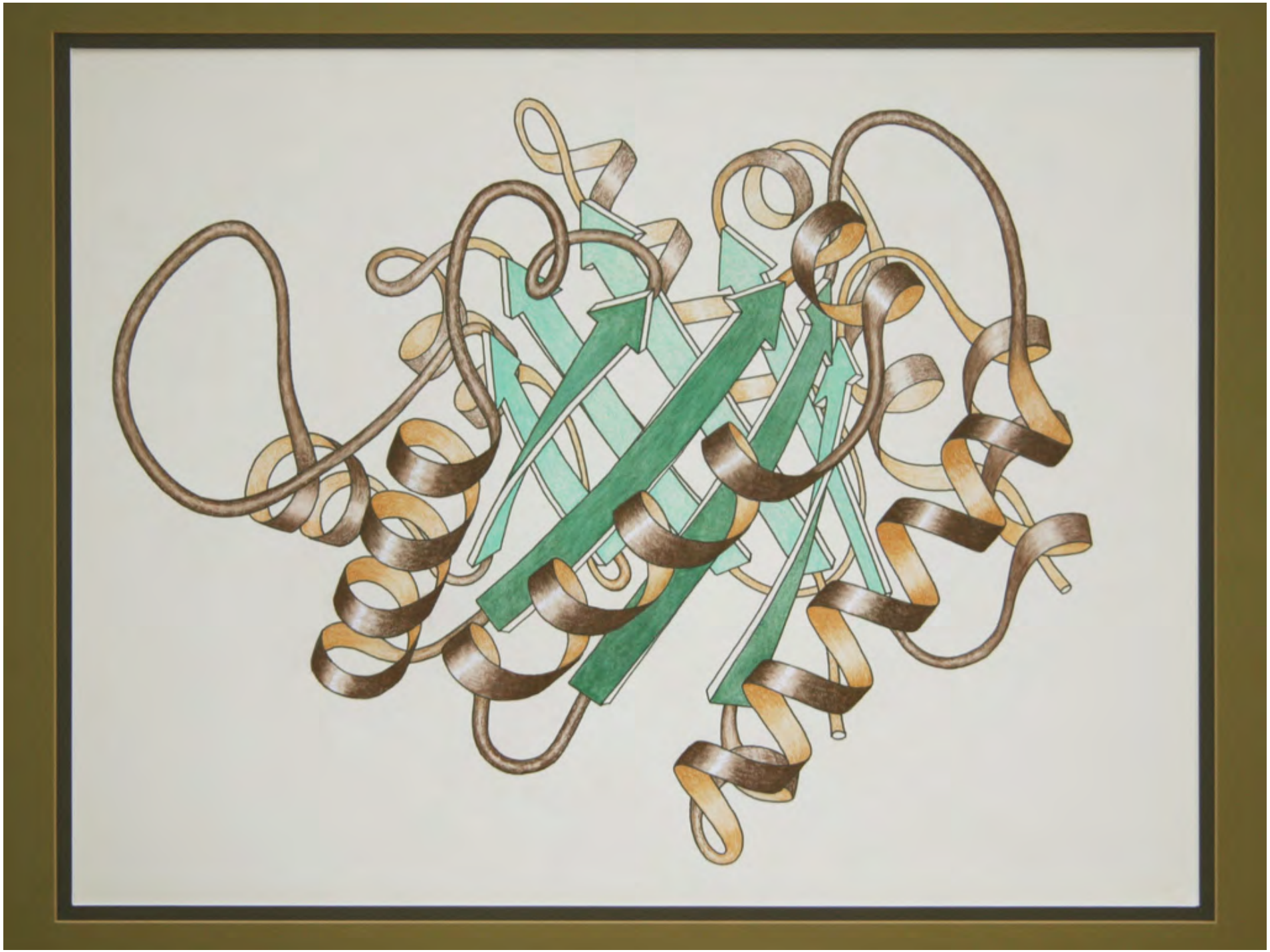


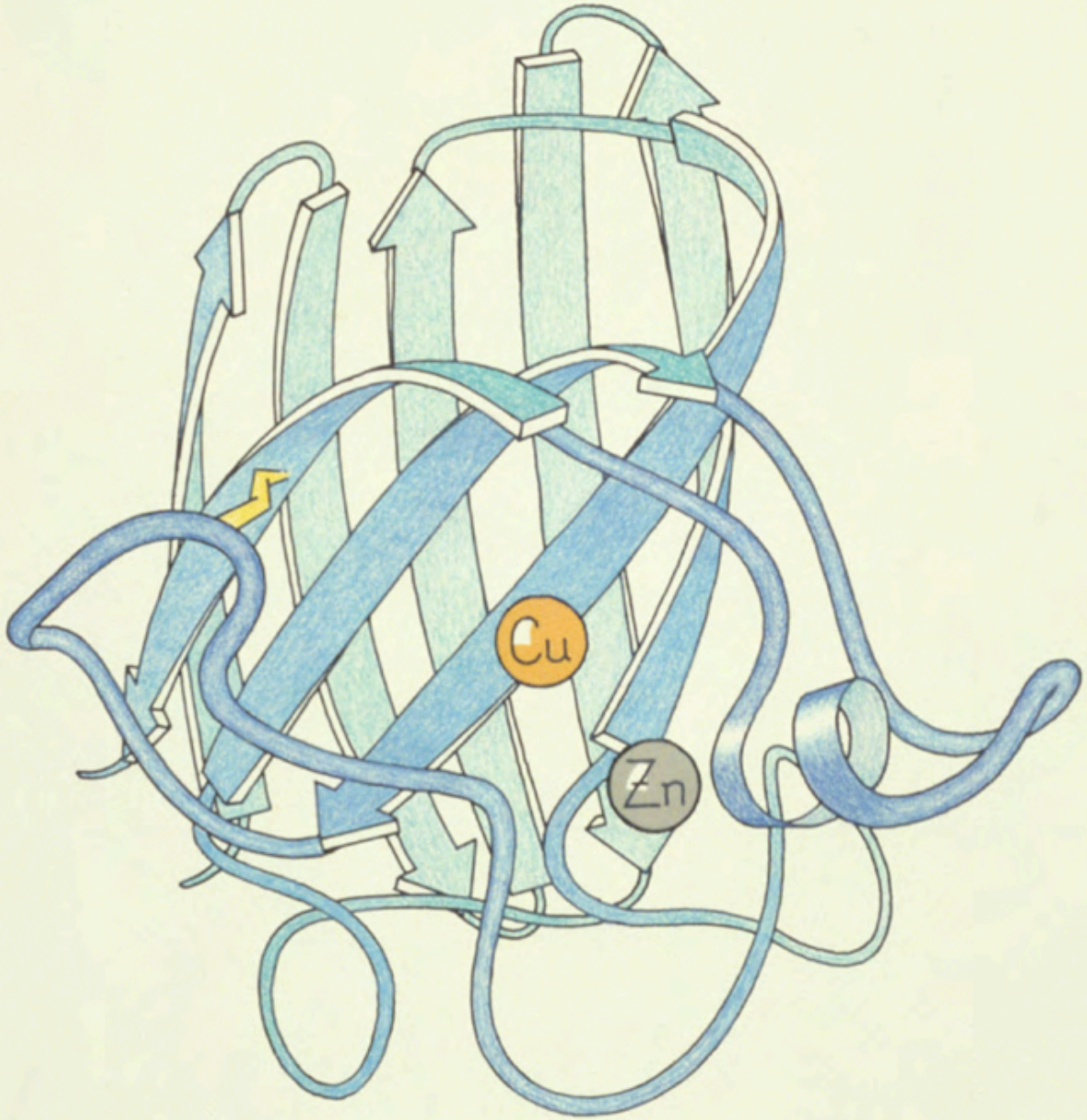

85
6
27
113
35
21
49
126
43
67
105
54
140


6
48
49
149

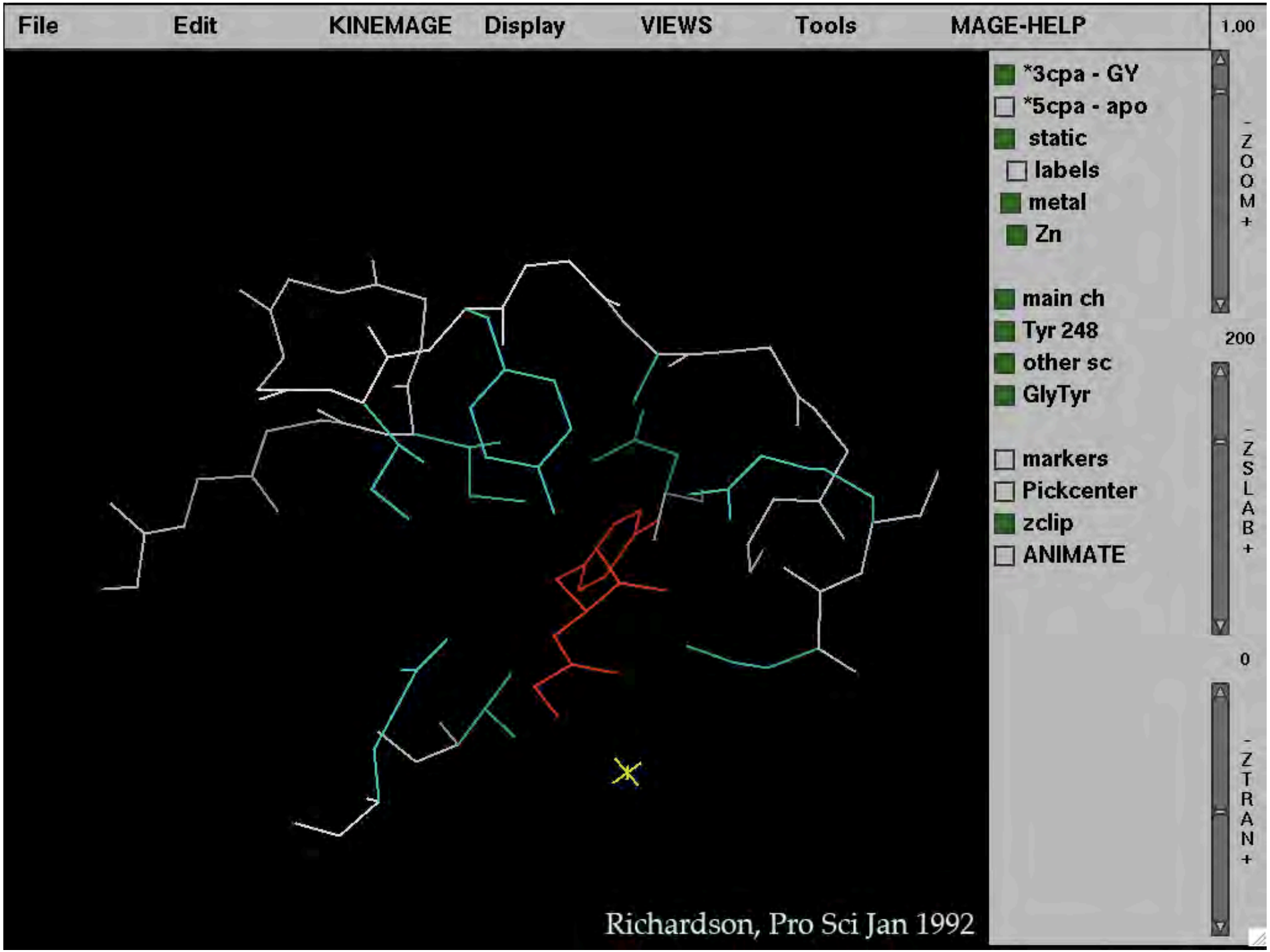


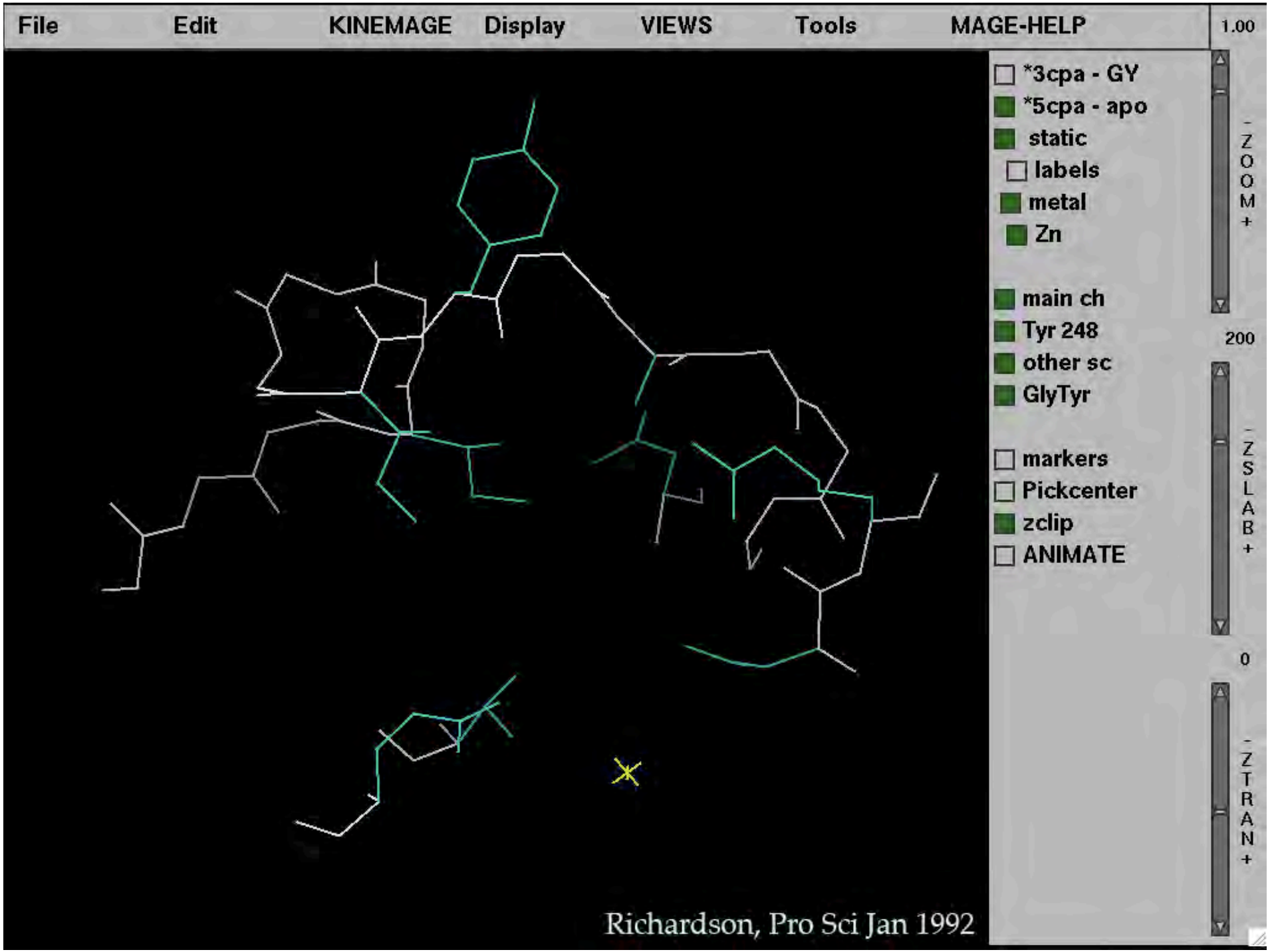
Staphylococcal Nuclease





Cu, Zn Superoxide Dismutase


File
Edit
KINEMAGE
Display
VIEWS
Tools
MAGE-HELP
1.00
*3cpa - GY
*5cpa - apo
static
labels
metal
Zn
main ch
Tyr 248
other sc
GlyTyr
markers
Pickcenter
zclip
ANIMATE
- ZOOM +
200
- ZSLAB +
0
- ZTRAN +
Richardson, Pro Sci Jan 1992


File
Edit
KINEMAGE
Display
VIEWS
Tools
MAGE-HELP
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*3cpa - GY
*5cpa - apo
static
labels
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main ch
Tyr 248
other sc
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- ZOOM +
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- ZSLAB +
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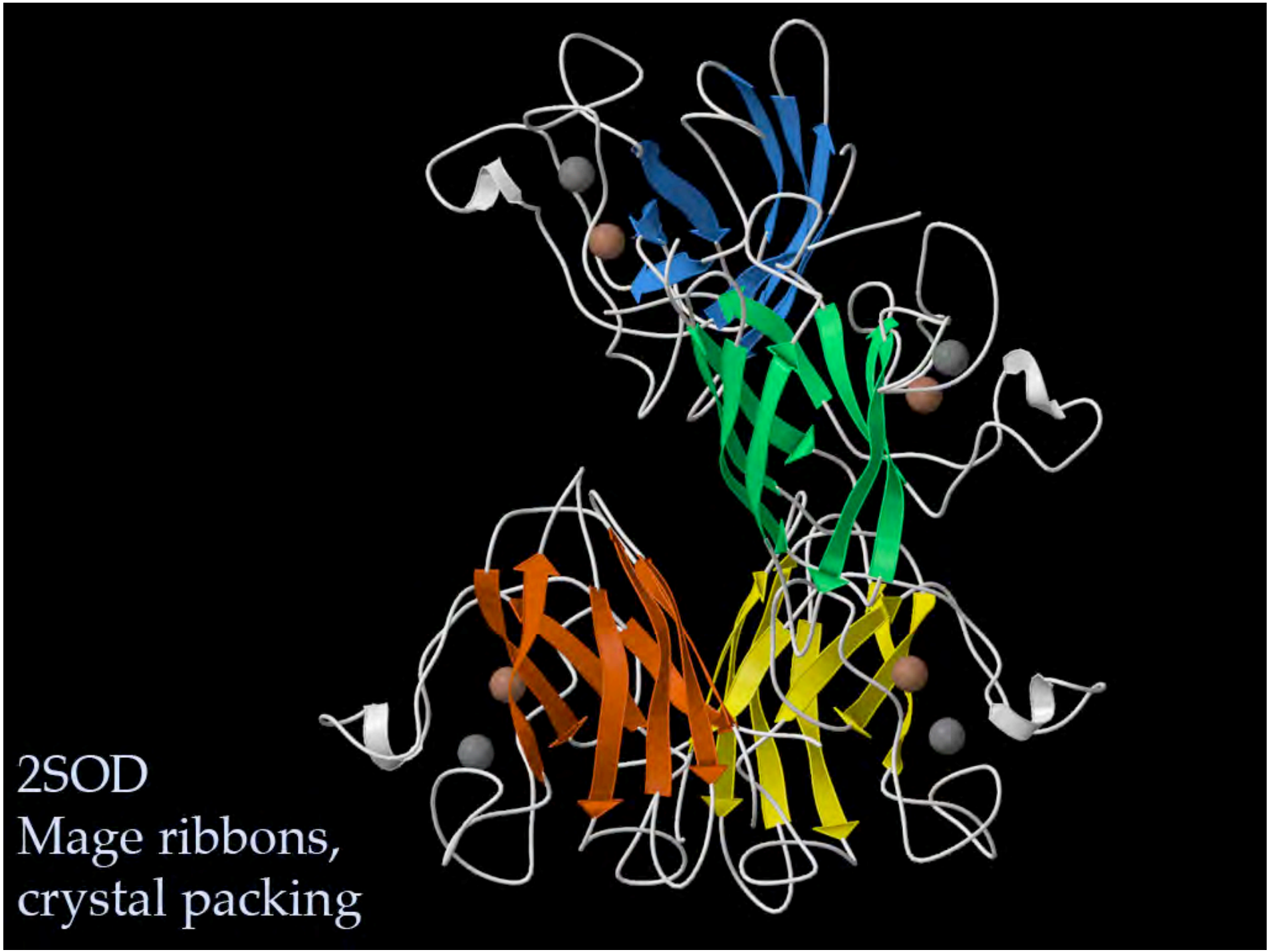
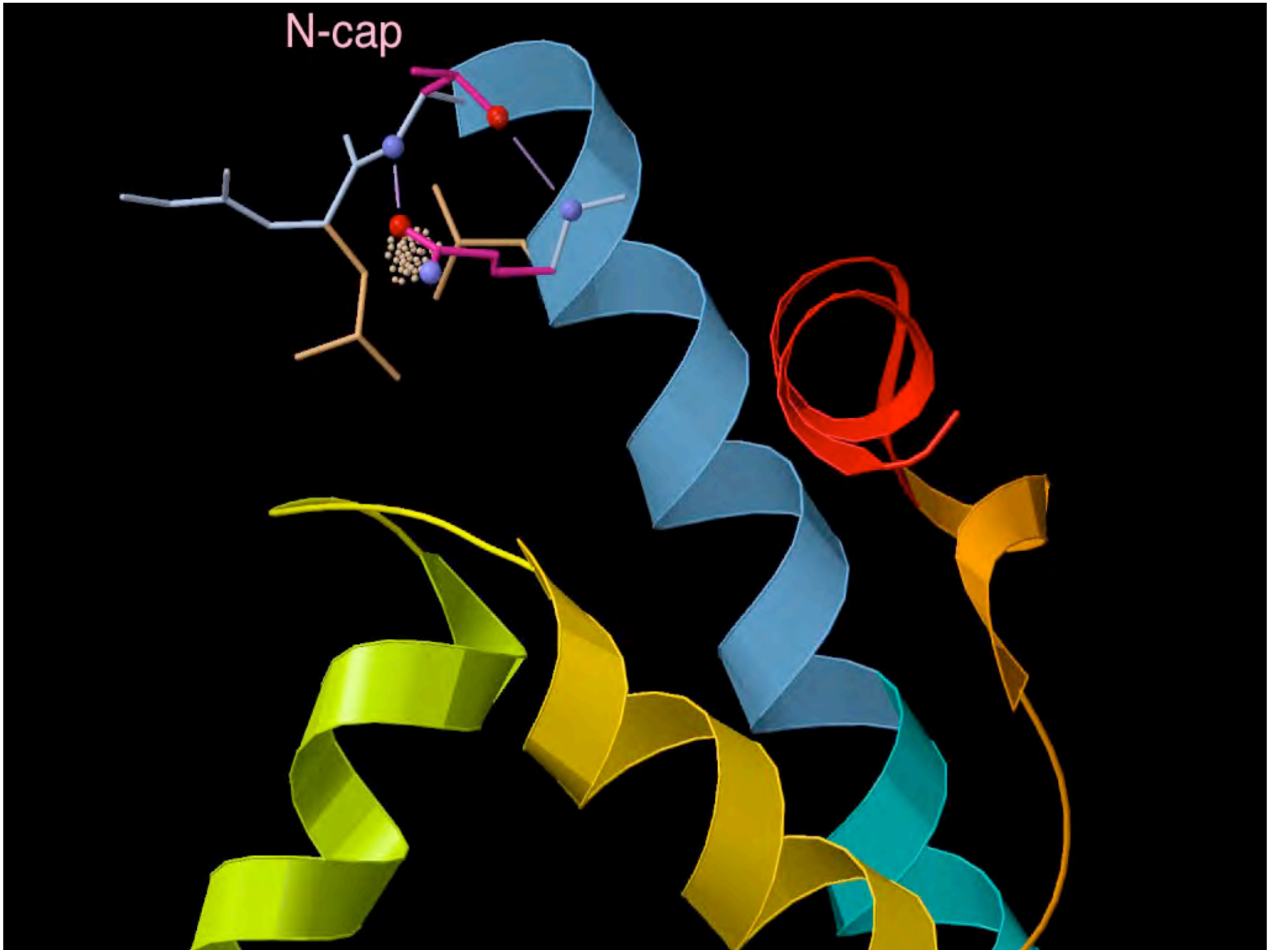
- ZTRAN +
Richardson, Pro Sci Jan 1992


2SOD
Mage ribbons,
crystal packing

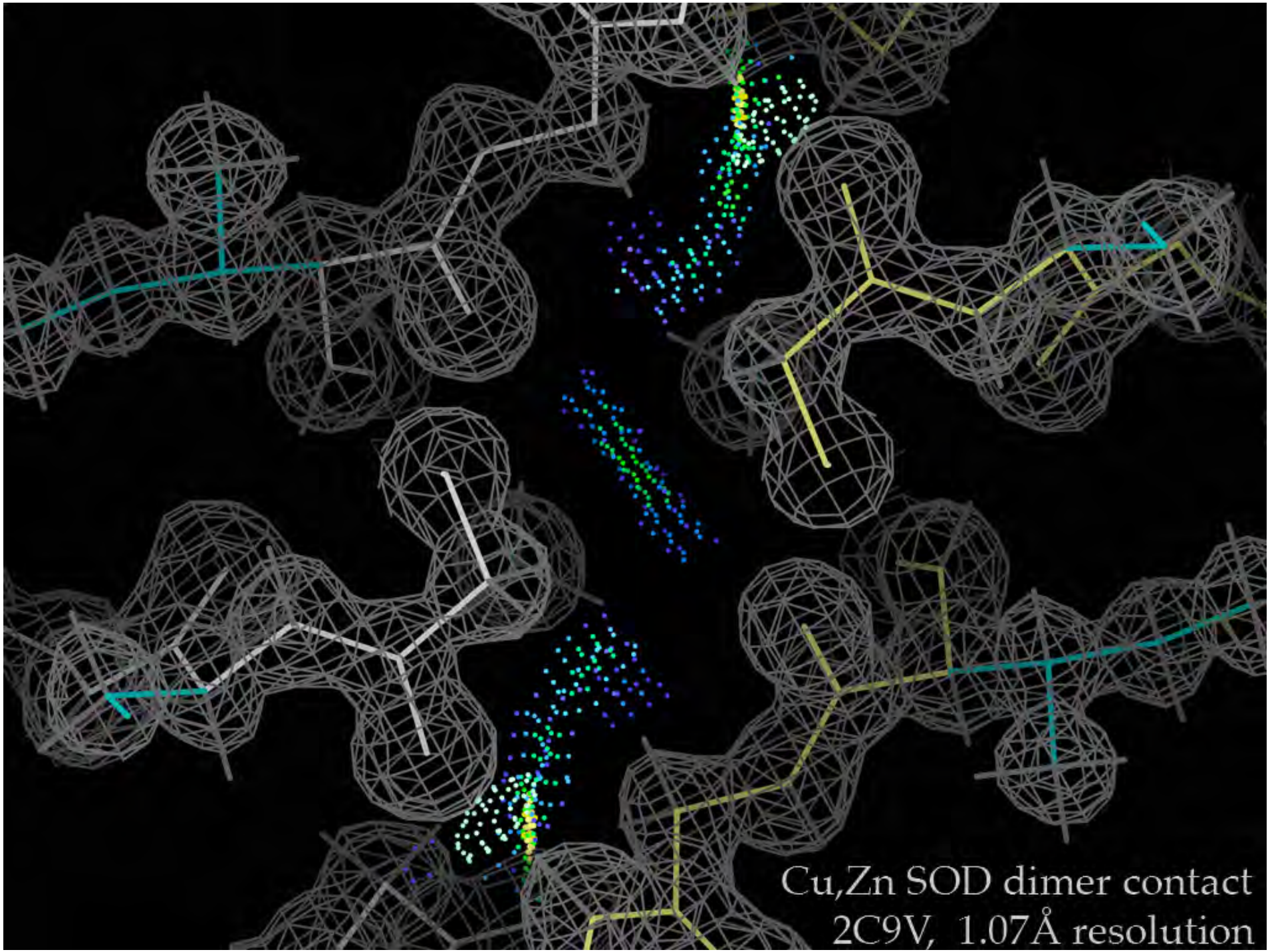

N-cap

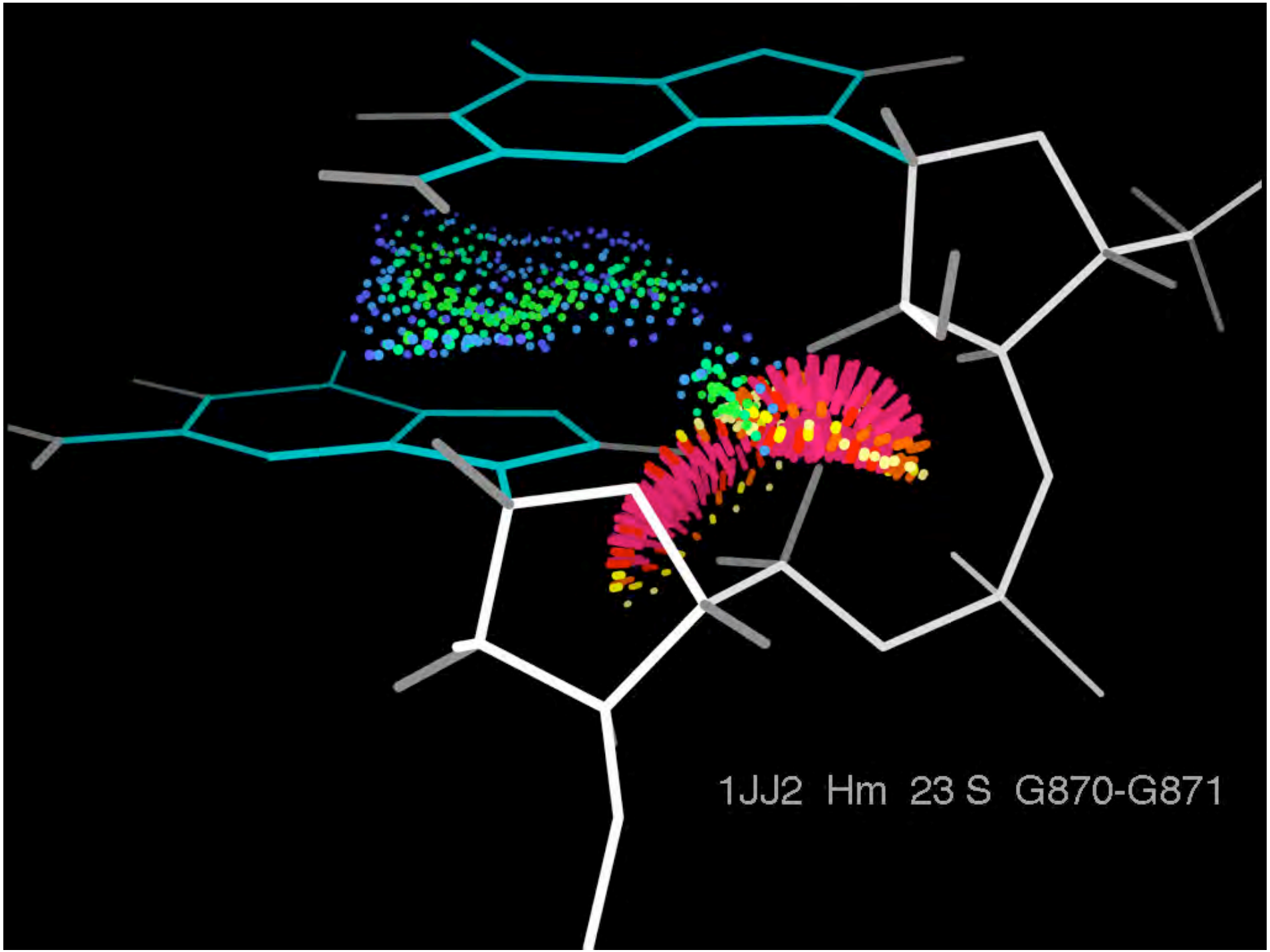
Felix - early
de novo design

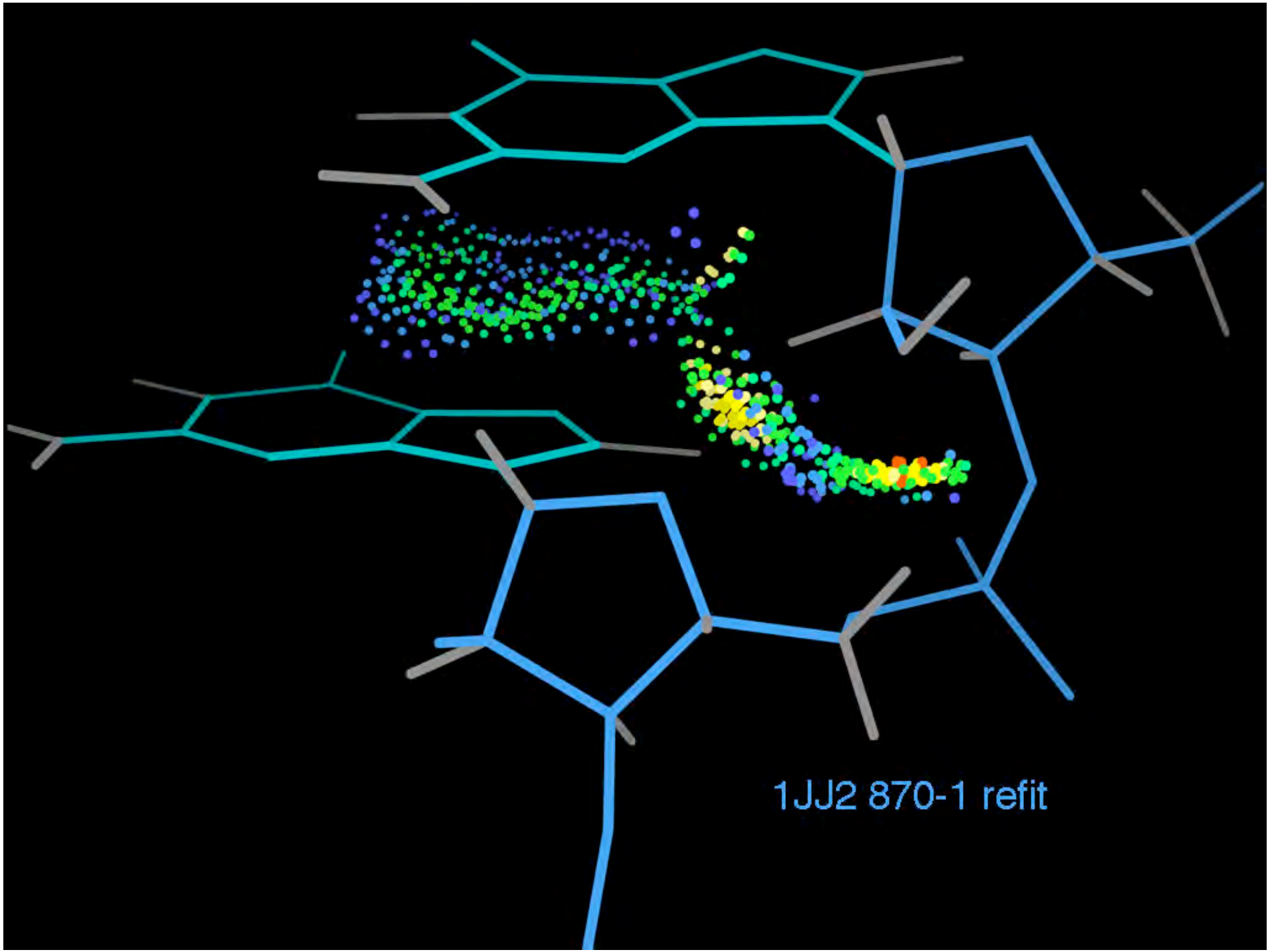
Negative design

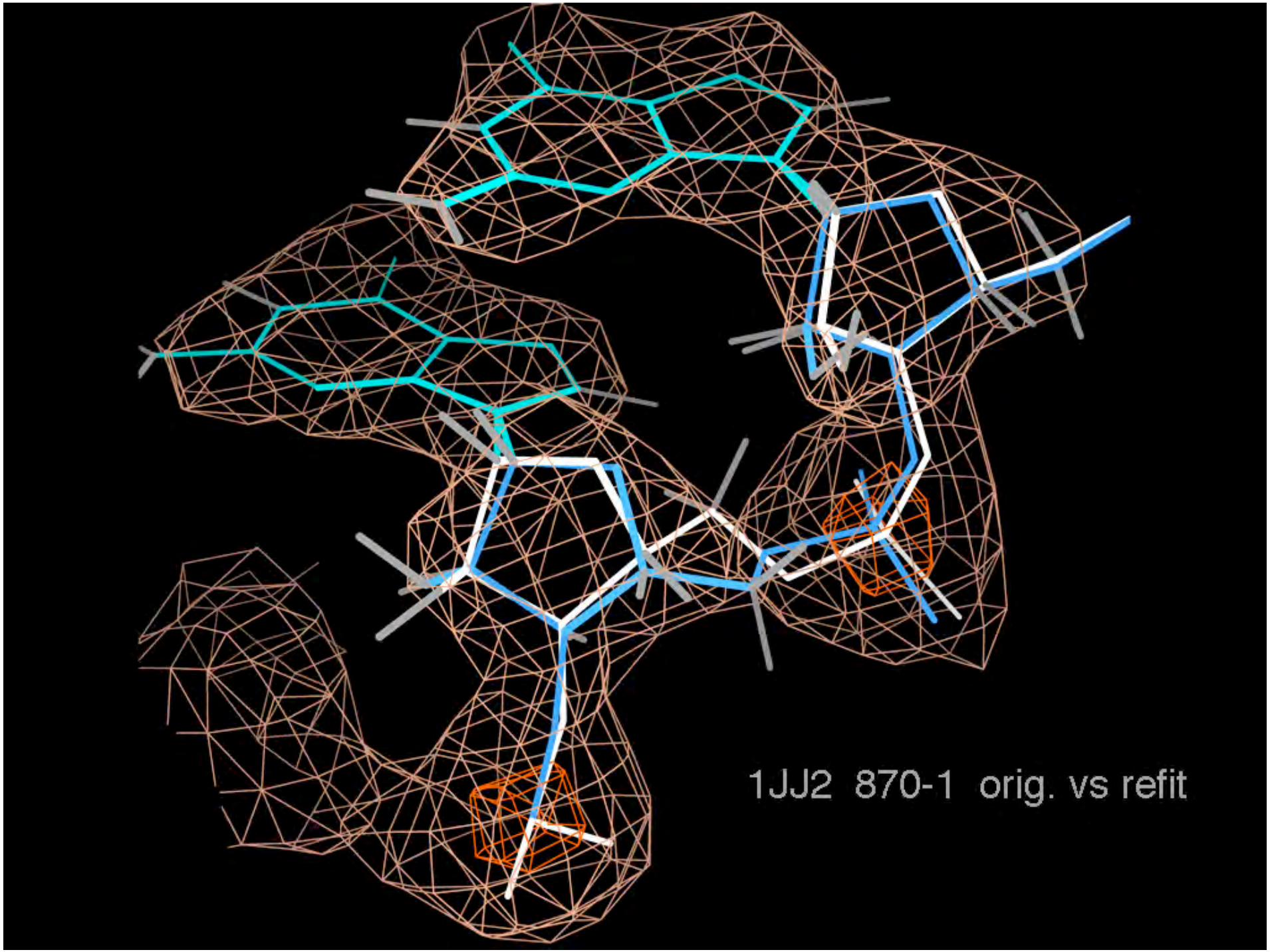
Uniqueness
trumps stability

Need explicit
hydrogen atoms

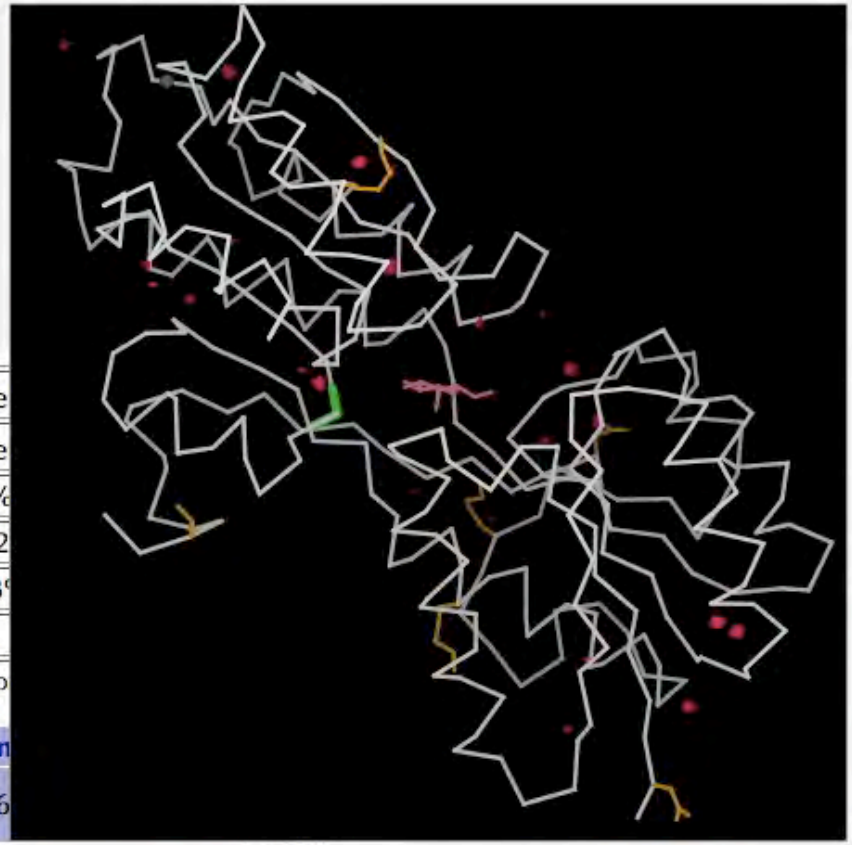

Cu,Zn SOD dimer contact
2C9V, 1.07Å resolution


1JJ2 Hm 23 S G870-G871


1JJ2 870-1 refit


1JJ2 870-1 orig. vs refit

Multi-criterion validation



Multi-criterion kinemage

Multi-criterion chart

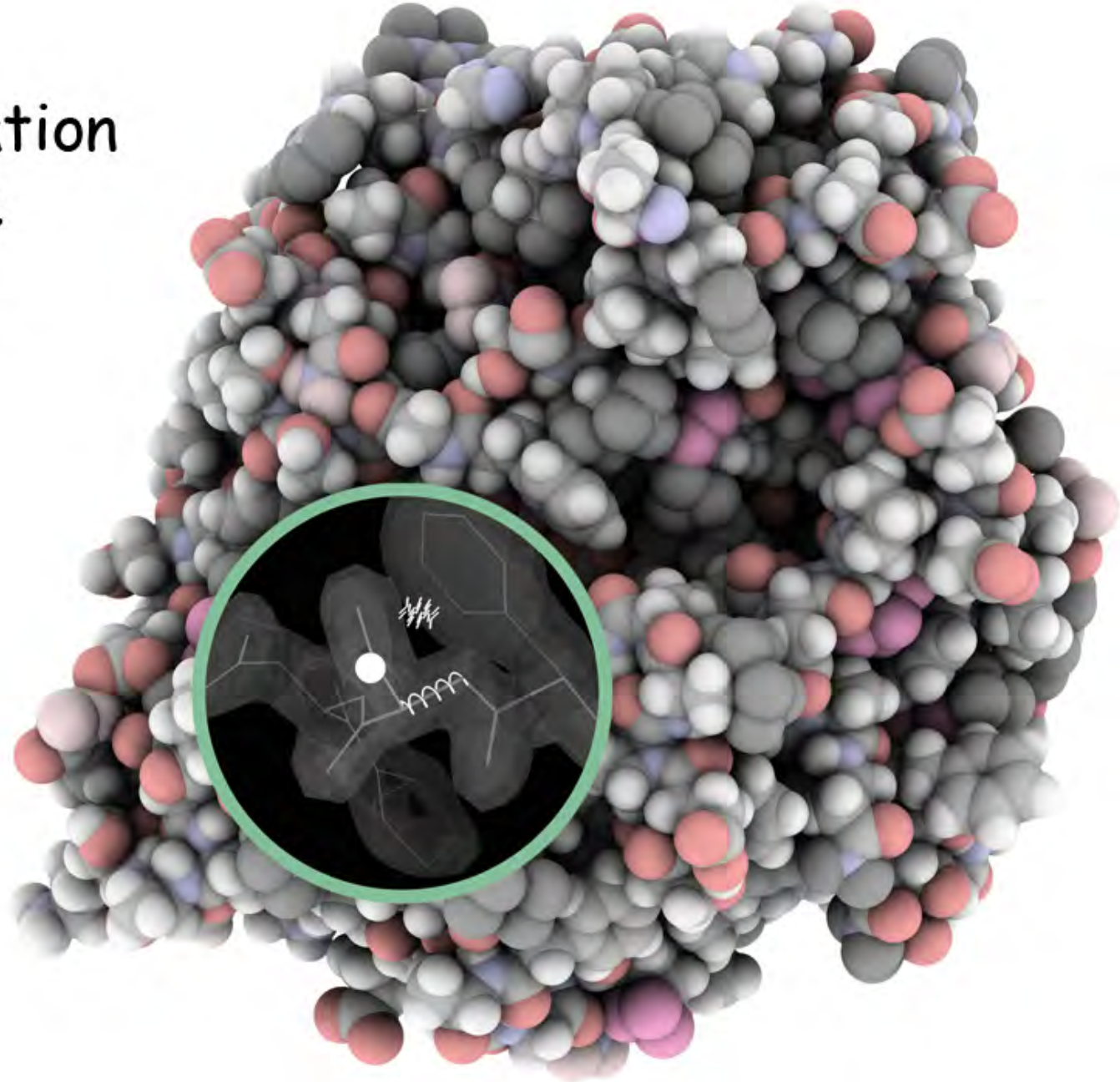
All-Atom Contacts	Clashscore, all atoms:	5.5	93rd perce
	Clashscore, B<40:	5.12	85th perce
Protein Geometry	Rotamer outliers	2.43%	Goal: <1%
	Ramachandran outliers	0.33%	Goal: <0.2
	Ramachandran favored	97.72%	Goal: >98
	Cβ deviations >0.25Å	0	Goal: 0

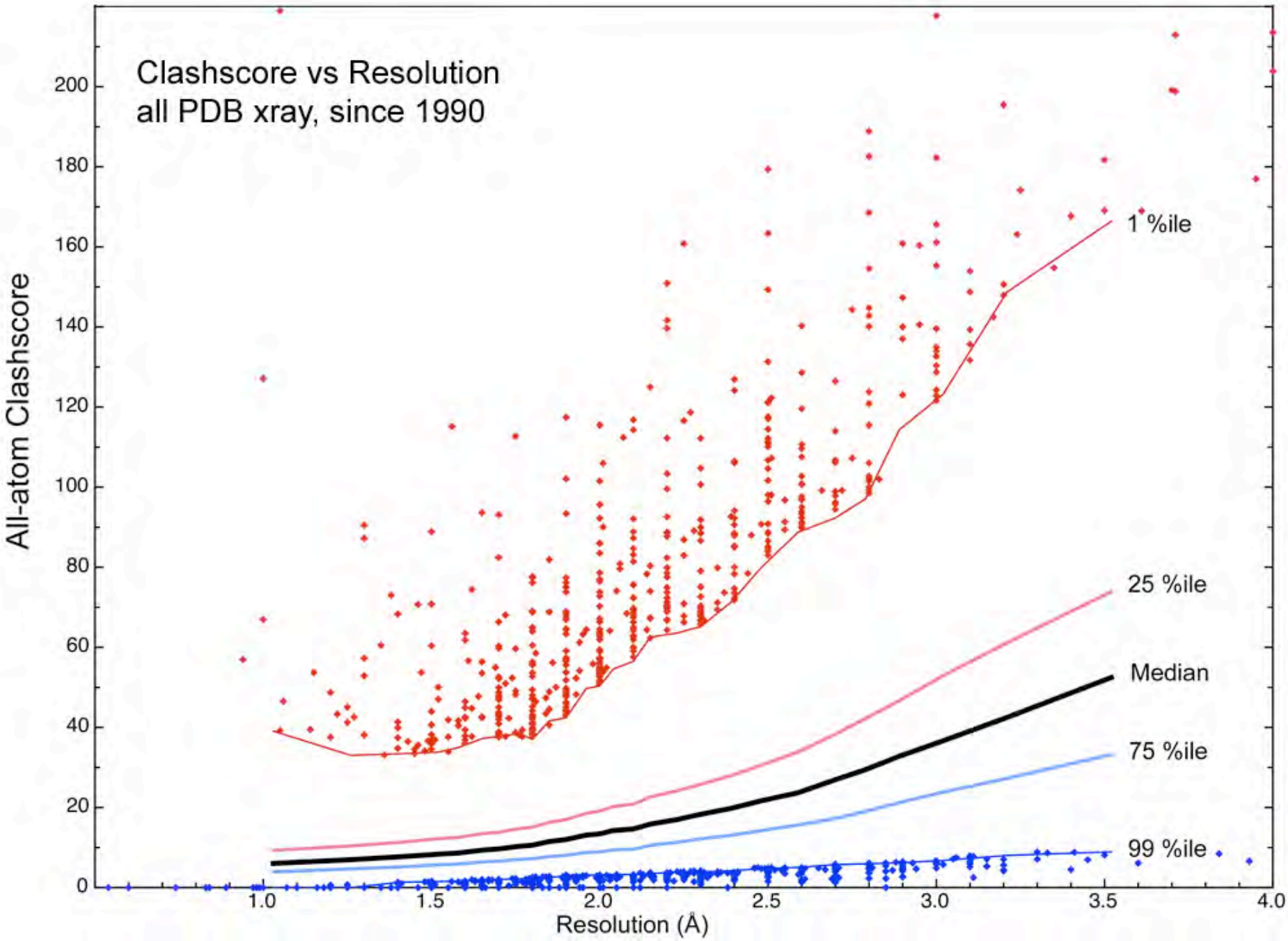
* 100th percentile is the best among structures between 1.45Å and 1.95Å; 0th percentile is the wo

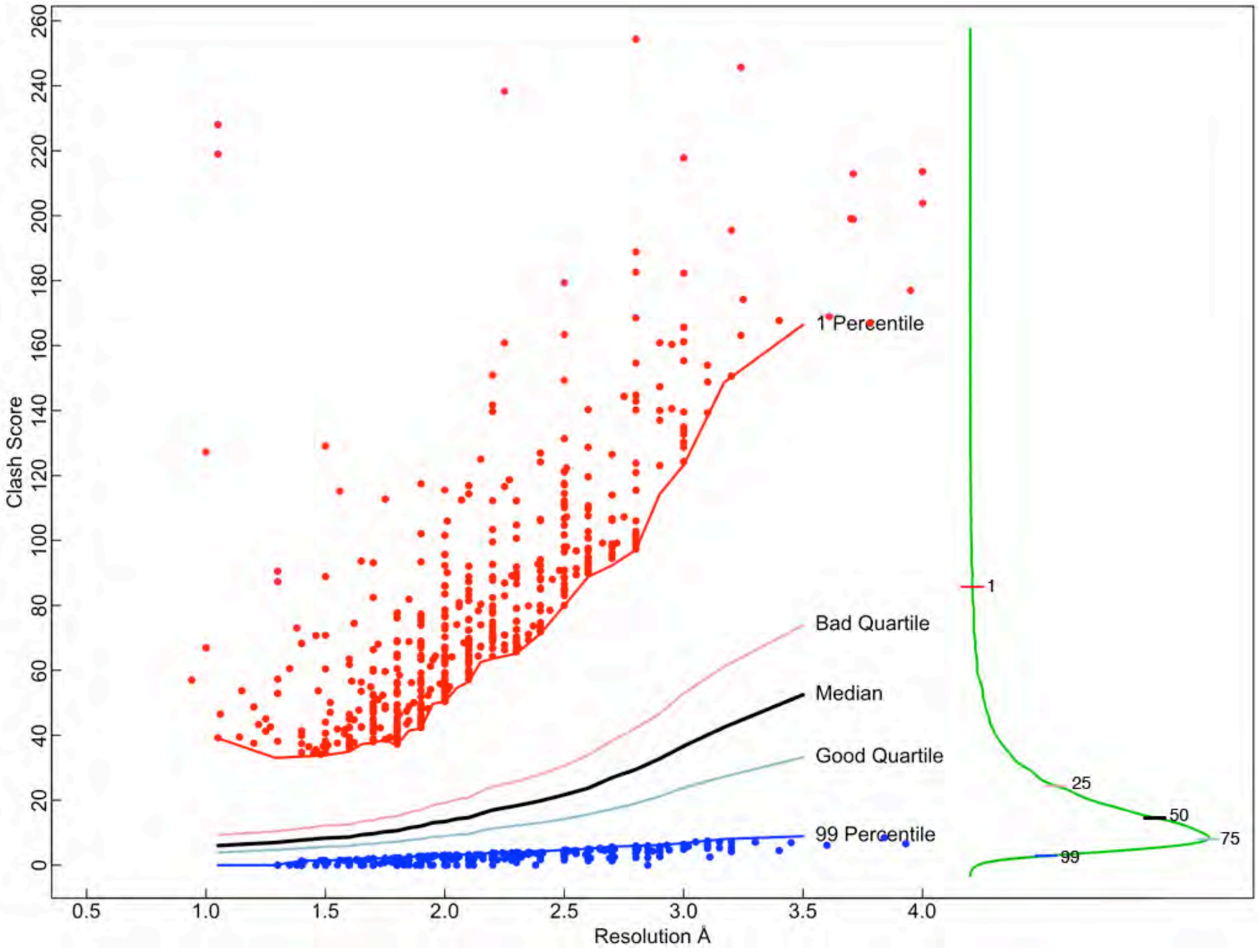
Res	High B	Clash > 0.4Å	Ramachandran	Rotan	
	Avg: 27.32	Clashscore: 5.5	Outliers: 1 of 307	Outliers: 6	
1 ALA	60.72	-	-	-	0.089Å
2 ASP	61.21	-	Allowed (1.41%) General case / -99.5,55.5	0% angles: -20.9,70.7	0.07Å
3 THR	42.57	-	Favored (4.2%) General case / -67.9,110.0	16.1% angles: -48.5	0.12Å
4 ARG	52.19	0.509Å 1HB with 91 HOH O	Favored (45.09%) General case / -95.5,122.8	63.1% angles: -77.2,171.6,152.3,173.7	0.098Å
5 ILE	17.22	0.415Å HB with 36 LEU 3HD2	Favored (63.7%) General case / -118.6,129.4	91.9% angles: -62.1,171.1	0.113Å
6 GLY	10.69	-	Favored (8.51%) Glycine / -95.1,134.0	-	-
7 VAL	11.1	-	Favored (59.44%) General case / -127.1,128.8	54.8% angles: -178.6	0.089Å
8 THR	11.26	-	Favored (57.35%) General case / -116.2,136.5	73.1% angles: 61.4	0.058Å
9 ILE	14.28	-	Favored (59.36%) General case / -110.5,133.3	39.5% angles: -61.4,-62.2	0.103Å

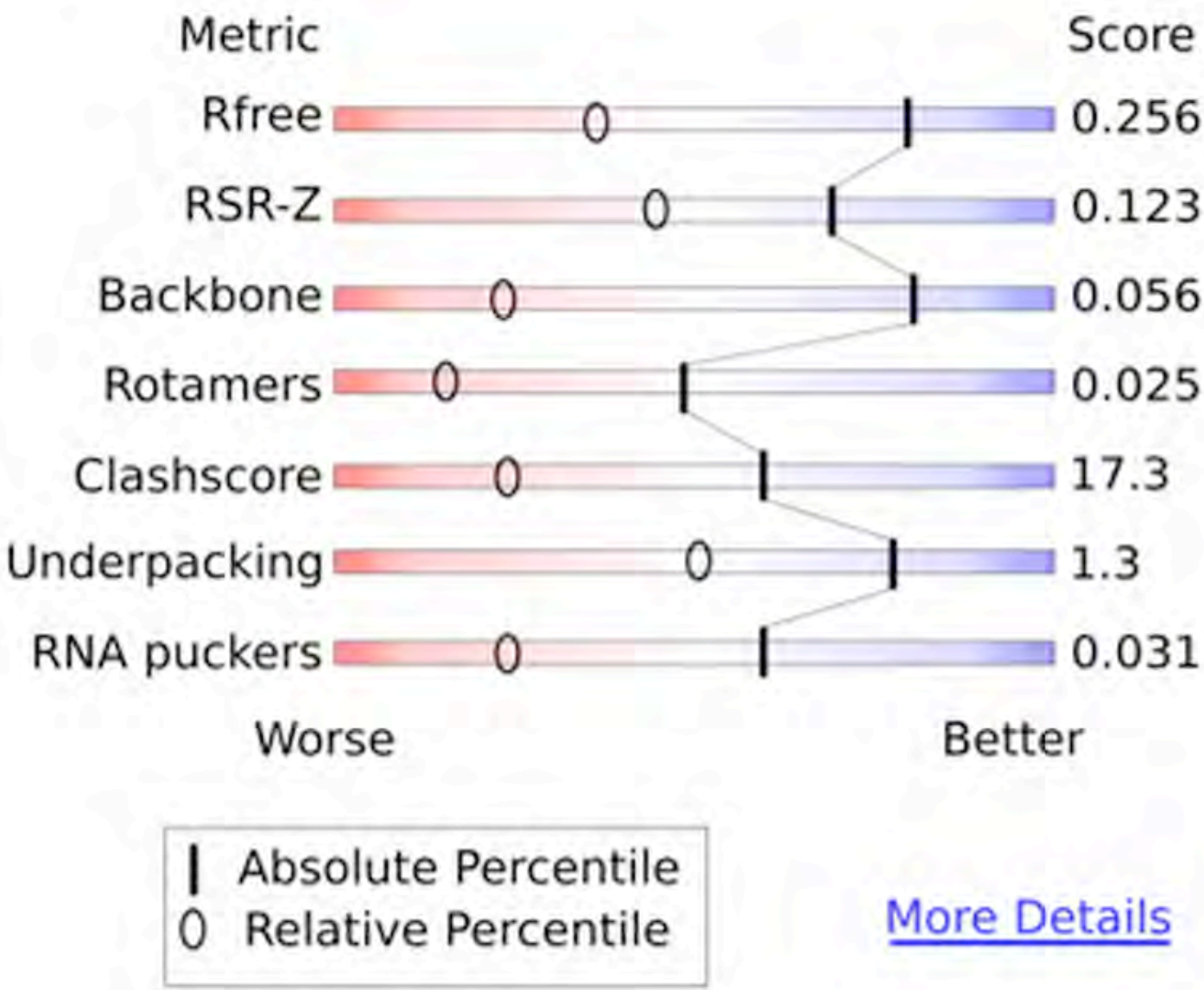
wwPDB
X-ray Validation
Task Force
report
now out!

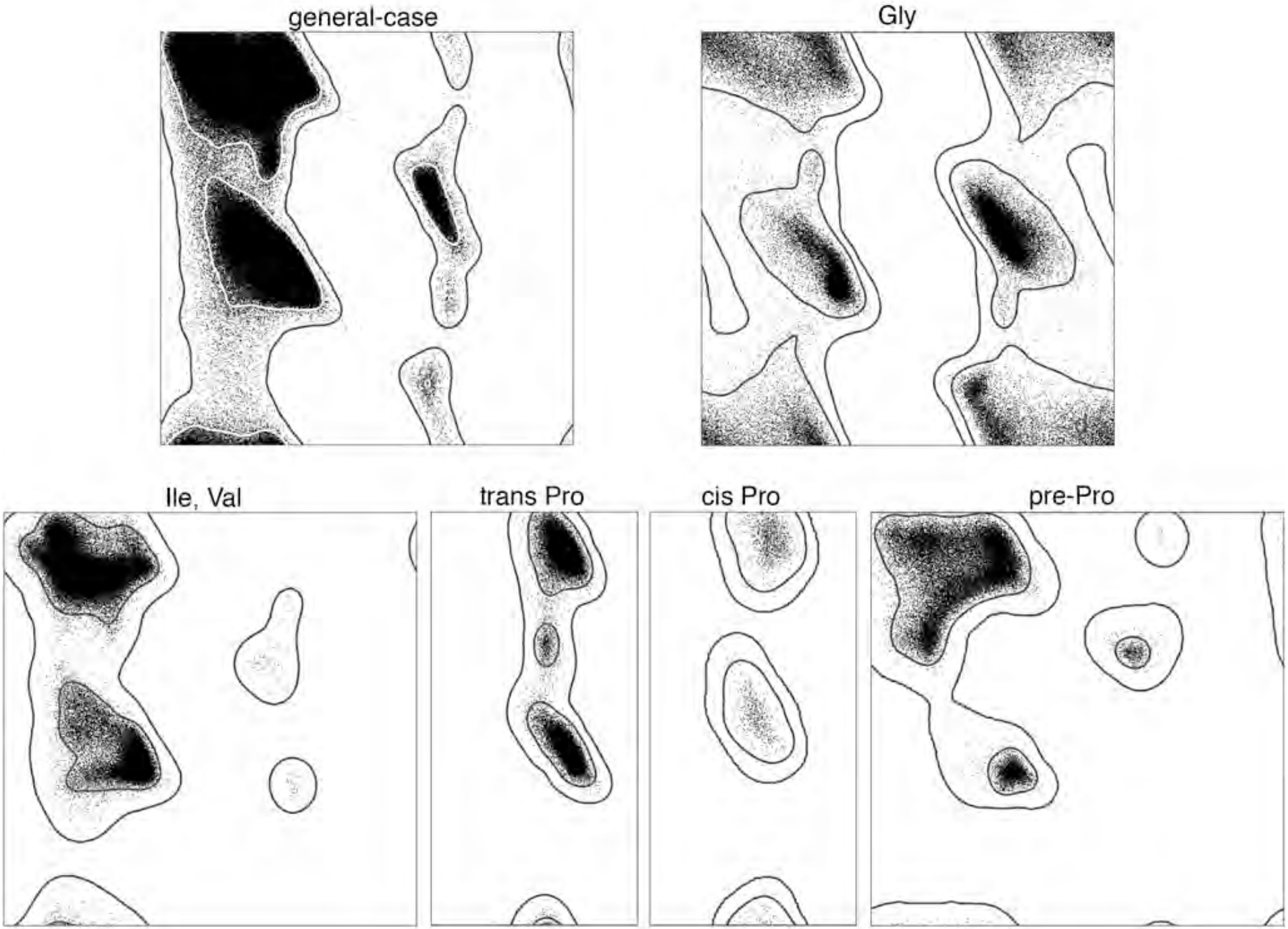
Read et al,
Structure
19: 1395
(open access)



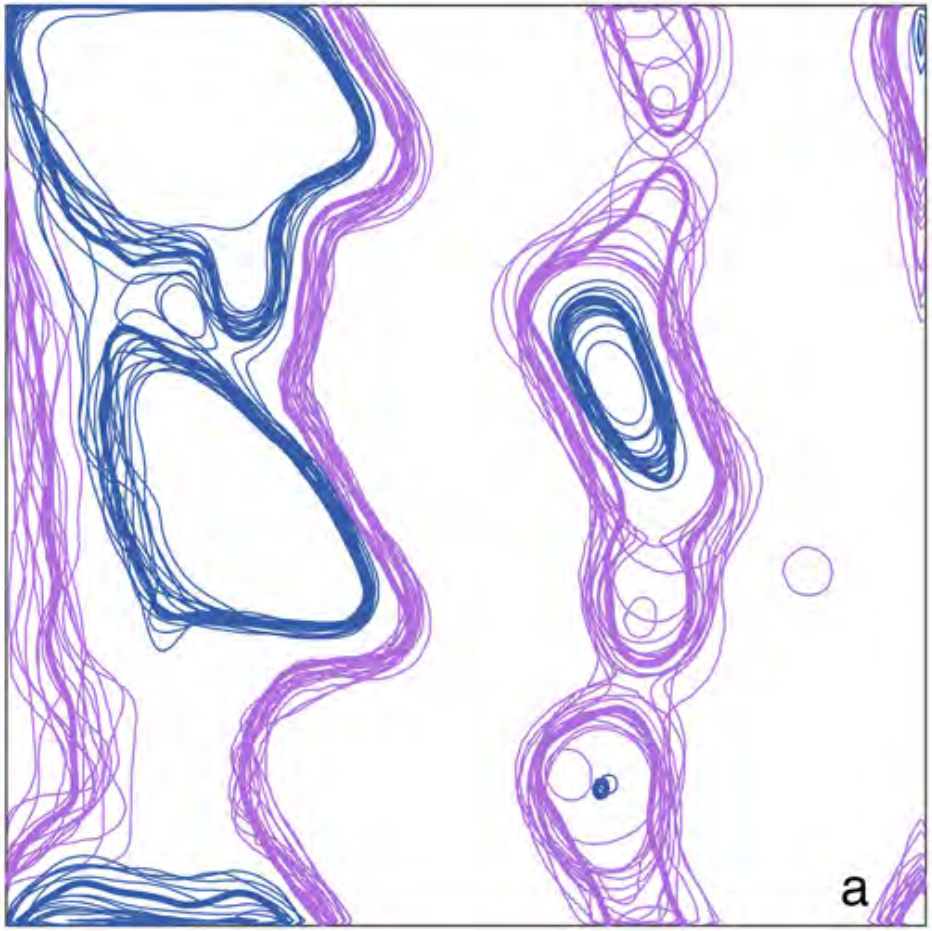

Clashscore vs Resolution
all PDB xray, since 1990
All-atom Clashscore
Resolution (Å)
1 %ile
25 %ile
Median
75 %ile
99 %ile
0
20
40
60
80
100
120
140
160
180
200
1.0
1.5
2.0
2.5
3.0
3.5
4.0


Clash Score
0
20
40
60
80
100
120
140
160
180
200
220
240
260
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Resolution Å
1 Percentile
Bad Quartile
Median
Good Quartile
99 Percentile
1
25
50
75
99

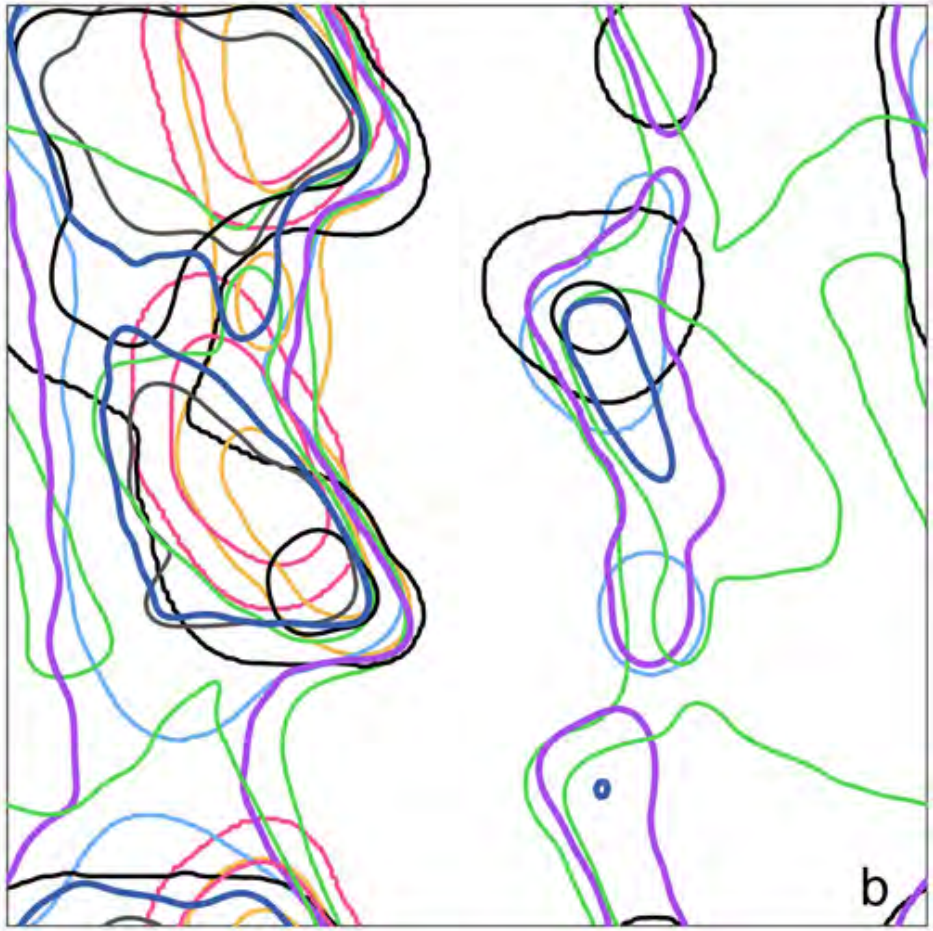

Metric
Score
Rfree
0.256
RSR-Z
0.123
Backbone
0.056
Rotamers
0.025
Clashscore
17.3
Underpacking
1.3
RNA puckers
0.031
Worse
Better
Absolute Percentile
Relative Percentile
More Details


general-case
Gly
Ile, Val
trans Pro
cis Pro
pre-Pro

Ramachandran-plot categories



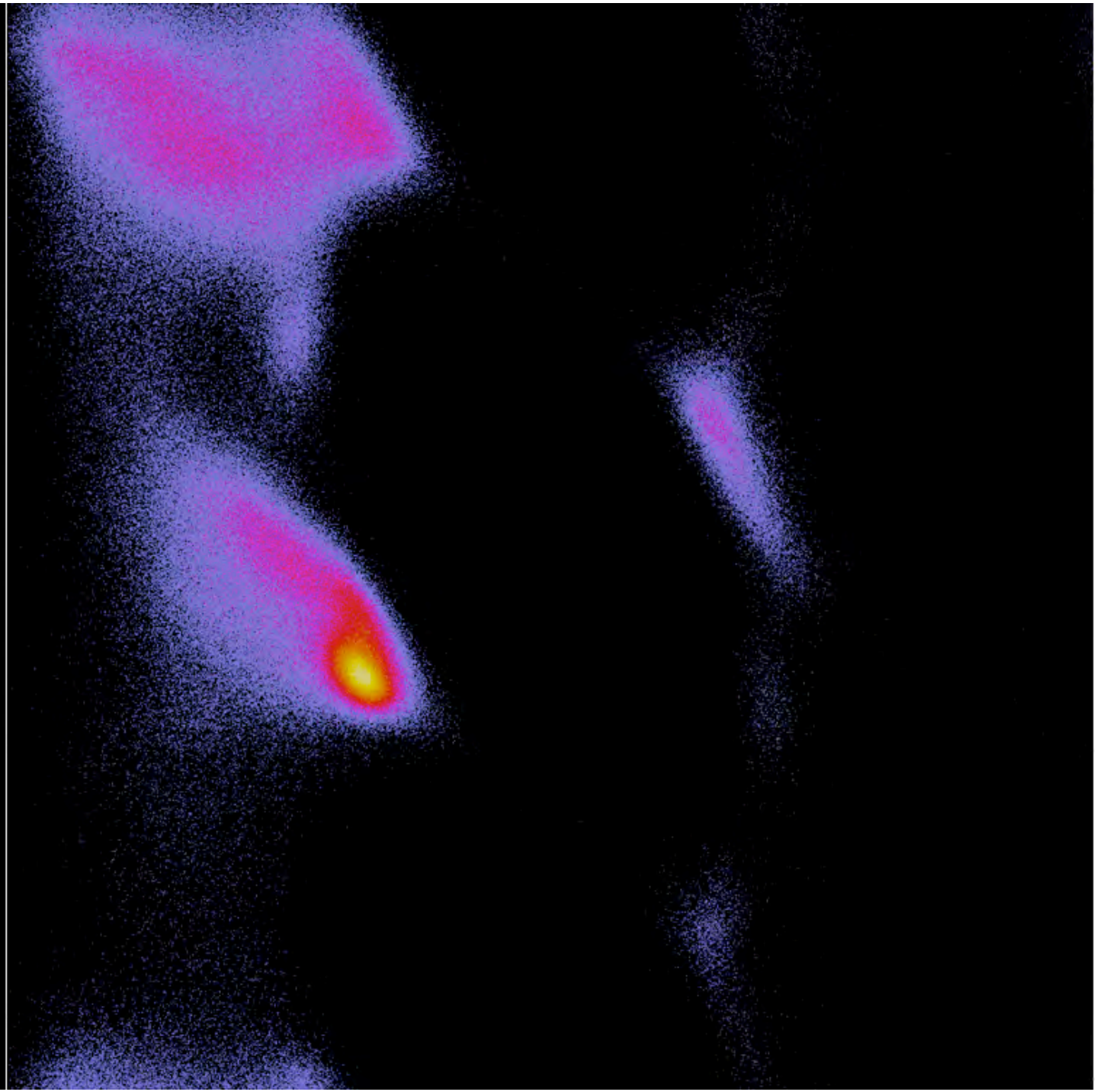
General case -
16 similar amino acids



5 other very distinct categories -
Gly, cis/trans Pro, pre-Pro, IleVal

Rama
General-case

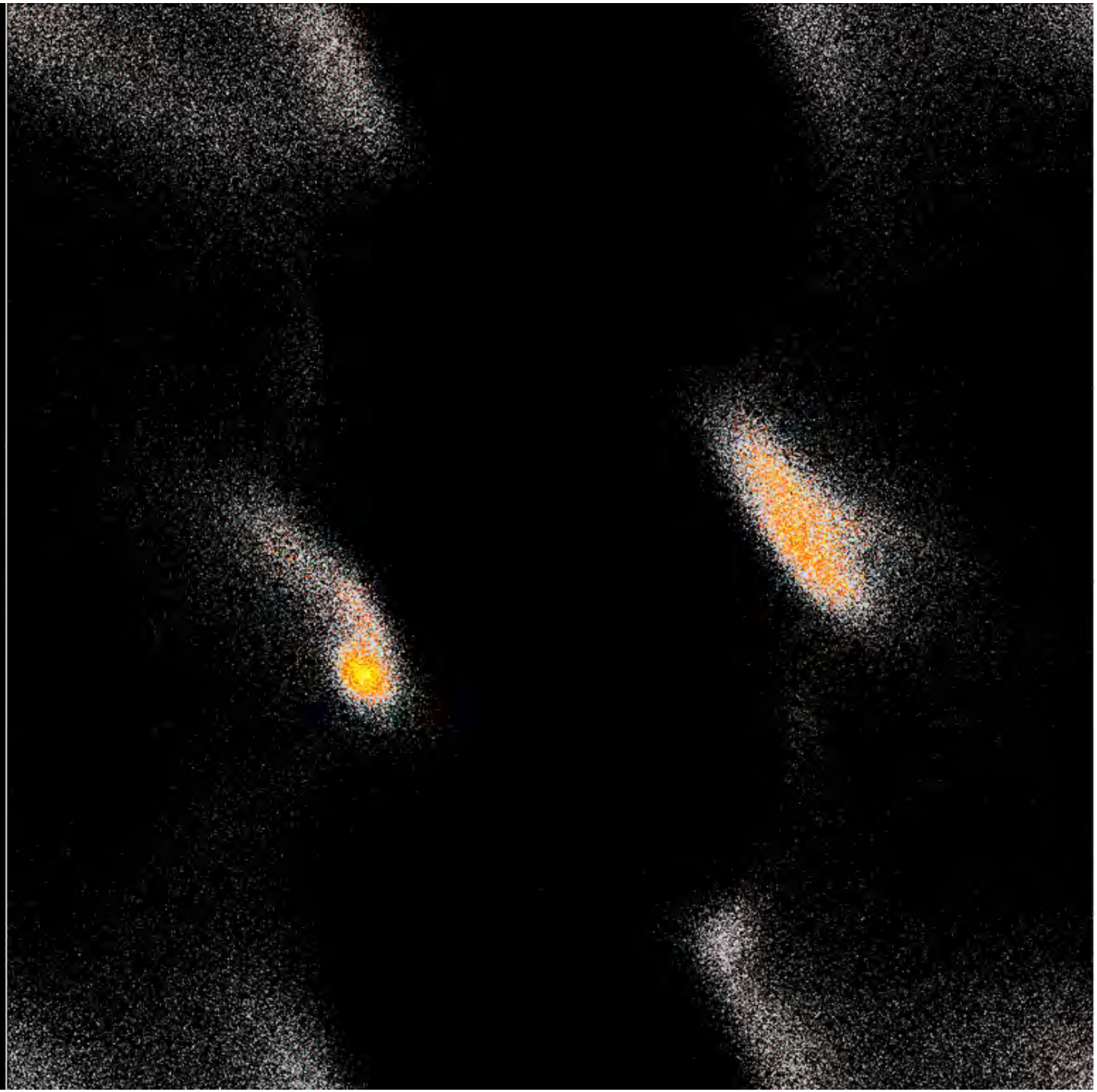
Top8000:
resol <2.0
MPr sc <2.0
homol <70%
570,000 points
mc B ≤30

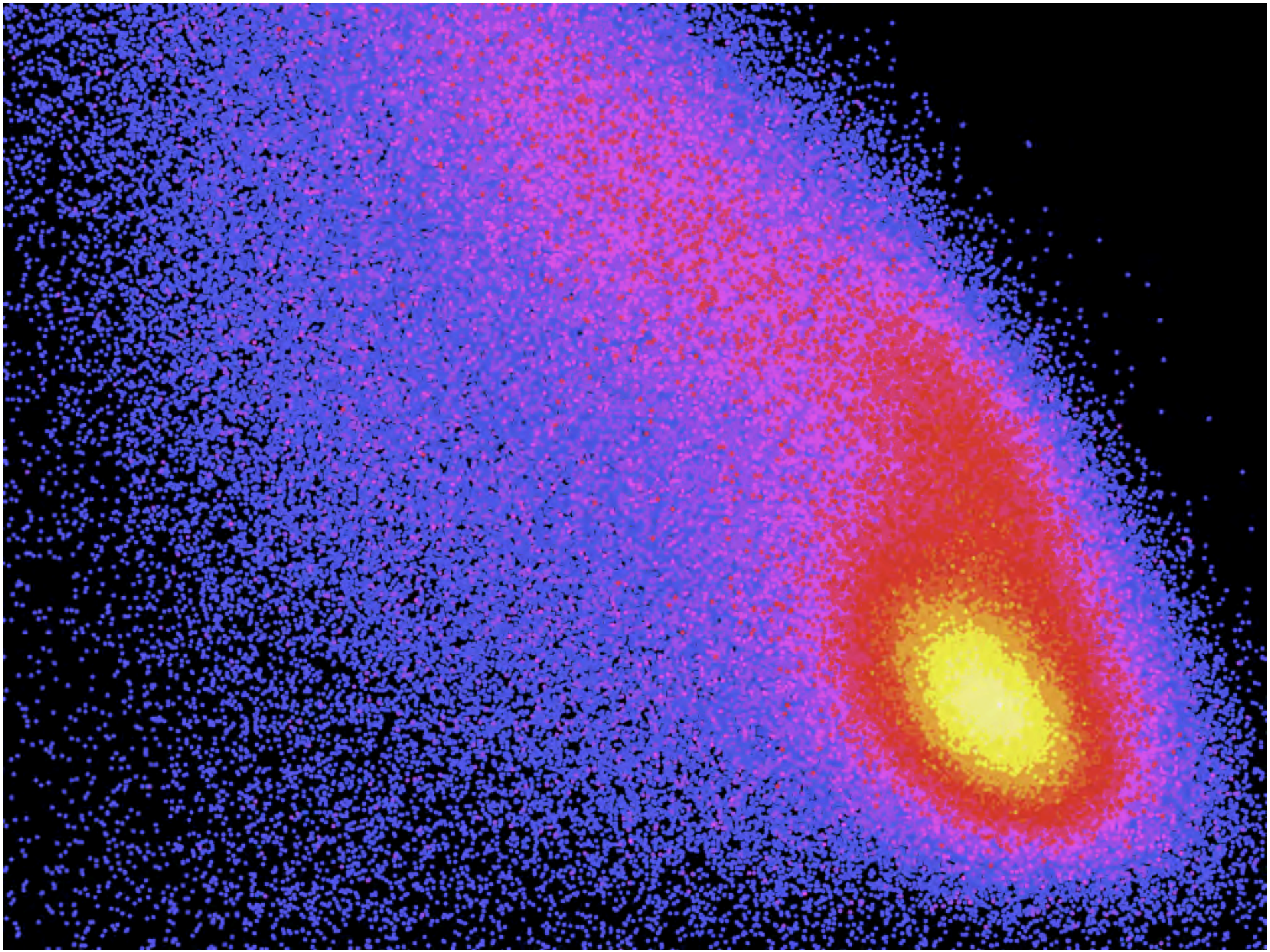


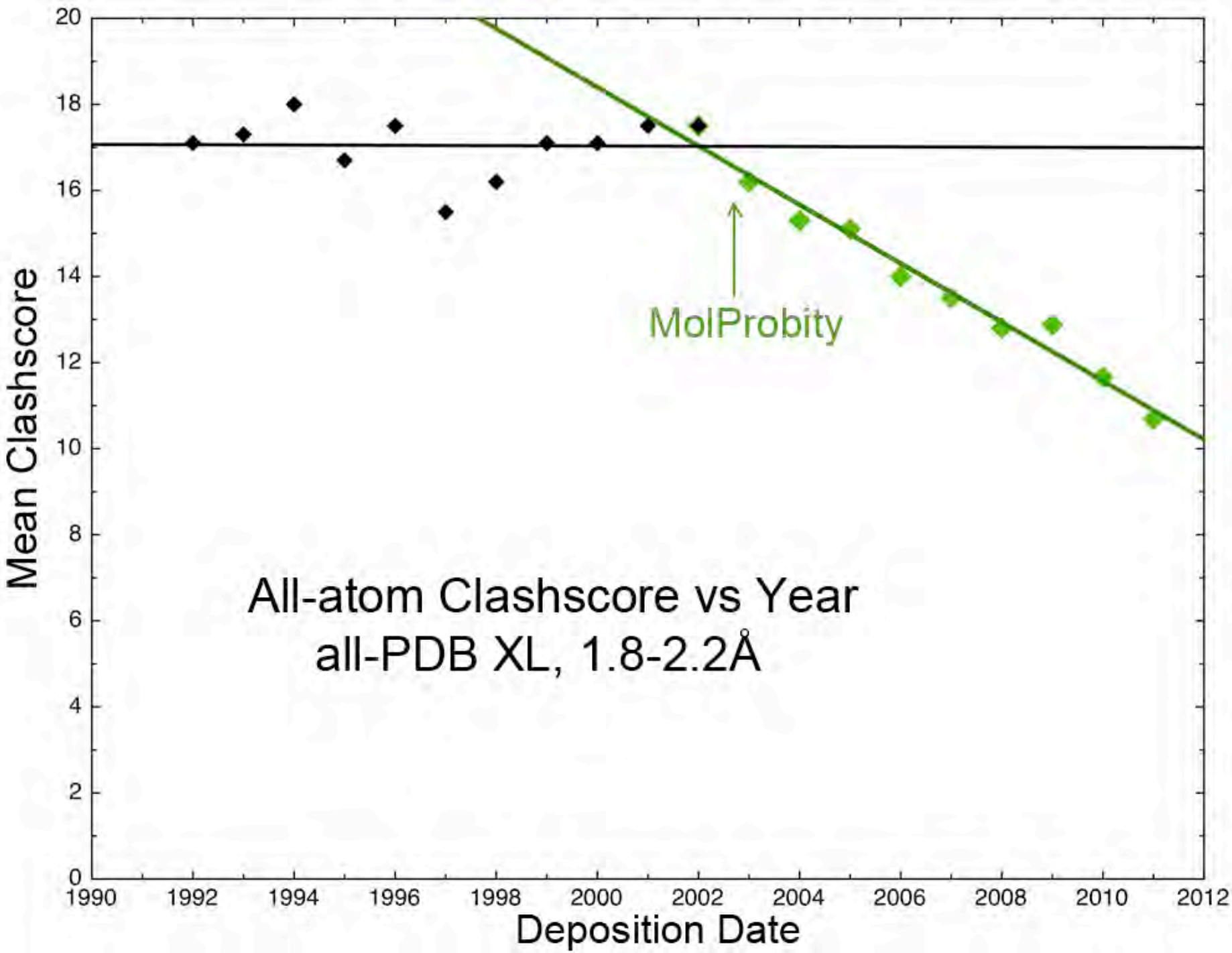
Glycine

Top8000

116,000 points






All-atom Clashscore vs Year
all-PDB XL, 1.8-2.2Å
MolProbity
Mean Clashscore
Deposition Date
0
2
4
6
8
10
12
14
16
18
20
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012

All-Atom Contact Analysis

MOL PROBITY

RLab:

Bryan Arendall
Vincent Chen
Jeremy Block
Gary Kapral
Dan Keedy
Christopher Williams
Swati Jain
Bradley Hintze
Lindsay Deis
Lizbeth Videau
Michael Prisant
Jane & Dave Richardson

Mike Word
Simon Lovell
Ian Davis
Laura Murray
Jeff Headd

PHENIX developers

Xray Validation Task Force

wwPDB, NDB, EDS

NIGMS