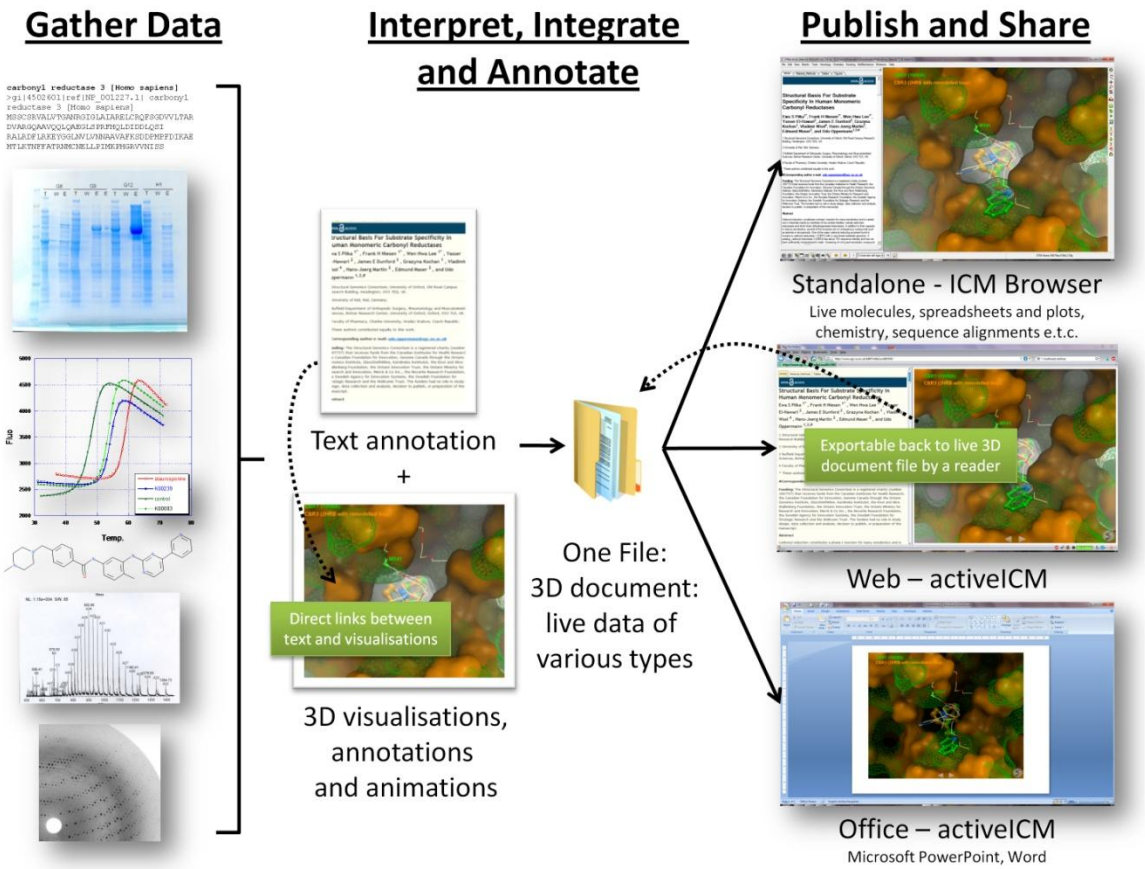
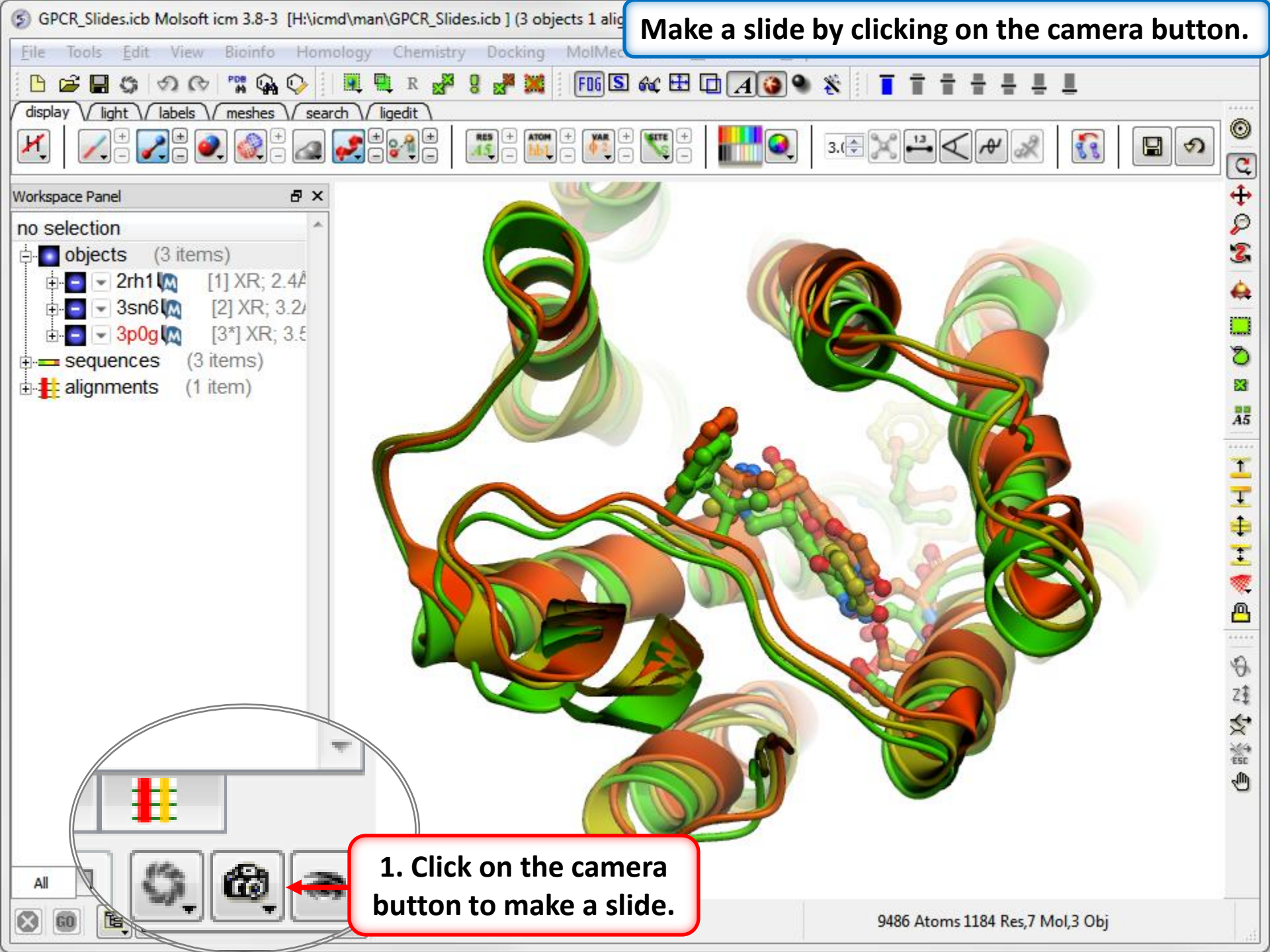
Slides and ActiveICM

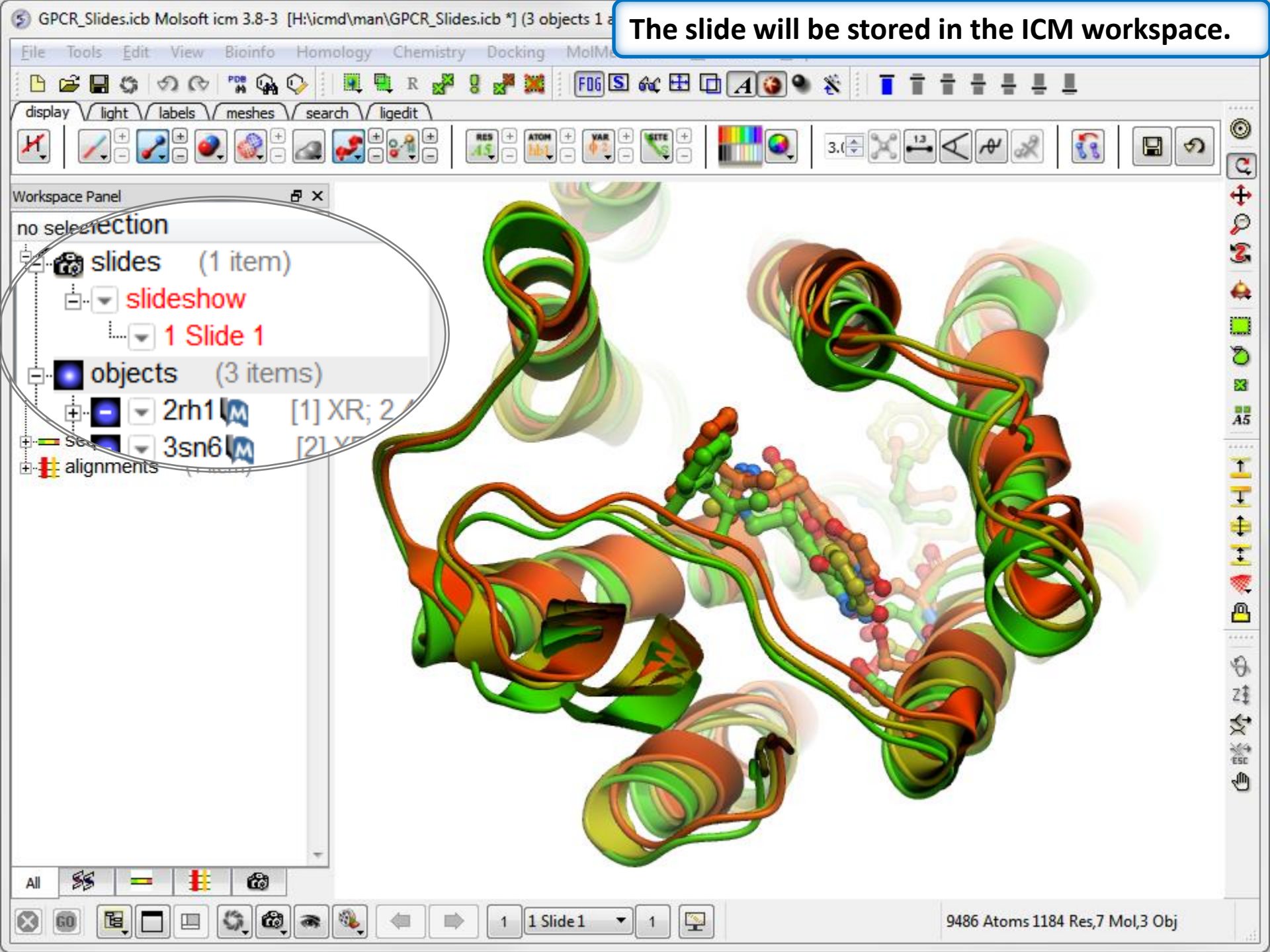


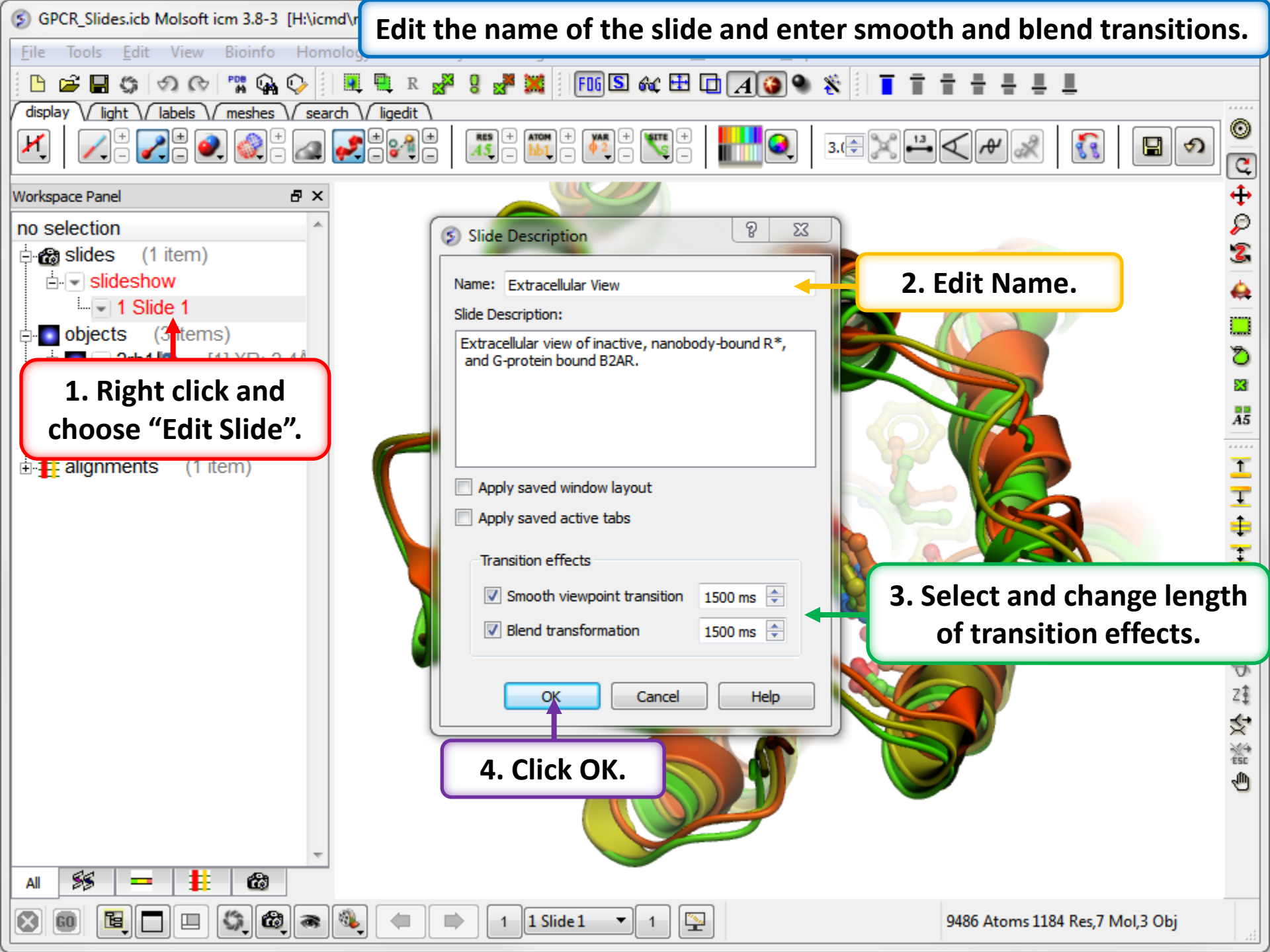
PLOS | COLLECTIONS

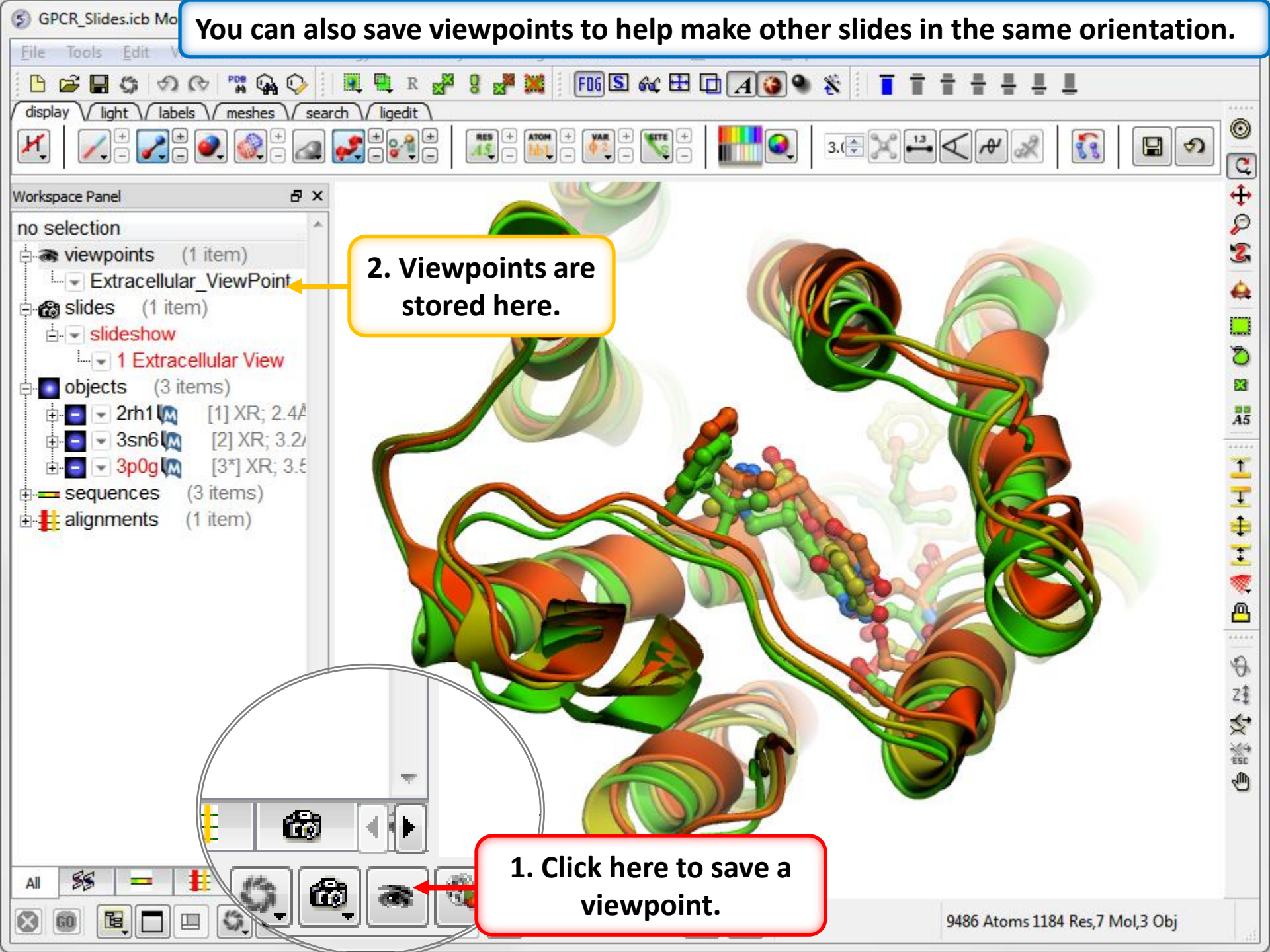
nature structural & molecular biology

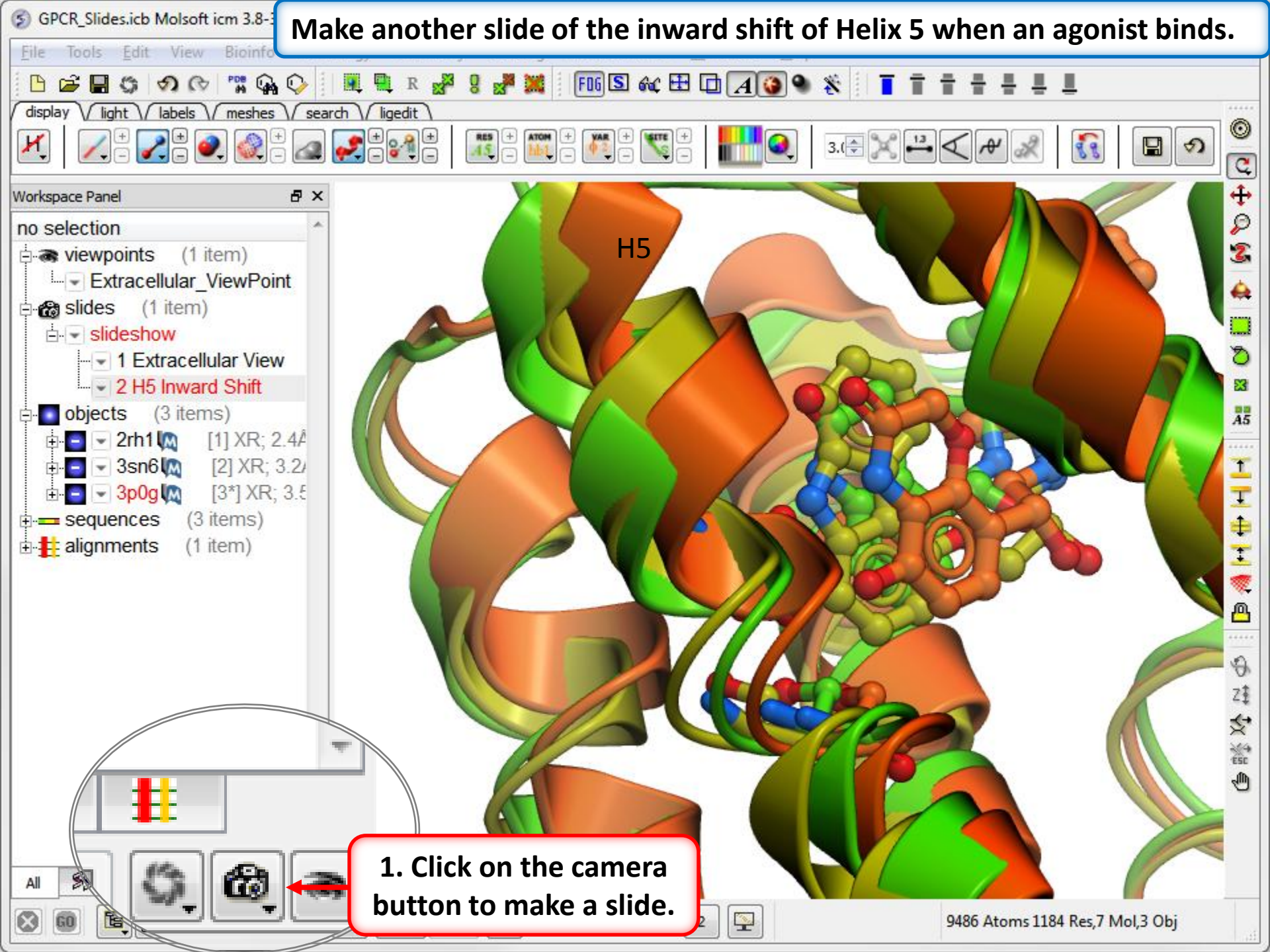
In this example we are going to look at the effect of an agonist binding to the Beta-2-Adrenergic GPCR (B2AR). A prepared ICM file containing three B2AR GPCRs superimposed can be downloaded here ftp.molsoft.com/pub/GPCR_slides.icb .The file contains pdb files 2RH1 (R inactive state), 3P0G (R* active state, with G-alpha mimic), and 3SN6 (R*G G-protein signalling state). The agonist ligand causes Helix 5 to shift inwards and Helix 6 to swing outwards. This agonist binding poses were predicted using ICM a year before the crystal structures were solved (see Katritch and Abagyan TIPS 2011).

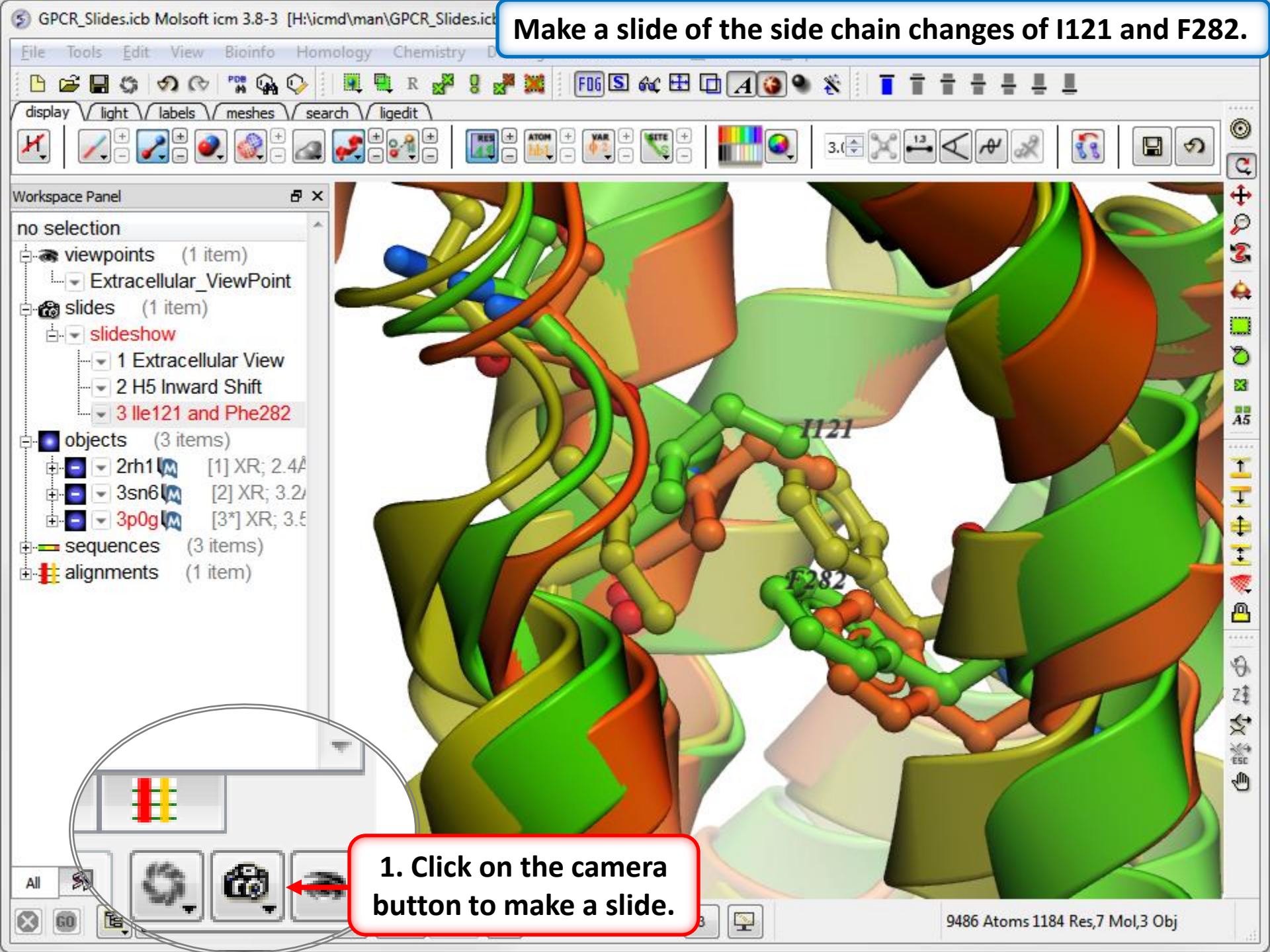

GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\man\GPCR_Slides.icb] (3 objects 1 alig
Make a slide by clicking on the camera button.
File Tools Edit View Bioinfo Homology Chemistry Docking MolMec
display light labels meshes search ligedit
Workspace Panel
no selection
objects (3 items)
2rh1 [1] XR; 2.4Å
3sn6 [2] XR; 3.2Å
3p0g [3*] XR; 3.5
sequences (3 items)
alignments (1 item)
All
GO
1. Click on the camera button to make a slide.
9486 Atoms 1184 Res,7 Mol,3 Obj

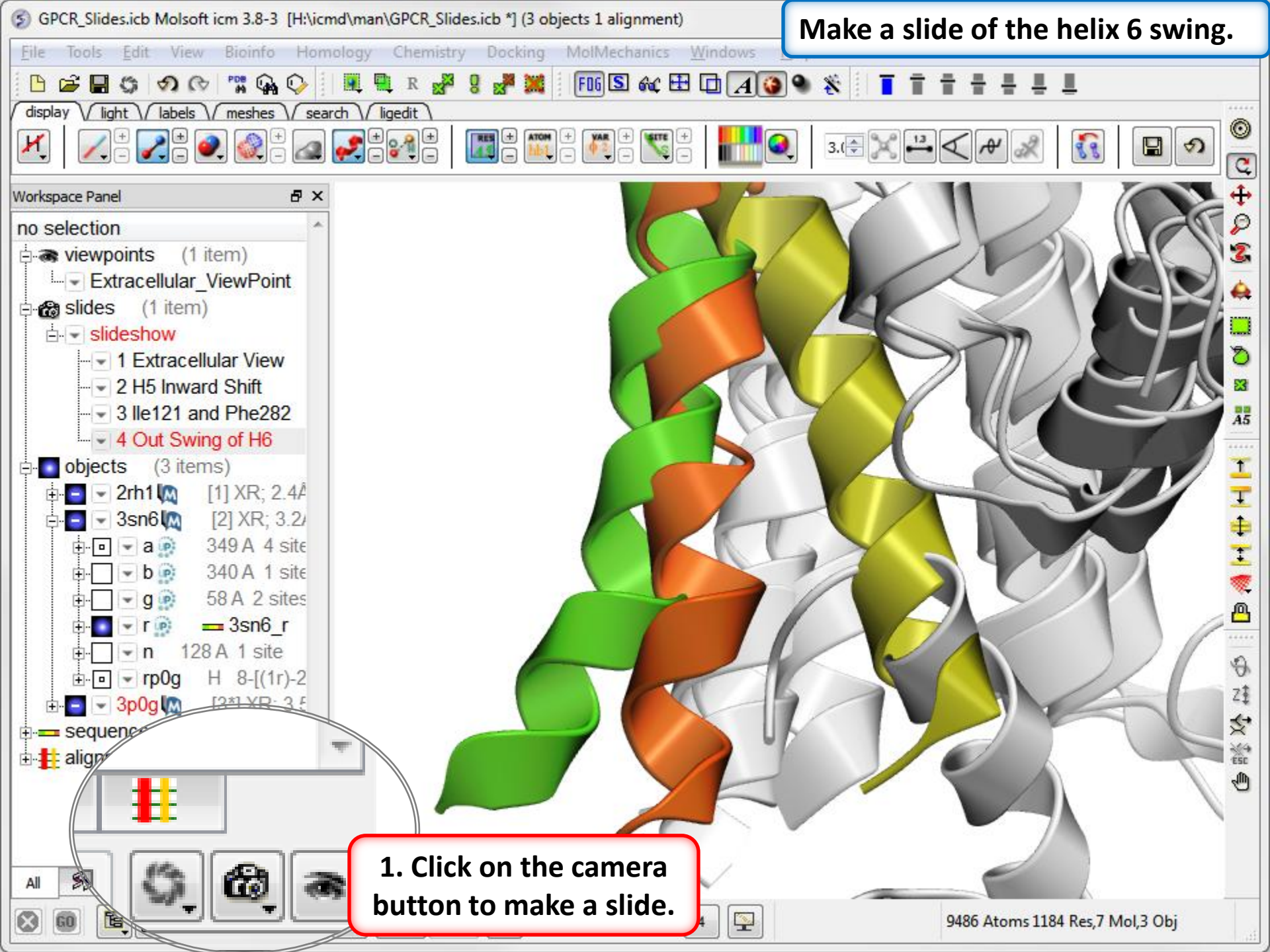

The slide will be stored in the ICM workspace.
GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\man\GPCR_Slides.icb *] (3 objects 1 a
File Tools Edit View Bioinfo Homology Chemistry Docking
display light labels meshes search ligedit
Workspace Panel
no selection
slides (1 item)
slideshow
1 Slide 1
objects (3 items)
2rh1
[1] XR; 2
3sn6
alignments
All
1 Slide 1
9486 Atoms 1184 Res,7 Mol,3 Obj

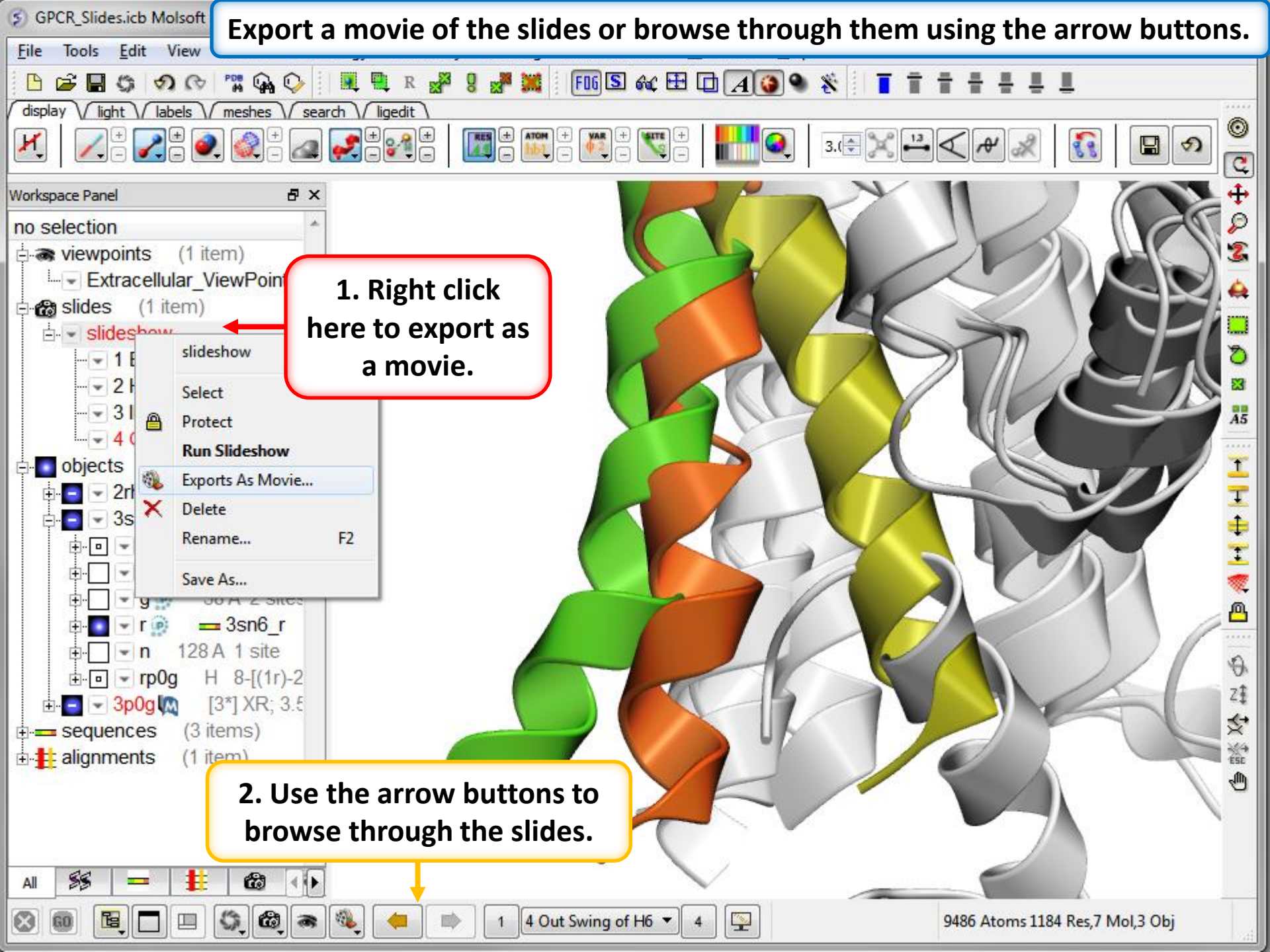

Edit the name of the slide and enter smooth and blend transitions.
GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\r
File Tools Edit View Bioinfo Homolog
display light labels meshes search ligedit
Workspace Panel
no selection
slides (1 item)
slideshow
1 Slide 1
objects (3 items)
alignments (1 item)
1. Right click and choose “Edit Slide”.
Slide Description
Name: Extracellular View
2. Edit Name.
Slide Description:
Extracellular view of inactive, nanobody-bound R*, and G-protein bound B2AR.
Apply saved window layout
Apply saved active tabs
Transition effects
Smooth viewpoint transition 1500 ms
Blend transformation 1500 ms
3. Select and change length of transition effects.
OK
Cancel
Help
4. Click OK.
All
1 Slide 1
9486 Atoms 1184 Res,7 Mol,3 Obj

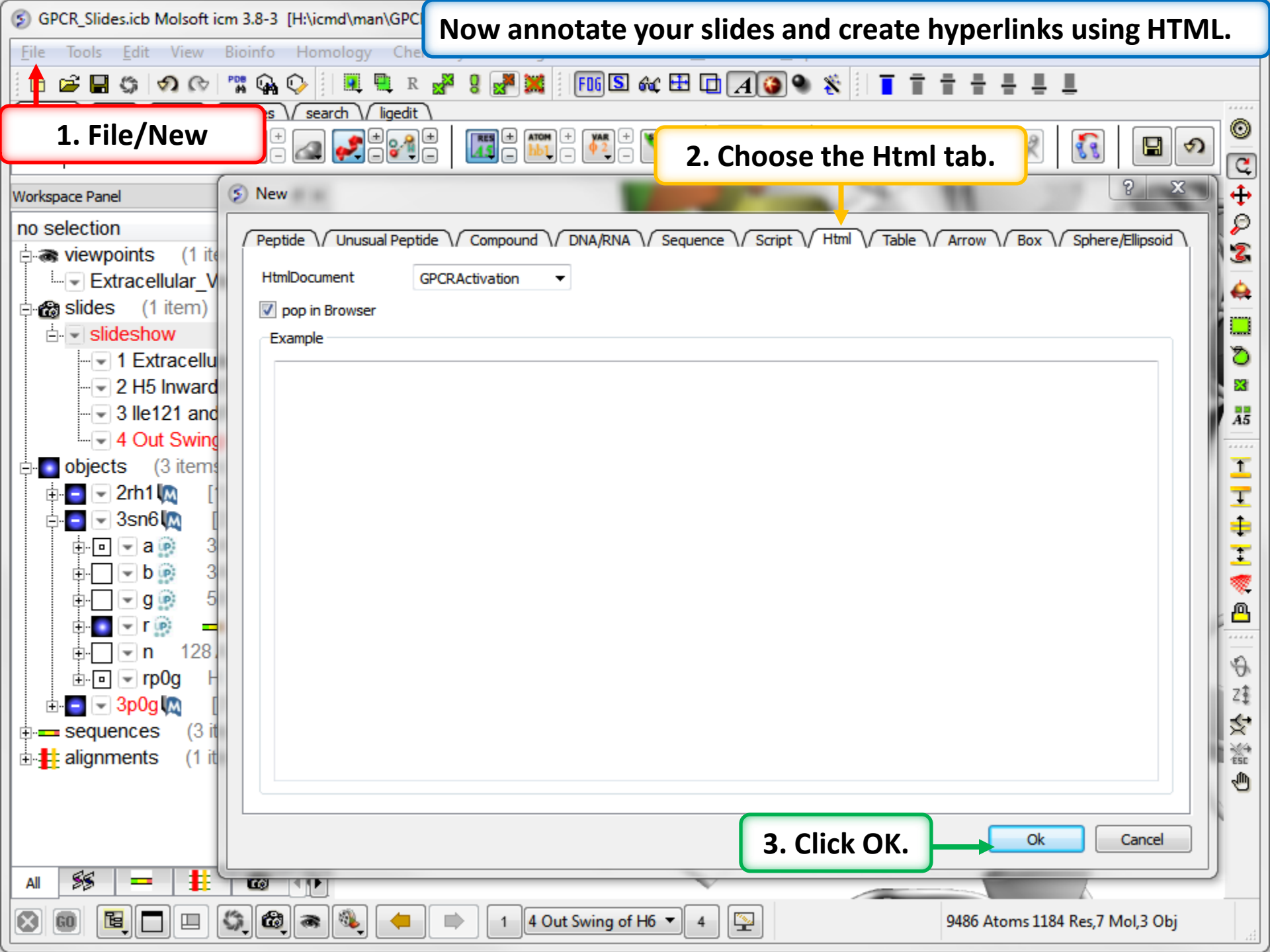

You can also save viewpoints to help make other slides in the same orientation.
GPCR_Slides.icb Mo
File Tools Edit
display light labels meshes search ligedit
Workspace Panel
no selection
viewpoints (1 item)
Extracellular_ViewPoint
slides (1 item)
slideshow
1 Extracellular View
objects (3 items)
2rh1 [1] XR; 2.4Å
3sn6 [2] XR; 3.2Å
3p0g [3*] XR; 3.5
sequences (3 items)
alignments (1 item)
2. Viewpoints are stored here.
1. Click here to save a viewpoint.
All
9486 Atoms 1184 Res,7 Mol,3 Obj

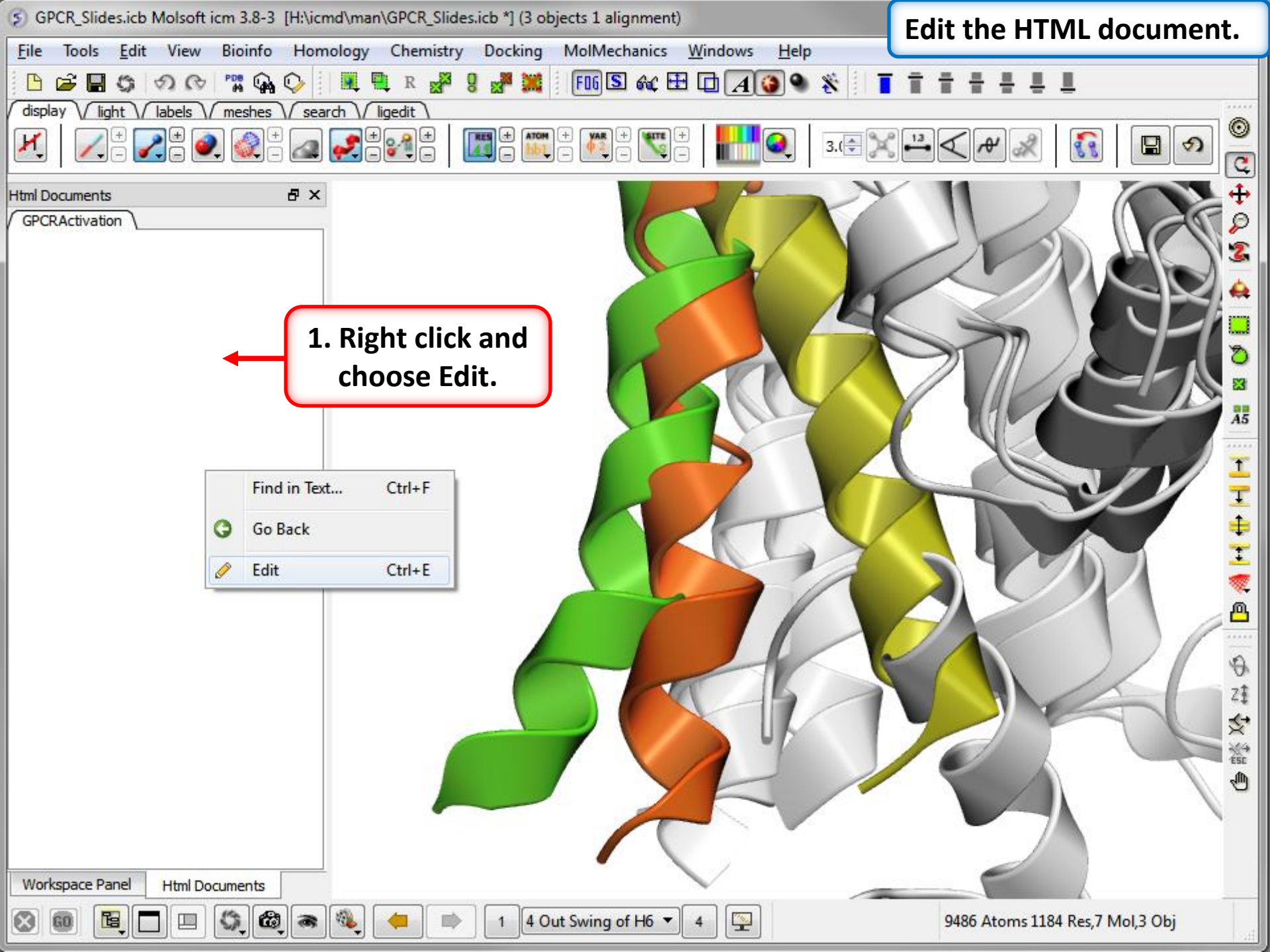

Make another slide of the inward shift of Helix 5 when an agonist binds.
GPCR_Slides.icb Molsoft icm 3.8-
File Tools Edit View
display light labels meshes search ligedit
Workspace Panel
no selection
viewpoints (1 item)
Extracellular_ViewPoint
slides (1 item)
slideshow
1 Extracellular View
2 H5 Inward Shift
objects (3 items)
2rh1
3sn6
3p0g
sequences (3 items)
alignments (1 item)
H5
All
GO
1. Click on the camera button to make a slide.
9486 Atoms 1184 Res,7 Mol,3 Obj

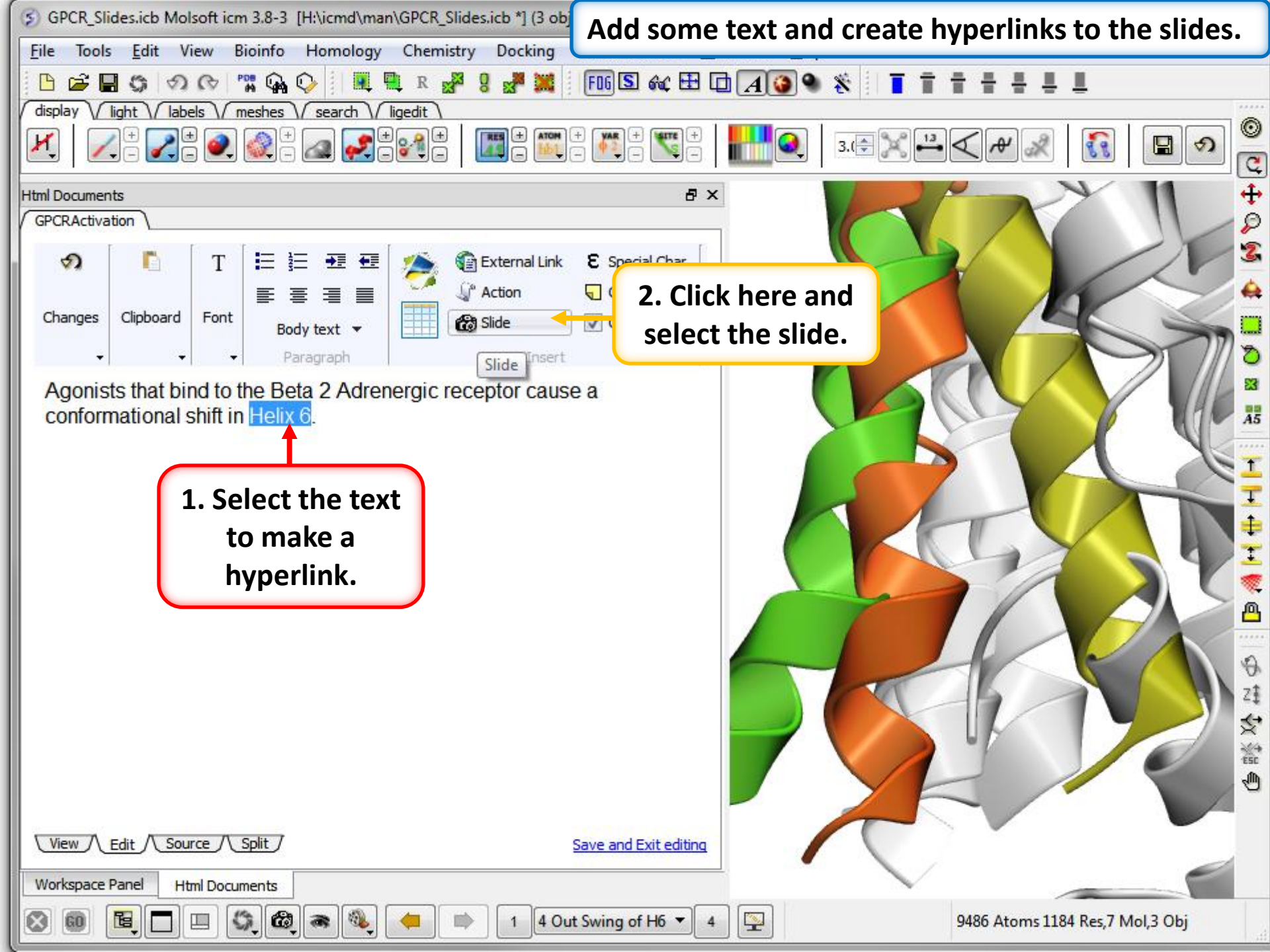

Make a slide of the side chain changes of I121 and F282.
GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\man\GPCR_Slides.icb
File Tools Edit View Bioinfo Homology Chemistry
display light labels meshes search ligedit
Workspace Panel
no selection
viewpoints (1 item)
Extracellular_ViewPoint
slides (1 item)
slideshow
1 Extracellular View
2 H5 Inward Shift
3 Ile121 and Phe282
objects (3 items)
2rh1 [1] XR; 2.4Å
3sn6 [2] XR; 3.2Å
3p0g [3*] XR; 3.5
sequences (3 items)
alignments (1 item)
I121
F282
All
1. Click on the camera button to make a slide.
9486 Atoms 1184 Res,7 Mol,3 Obj

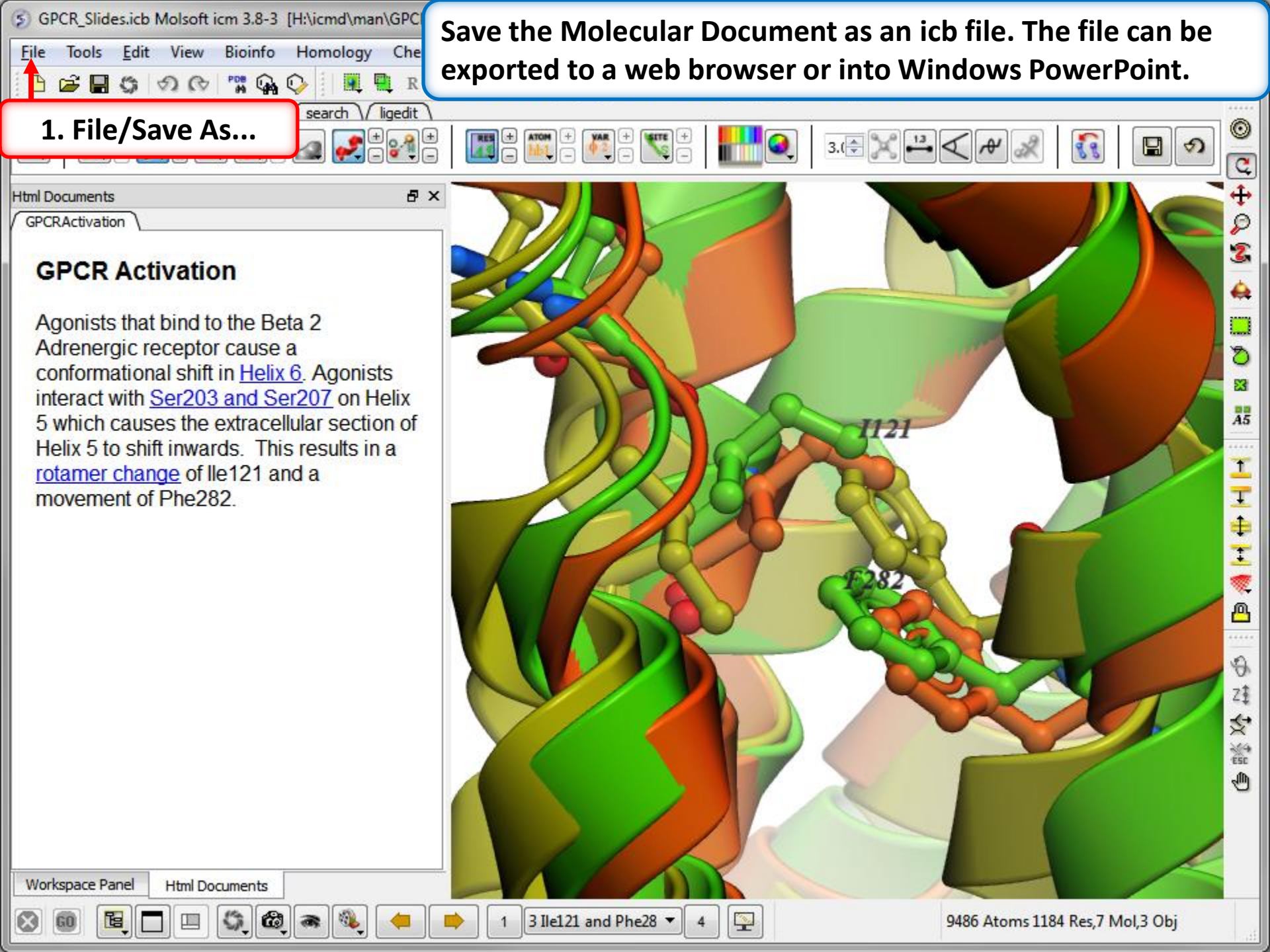

GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\man\GPCR_Slides.icb *] (3 objects 1 alignment)
Make a slide of the helix 6 swing.
File Tools Edit View Bioinfo Homology Chemistry Docking MolMechanics Windows
display light labels meshes search ligedit
Workspace Panel
no selection
viewpoints (1 item)
Extracellular_ViewPoint
slides (1 item)
slideshow
1 Extracellular View
2 H5 Inward Shift
3 Ile121 and Phe282
4 Out Swing of H6
objects (3 items)
2rh1
3sn6
a 349 A 4 site
b 340 A 1 site
g 58 A 2 sites
r 3sn6_r
n 128 A 1 site
rp0g H 8-[(1r)-2
3p0g
All
1. Click on the camera button to make a slide.
9486 Atoms 1184 Res,7 Mol,3 Obj


GPCR_Slides.icb Molsoft
Export a movie of the slides or browse through them using the arrow buttons.
File Tools Edit View
display light labels meshes search ligedit
Workspace Panel
no selection
viewpoints (1 item)
Extracellular_ViewPoint
slides (1 item)
slideshow
1. Right click here to export as a movie.
slideshow
Select
Protect
Run Slideshow
Exports As Movie...
Delete
Rename... F2
Save As...
objects
3sn6_r
128 A 1 site
sequences (3 items)
alignments
2. Use the arrow buttons to browse through the slides.
All
4 Out Swing of H6
9486 Atoms 1184 Res,7 Mol,3 Obj


Now annotate your slides and create hyperlinks using HTML.
1. File/New
2. Choose the Html tab.
3. Click OK.
New
Peptide
Unusual Peptide
Compound
DNA/RNA
Sequence
Script
Html
Table
Arrow
Box
Sphere/Ellipsoid
HtmlDocument
GPCRActivation
pop in Browser
Example
Ok
Cancel
Workspace Panel
no selection
viewpoints
slides
slideshow
objects
sequences
alignments
9486 Atoms 1184 Res,7 Mol,3 Obj


GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\man\GPCR_Slides.icb *] (3 objects 1 alignment)
Edit the HTML document.
File Tools Edit View Bioinfo Homology Chemistry Docking MolMechanics Windows Help
display light labels meshes search ligedit
Html Documents
GPCRActivation
1. Right click and choose Edit.
Find in Text... Ctrl+F
Go Back
Edit Ctrl+E
Workspace Panel
Html Documents
4 Out Swing of H6
9486 Atoms 1184 Res,7 Mol,3 Obj


GPCR_Slides.icb Molsoft icm 3.8-3 [H:\icmd\man\GPCR_Slides.icb *] (3 obj
Add some text and create hyperlinks to the slides.
File Tools Edit View Bioinfo Homology Chemistry Docking
display light labels meshes search ligedit
Html Documents
GPCRActivation
Changes
Clipboard
Font
Body text
Paragraph
External Link
Action
Slide
Insert
Slide
2. Click here and select the slide.
Agonists that bind to the Beta 2 Adrenergic receptor cause a conformational shift in Helix 6.
1. Select the text to make a hyperlink.
View Edit Source Split
Save and Exit editing
Workspace Panel
Html Documents
4 Out Swing of H6
9486 Atoms 1184 Res,7 Mol,3 Obj


Save the Molecular Document as an icb file. The file can be exported to a web browser or into Windows PowerPoint.
1. File/Save As...
File Tools Edit View Bioinfo Homology
search ligedit
Html Documents
GPCRActivation
GPCR Activation
Agonists that bind to the Beta 2 Adrenergic receptor cause a conformational shift in Helix 6. Agonists interact with Ser203 and Ser207 on Helix 5 which causes the extracellular section of Helix 5 to shift inwards. This results in a rotamer change of Ile121 and a movement of Phe282.
I121
F282
Workspace Panel
Html Documents
3 Ile121 and Phe28
9486 Atoms 1184 Res,7 Mol,3 Obj