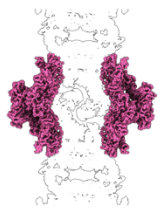

Supplementary information

Cytoplasmic lattices are megadalton storage complexes in mammalian oocytes

In the format provided by the
authors and unedited

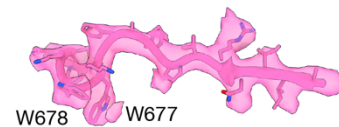
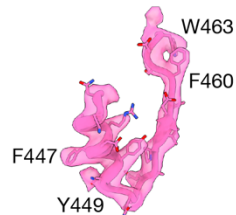
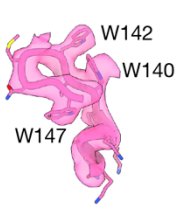
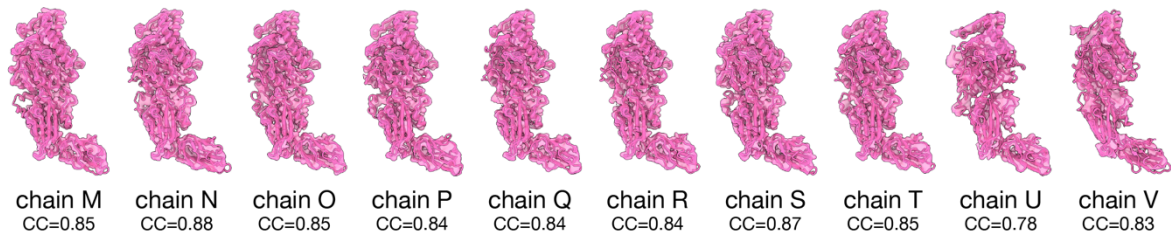
PADI6

Sequence used for modelling	Q8K3V4	Location in CPL globular repeat
Sequence length (aa)	682	
Molecular weight (kDa)	76.8	
Number of copies in one repeat	20	
Abundance in proteome (log ₂ iBAQ)	25.3	

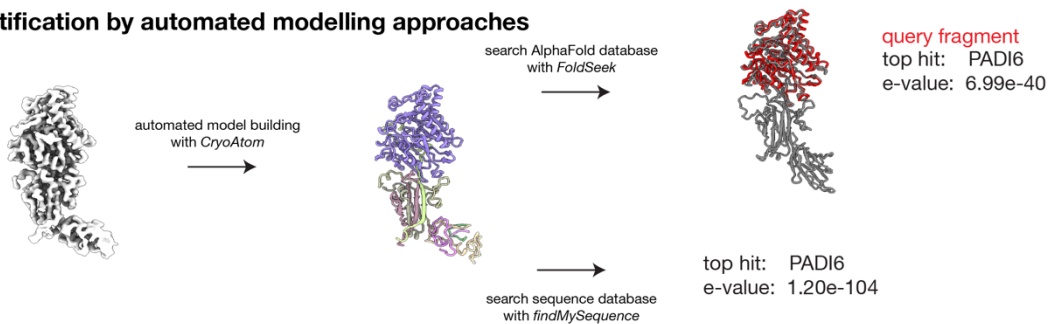
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

- 1) Immunogold electron microscopy localizes PADI6 to the CPLs (Wright et al 2003 Dev Biol).
- 2) Expansion microscopy shows that PADI6 localizes fiber-like structures resembling CPLs that are abundant throughout the cytoplasm of mouse oocytes (Jentoft et al 2023 Cell).
- 3) PADI6 knockout results in complete loss of CPLs from the oocyte cytoplasm (Yurttas et al 2008 Development).

Supplementary Figure 1 | Protein identification and assessment report for PADI6.

NLRP5

Sequence used for modelling Q9R1M5 Location in CPL globular repeat

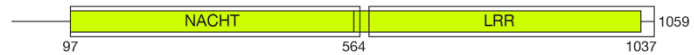
Sequence length (aa) 1163

Molecular weight (kDa) 131.3

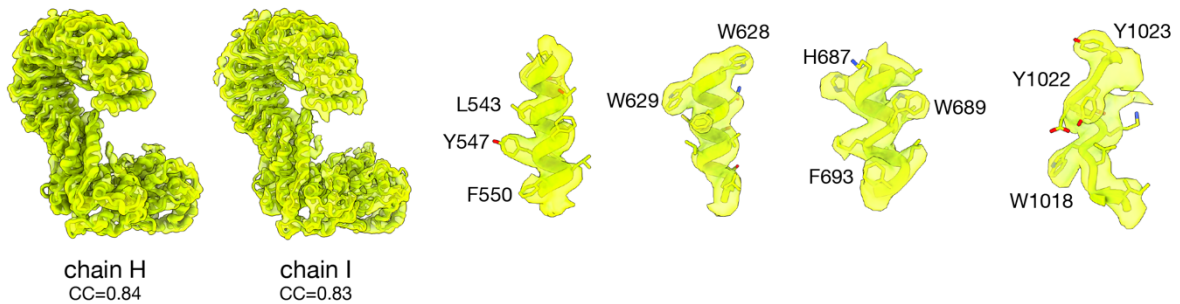
Number of copies in one repeat 4

Abundance in proteome ($\log_2$ iBAQ) 21.7

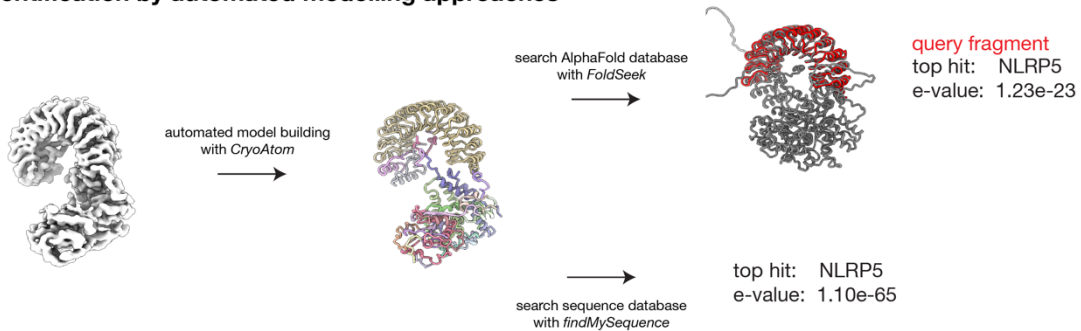
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

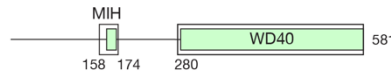
- 1) NLRP5 co-localizes with PADI6 throughout the oocyte cytoplasm (Kim et al 2010 PLoS One; Jentoft et al 2023 Cell).
- 2) Immunogold labelling electron microscopy localizes NLRP5 to the CPLs (Tashiro et al 2010 Genes Cells).
- 3) CPLs are decreased in oocytes from NLRP5-disrupted mice (Kim et al 2010 PLoS One).
- 4) The structure and binding site of NLRP5 within native CPLs matches those in reconstituted SCMC (Chi et al 2024 Nat Struct Mol Biol).

Supplementary Figure 2 | Protein identification and assessment report for NLRP5.

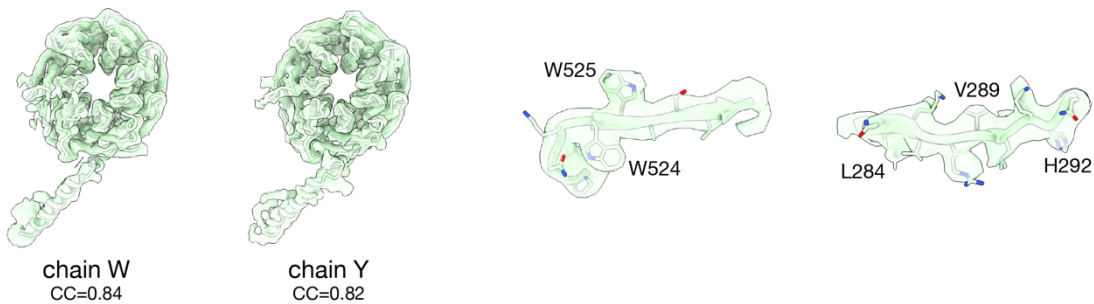
TLE6

Sequence used for modelling	Q9WVB3	Location in CPL globular repeat
Sequence length (aa)	581	
Molecular weight (kDa)	65.1	
Number of copies in one repeat	4	
Abundance in proteome (log ₂ iBAQ)	22.1	

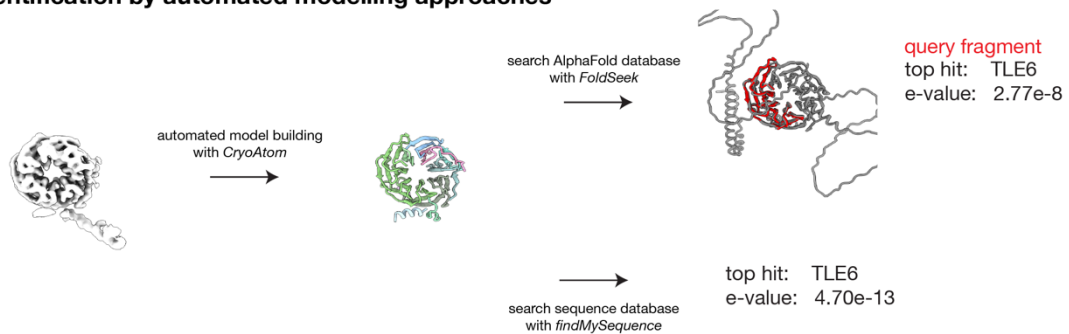
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches

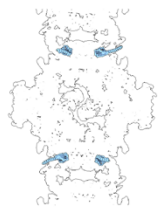


Supporting information

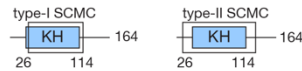
- 1) CPLs disappear from the cytoplasm of oocytes from TLE6-null mice (Qin et al 2019 Development).
- 2) TLE6 colocalizes with PADI6 throughout the oocyte cytoplasm (Jentoft et al 2023 Cell).
- 3) The structure and binding site of TLE6 within native CPLs matches those in reconstituted SCMC (Chi et al 2024 Nat Struct Mol Biol).

Supplementary Figure 3 | Protein identification and assessment report for TLE6.

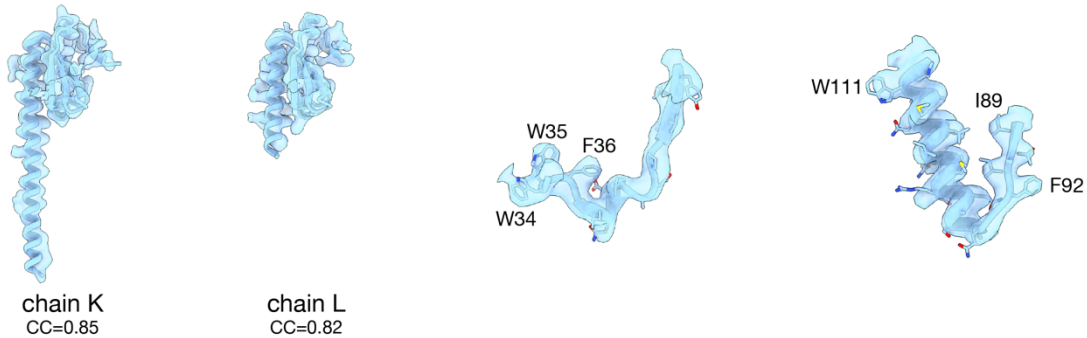
OOEP

Sequence used for modelling	Q9CWE6	Location in CPL globular repeat
Sequence length (aa)	164	
Molecular weight (kDa)	18.5	
Number of copies in one repeat	4	
Abundance in proteome (log ₂ iBAQ)	21.8	

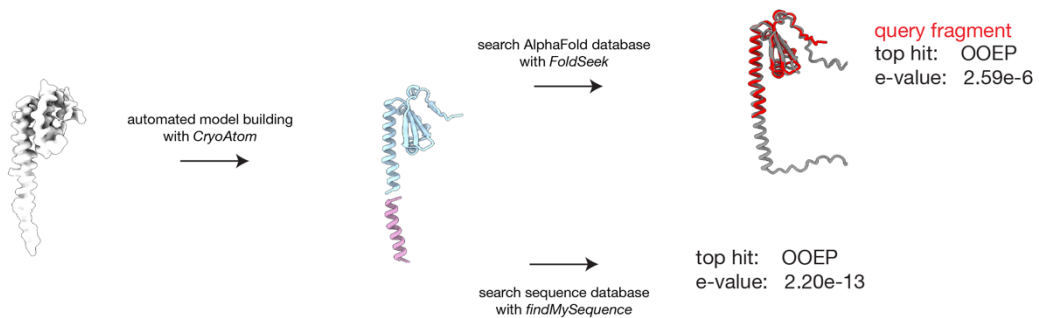
Domain organization (modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

- 1) OOEP localizes to CPLs by immunogold labelling electron microscopy (Tashiro et al 2010 Genes Cells).
- 2) OOEP colocalizes with PADI6-labelled fibers throughout the oocyte cytoplasm (Jentoft et al 2023 Cell).
- 3) The structure and binding site of OOEP within native CPLs matches those in reconstituted SCMC (Chi et al 2024 Nat Struct Mol Biol).
- 4) Oocytes from OOEP-deficient mice lack CPLs (Tashiro et al 2010 Genes Cells).

Supplementary Figure 4 | Protein identification and assessment report for OOEP.

KHDC3

Sequence used for modelling	Q9CWU5	Location in CPL globular repeat
Sequence length (aa)	440	
Molecular weight (kDa)	48	
Number of copies in one repeat	2	
Abundance in proteome (log ₂ iBAQ)	21	

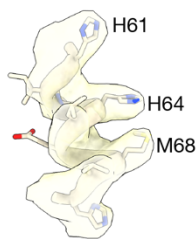
Domain organization
(modelled residues boxed)



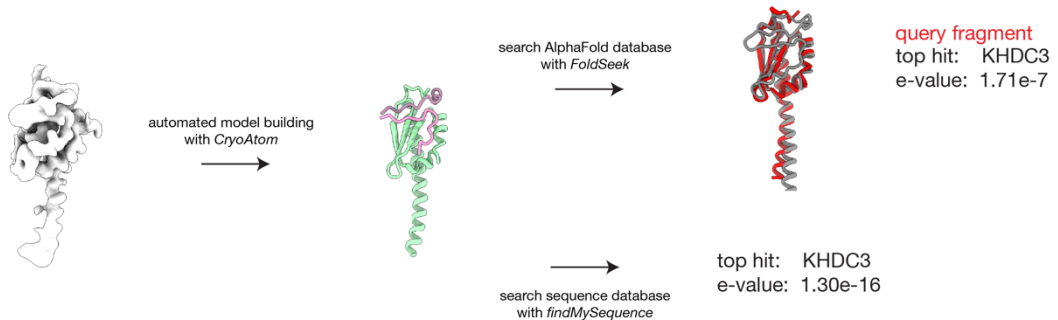
Examples of density



chain C
CC=0.84



Identification by automated modelling approaches

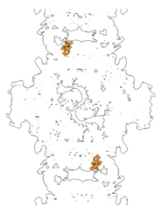


Supporting information

- 1) Oocytes from KHDC3-knockout mice lack CPLs (Qin et al 2019 Development).
- 2) KHDC3 co-localizes with PADI6-positive structures resembling CPLs throughout the cytoplasm of mouse oocytes (Jentoft et al 2023 Cell).

Supplementary Figure 5 | Protein identification and assessment report for KHDC3.

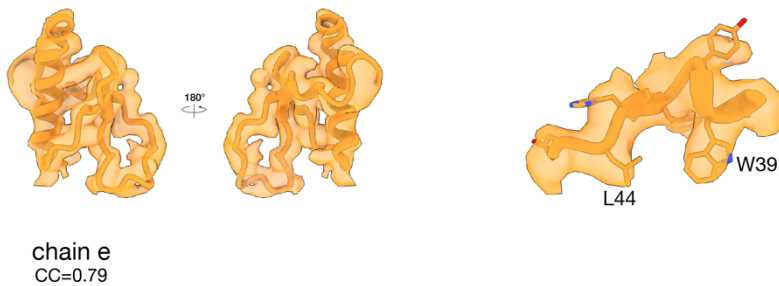
ZBED3

Sequence used for modelling	Q9D0L1	Location in CPL globular repeat
Sequence length (aa)	228	
Molecular weight (kDa)	25.6	
Number of copies in one repeat	2	
Abundance in proteome (log ₂ iBAQ)	18.7	

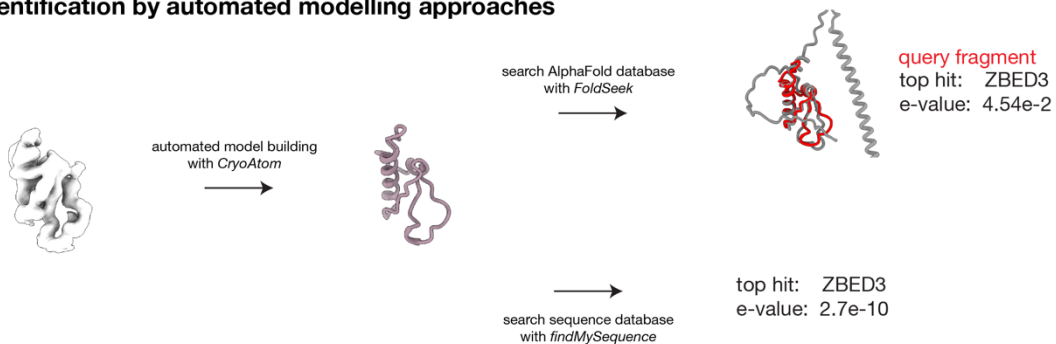
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

- 1) ZBED3 co-immunoprecipitates with TLE6 from mouse oocytes (Gao et al 2018 J Mol Cell Biol).
- 2) CPLs disappear from the cytoplasm of ZBED3-knockout mouse oocytes (Gao et al 2018 J Mol Cell Biol).
- 3) ZBED3 levels decrease in oocytes from TLE6-knockout mice (Jentoft et al 2023 Cell).
- 4) The structure and binding site of ZBED3 in native CPLs matches that of ZBED3 in reconstituted SCMC (Ou et al 2025 Structure).

Supplementary Figure 6 | Protein identification and assessment report for ZBED3.

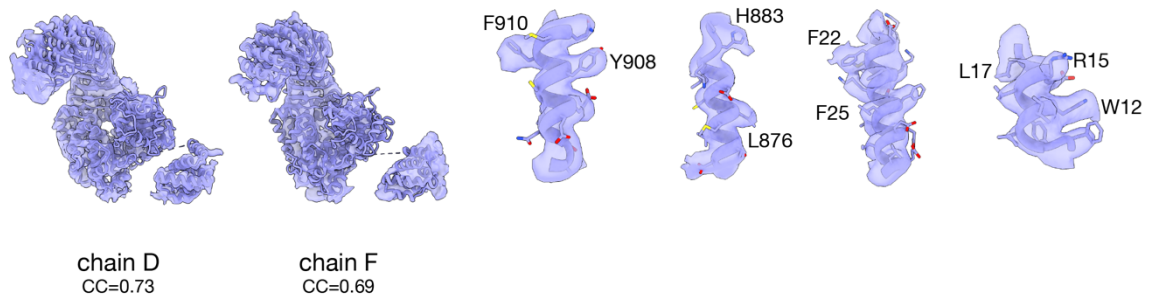
NLRP4F

Sequence used for modelling	L7N1W9	Location in CPL globular repeat
Sequence length (aa)	937	
Molecular weight (kDa)	107.9	
Number of copies in one repeat	4	
Abundance in proteome (log ₂ iBAQ)	19.7	

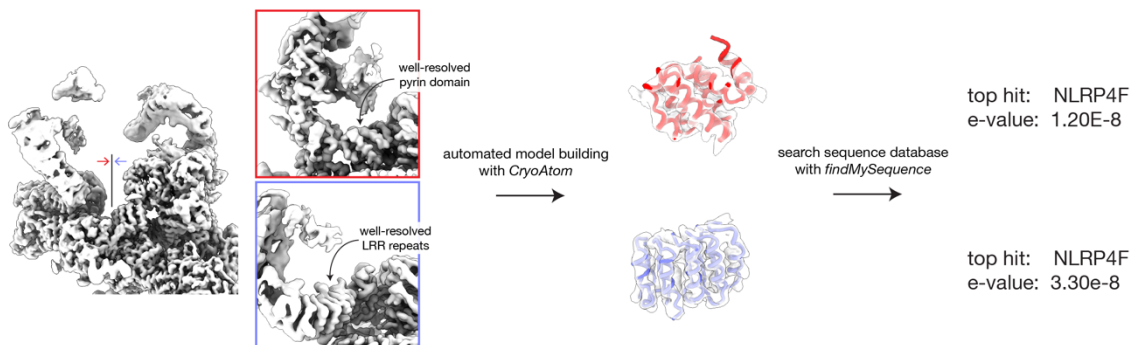
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

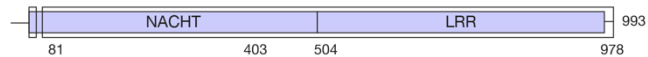
- 1) NLRP4F knockout results in complete loss of CPLs from the oocyte cytoplasm (Qin et al 2019 Development).
- 2) NLRP4F co-localizes with NLRP5 in the cytoplasm of mouse oocytes and co-immunoprecipitates with TLE6 and OOEP (Qin et al 2019 Development).
- 3) NLRP4F levels decrease in oocytes from PADI6-knockout and TLE6-knockout mice, which lack CPLs (Jentoft et al 2023 Cell).

Supplementary Figure 7 | Protein identification and assessment report for NLRP4F.

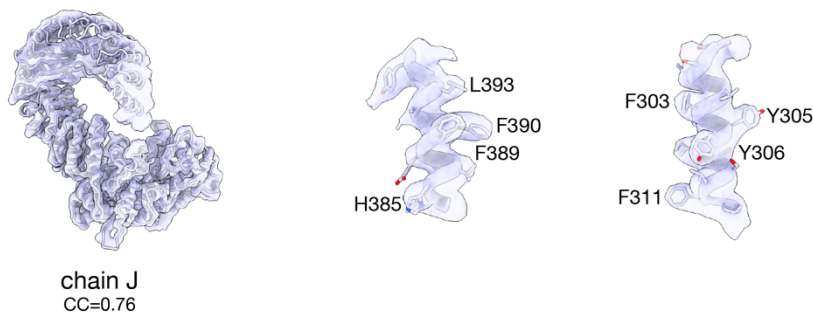
NLRP14

Sequence used for modelling	Q6B966	Location in CPL globular repeat
Sequence length (aa)	993	
Molecular weight (kDa)	113.4	
Number of copies in one repeat	2	
Abundance in proteome (log ₂ iBAQ)	21.6	

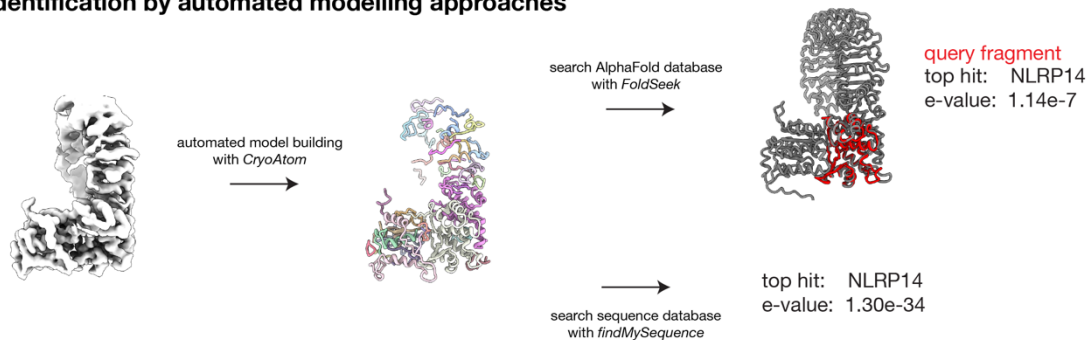
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

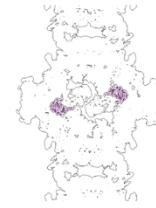
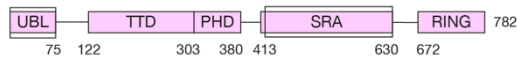
- 1) NLRP14 co-localizes with PADI6 in CPLs throughout the oocyte cytoplasm (Jentoft et al 2023 Cell).
- 2) Oocytes from NLRP14-knockout mice lack CPLs (Zhang et al 2023 Cell Rep).
- 3) NLRP14 co-immunoprecipitates with OOEP and can also pull down SCMC members NLRP5, TLE6, and OOEP (Zhang et al 2023 Cell Rep).
- 4) NLRP14 levels are decreased in PADI6-knockout oocytes, which lack CPLs (Williams et al 2025 bioRxiv).

Supplementary Figure 8 | Protein identification and assessment report for NLRP14.

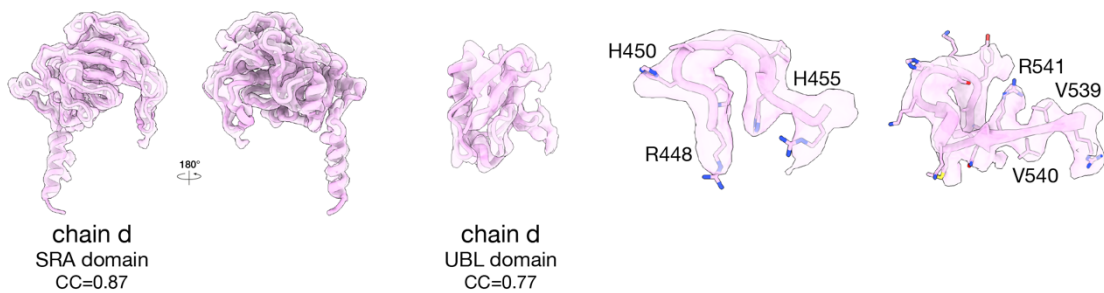
UHRF1

Sequence used for modelling	Q8VDF2	Location in CPL globular repeat
Sequence length (aa)	782	
Molecular weight (kDa)	88.3	
Number of copies in one repeat	2	
Abundance in proteome (log ₂ iBAQ)	22	

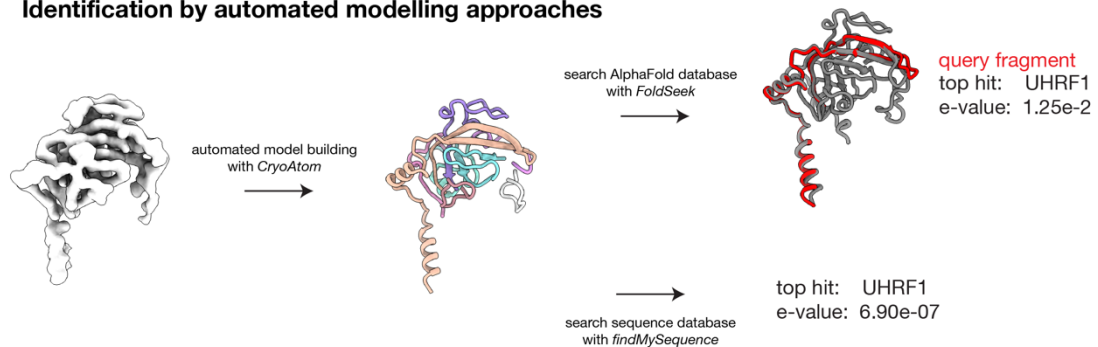
Domain organization
(modelled residues boxed)



Examples of density



Identification by automated modelling approaches

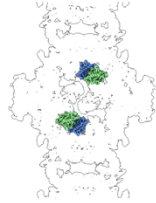


Supporting information

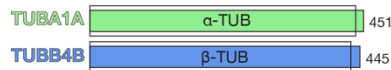
- 1) UHRF1 colocalizes with PADI6 in CPLs throughout the oocyte cytoplasm (Jentoft et al 2023 Cell).
- 2) UHRF1 levels are decreased in PADI6-knockout oocytes, which lack CPLs (Jentoft et al 2023 Cell; Williams et al 2025 bioRxiv).
- 3) UHRF1 is pulled down from oocyte lysates by anti-NLRP14 antibodies (Zhang et al 2023 Cell Rep).
- 4) Oocytes from UHRF1-deficient mice lack CPLs (Uemura et al 2023 Life Sci Alliance).

Supplementary Figure 9 | Protein identification and assessment report for UHRF1.

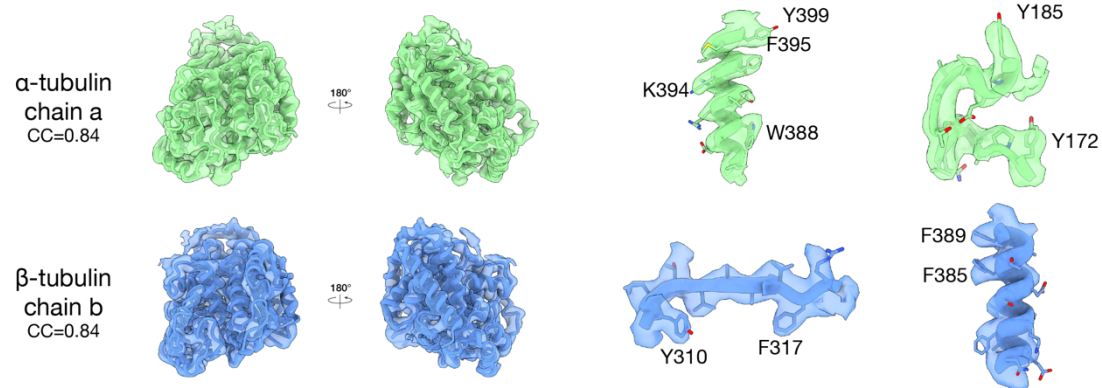
α/β -TUBULIN

Sequence used for modelling	P68369 (TUBA1A) P68372 (TUBB4B)	Location in CPL globular repeat
Sequence length (aa)	451 (TUBA1A) 445 (TUBB4B)	
Molecular weight (kDa)	50.1 (TUBA1A) 49.8 (TUBB4B)	
Number of copies in one repeat	2	
Abundance in proteome (log ₂ iBAQ)	21.6 (TUBA1A) 21.8 (TUBB4B)	

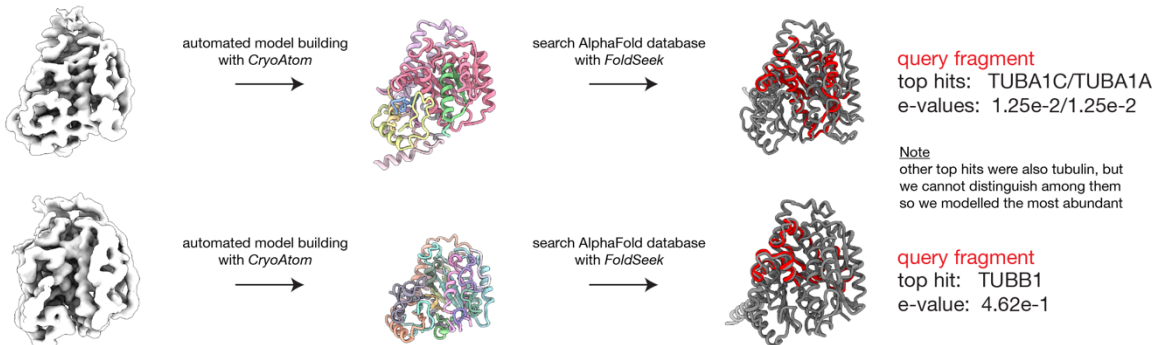
Domain organization (modelled residues boxed)



Examples of density



Identification by automated modelling approaches

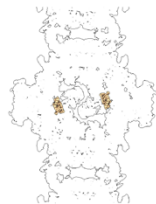


Supporting information

- 1) Immunogold labelling electron microscopy localizes tubulin to CPLs in mouse oocytes (Kan et al 2011 Dev Biol).
- 2) Tubulin co-localizes with PADI6 in CPLs throughout the mouse oocyte cytoplasm (Jentoft et al 2023 Cell).
- 3) Tubulin co-immunoprecipitates with PADI6 from mouse oocyte lysates (Kan et al 2011 Dev Biol).
- 4) Tubulin levels decrease in several knockout models that lack CPLs, including PADI6-null (Jentoft et al 2023 Cell; Williams et al 2025 bioRxiv), UHRF1-null (Uemura et al 2023 Life Sci Alliance), and NLRP14-null mice (Zhang et al 2023 Cell Rep).

Supplementary Figure 10 | Protein identification and assessment report for α/β -tubulin.

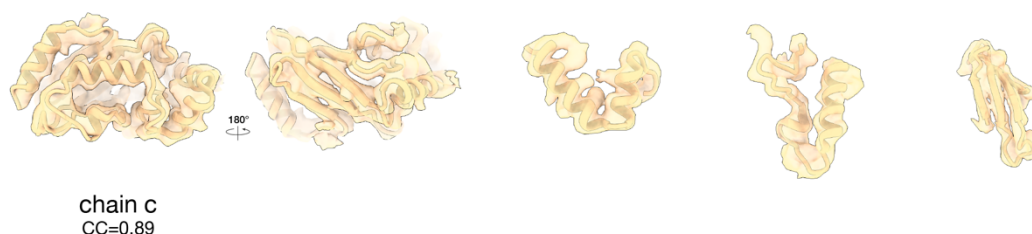
UBE2

Sequence used for modelling	P61079 (UBE2D3)	Location in CPL globular repeat
Sequence length (aa)	147	
Molecular weight (kDa)	16.7	
Number of copies in one repeat	2	
Abundance in proteome (log ₂ iBAQ)	19 (UBE2D3) 16.6 (UBE2K) 15.9 (UBE2M)	

Domain organization (modelled residues boxed)

UBC 147

Examples of density



Identification by automated modelling approaches

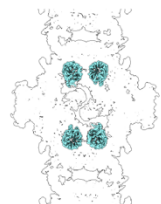


Supporting information

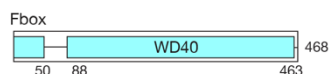
- 1) UBE2D3 co-localizes with PADI6 on CPLs in mouse oocytes (Jentoft et al 2023 Cell).
- 2) Levels of UBE2D2 decrease in PADI6-null oocytes (Williams et al 2025 bioRxiv) and levels of UBE2D3 decrease in UHRF1-null oocytes (Uemura et al 2023 Life Sci Alliance).

Supplementary Figure 11 | Protein identification and assessment report for UBE2.

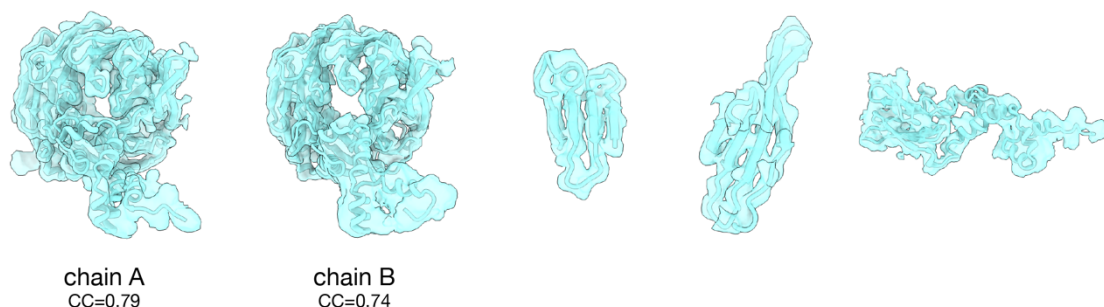
FBXW

Sequence used for modelling	Q5U467 (FBXW20)	Location in CPL globular repeat
Sequence length (aa)	468	
Molecular weight (kDa)	54	
Number of copies in one repeat	4 (up to 6)	
Abundance in proteome (log₂iBAQ)	20.9 (FBXW20) 19.9 (FBXW14) 19.4 (FBXW18)	

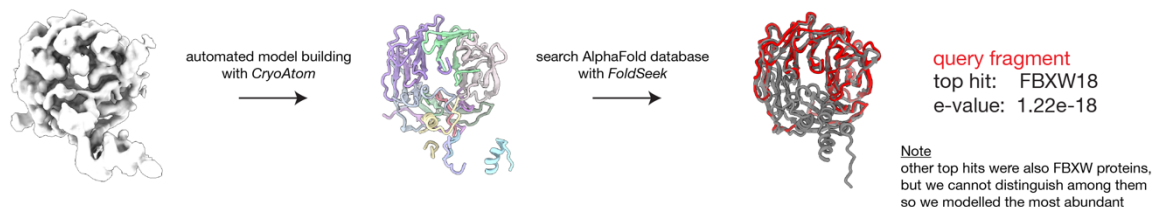
Domain organization (modelled residues boxed)



Examples of density



Identification by automated modelling approaches



Supporting information

- 1) Levels of several FBXW proteins are decreased in PADI6-knockout oocytes, which lack CPLs (Williams et al 2025 bioRxiv).

Supplementary Figure 12 | Protein identification and assessment report for FBXW.