



# *Animating Helical Biopolymers*

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CPSC 479

# Miscellaneous Molecular Properties

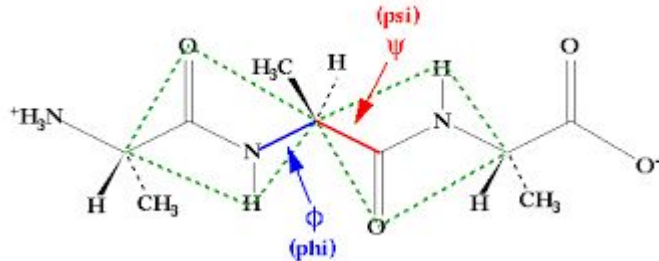
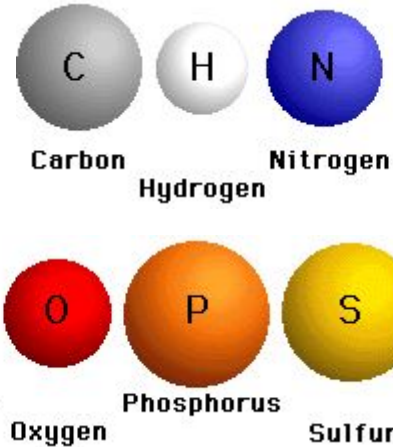
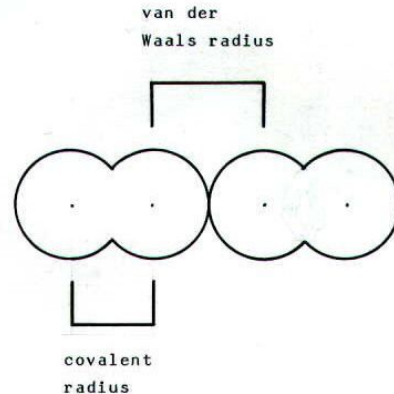
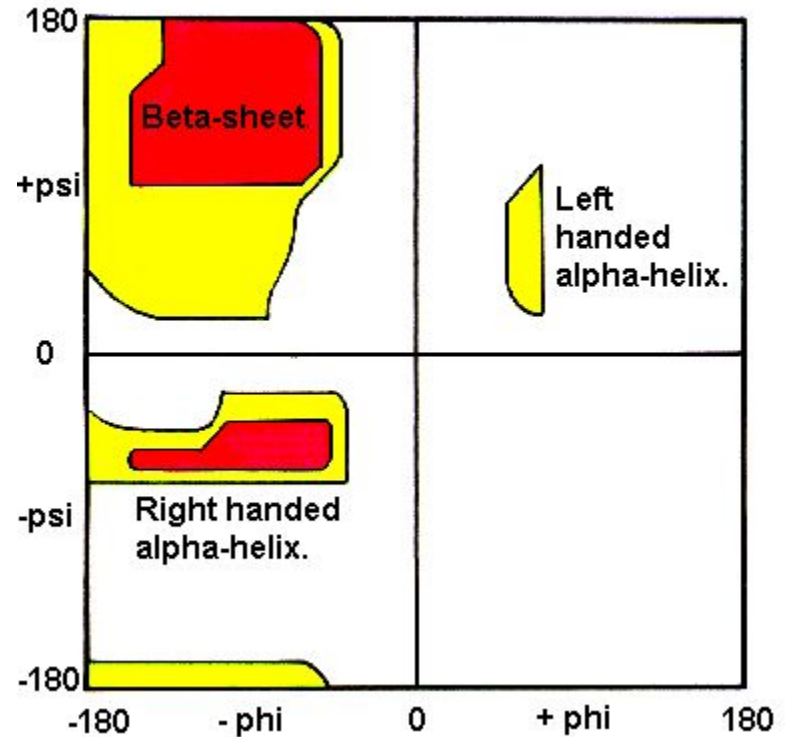


FIG. 13.1. Two hydrogen molecules, showing covalent radius and Van der Waals radius.



The Ramachandran Plot.



# Preliminary Results (from Midterm Project)

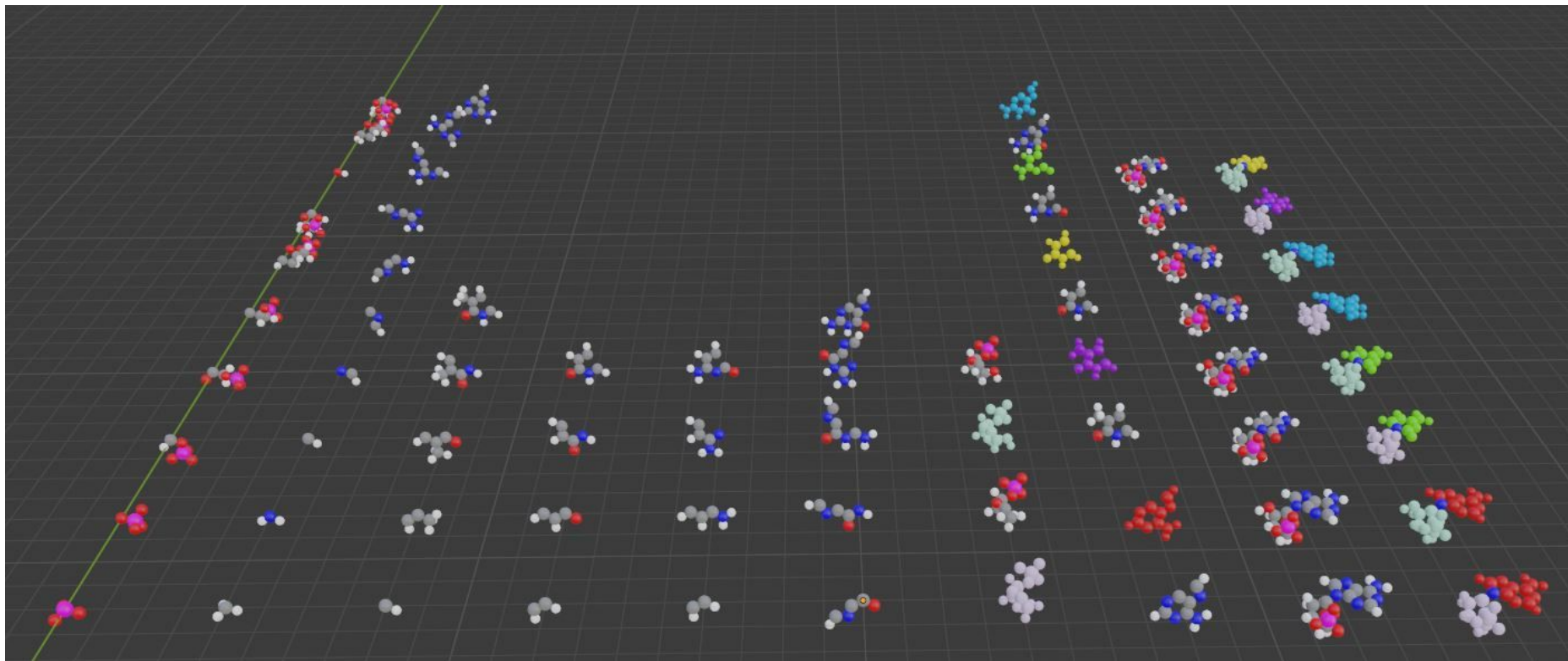
```
import numpy as np
import math
import re
import mathutils
import bpy
```

Places for Improvement:

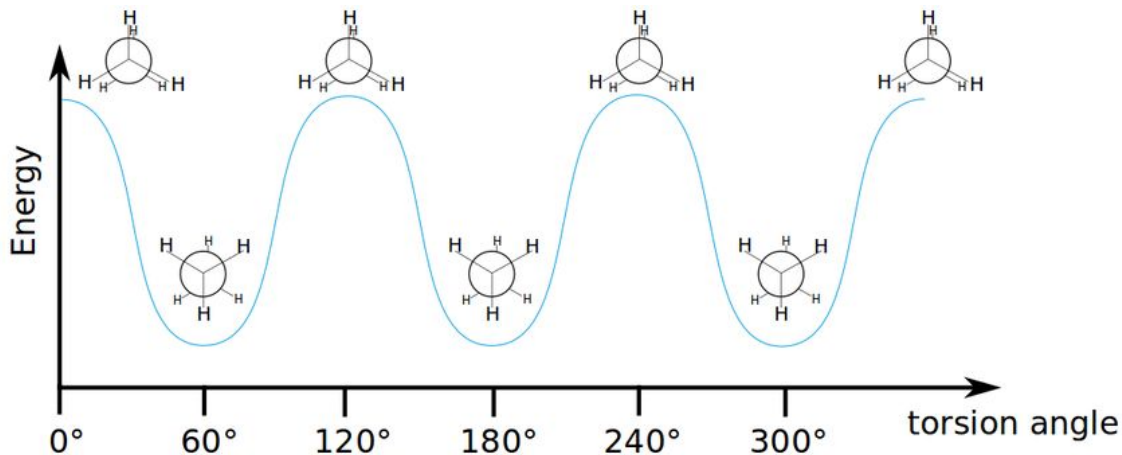
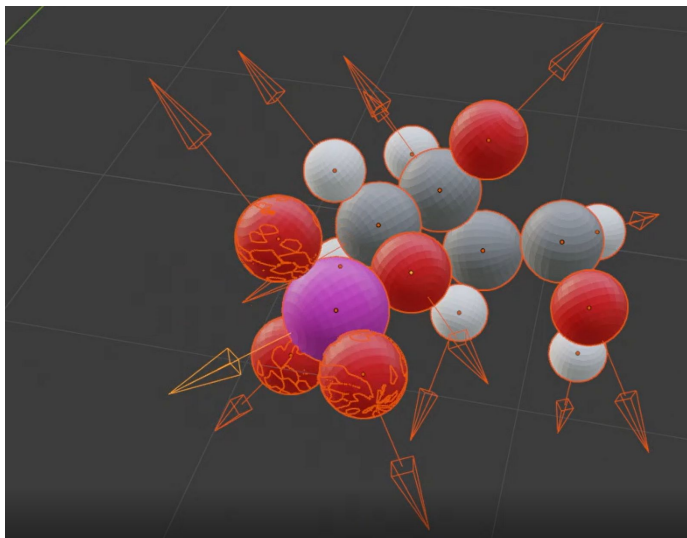
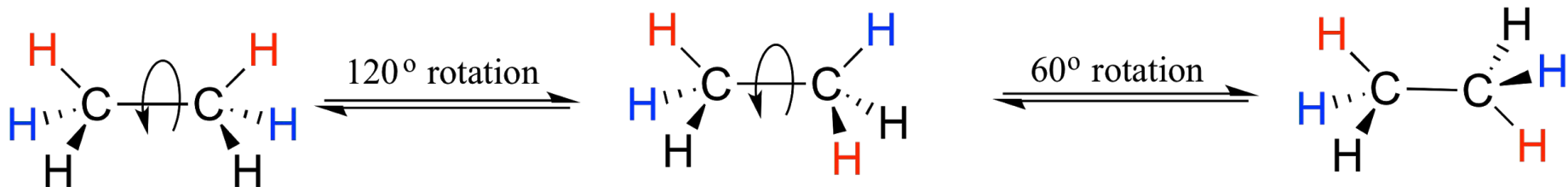
- Increase Mesh Flexibility
- Animate Movement
- Greater Diversity of Shapes
- Add User Interface
- Helical Construction about a 3D Function, not a Line
- Helper Functions
- Stylized Bonds



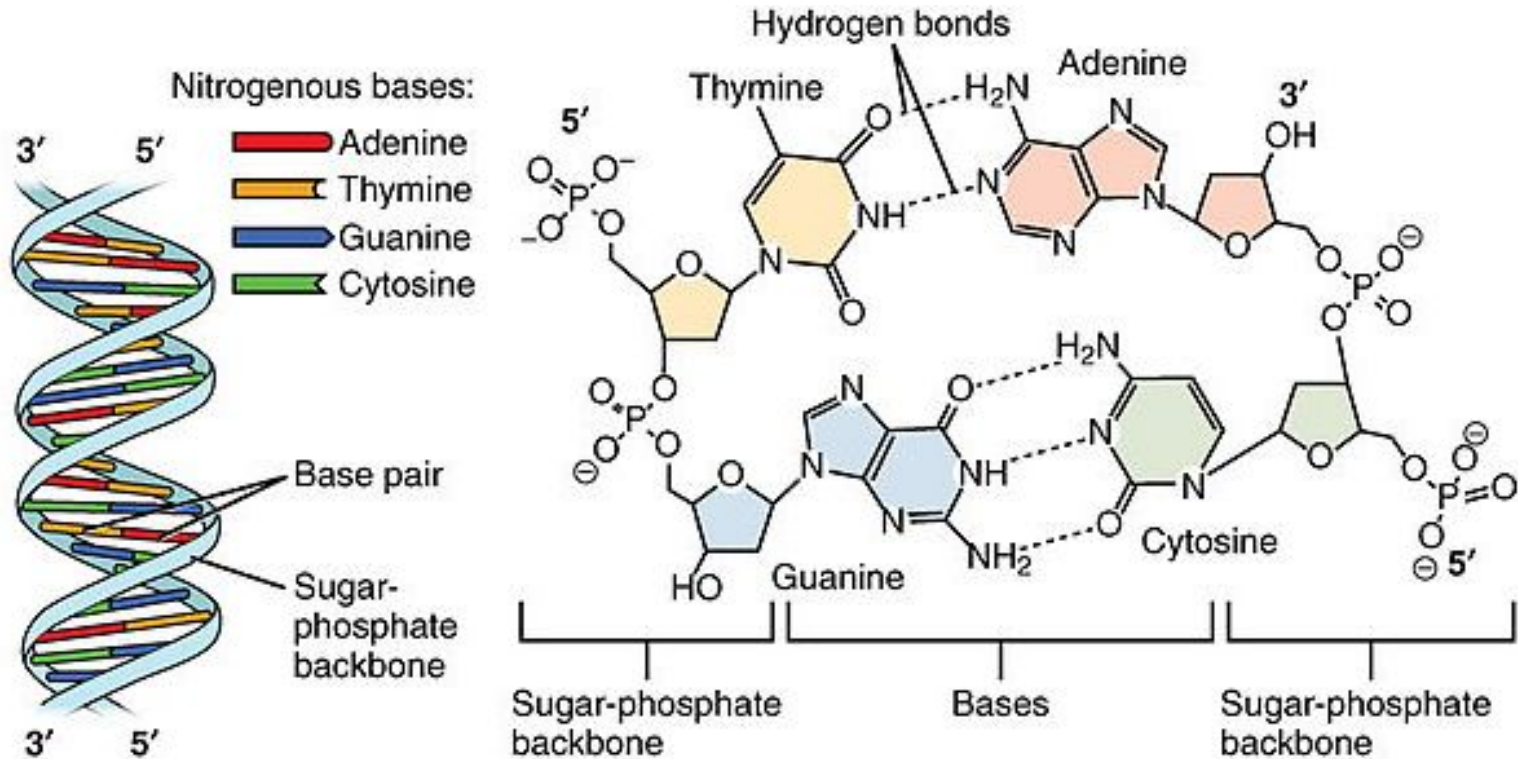
# Technique 1: Recursively Constructing Molecules



# Technique 2: Animating Molecular Bond Rotation



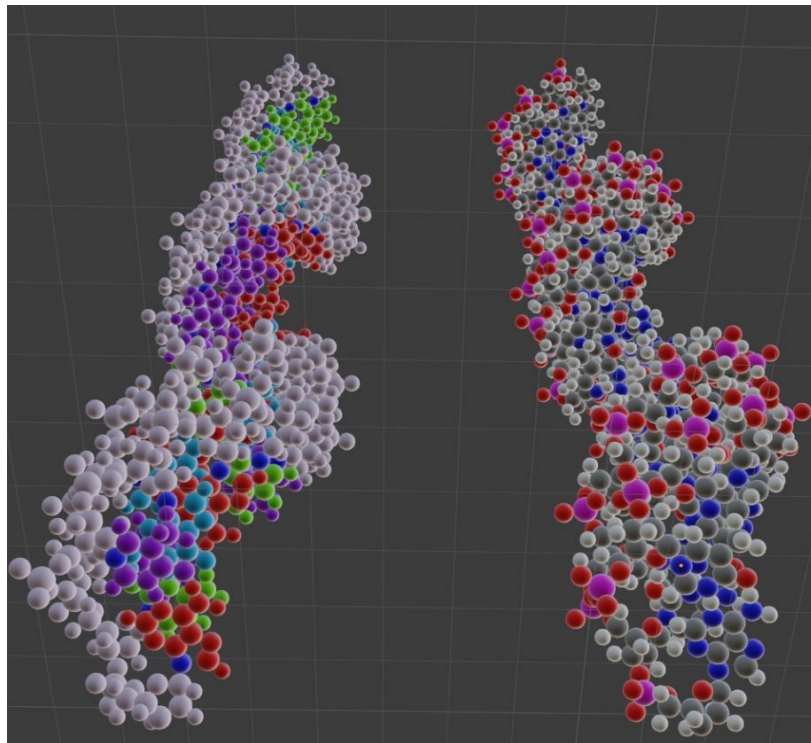
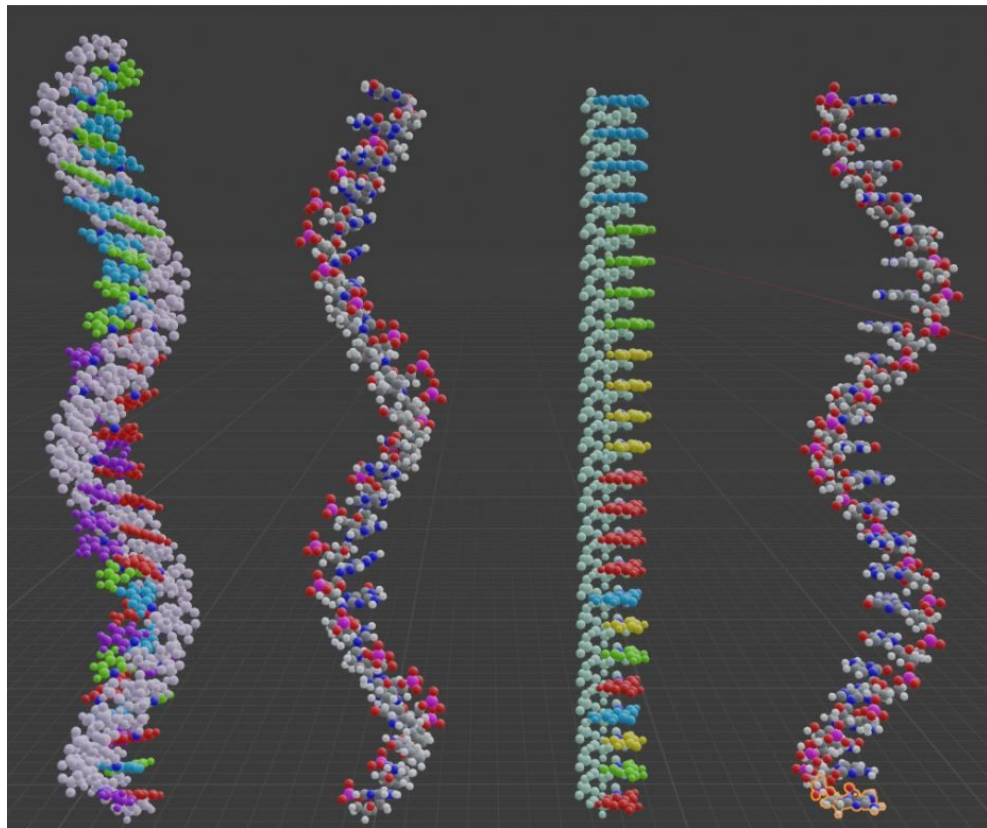
# DNA / RNA Helices



**Figure 1:** A diagram illustrating the basic features of DNA. This diagram heavily inspired my work and is one of the most straightforward explanations that I could find (Albert.io, 2019)



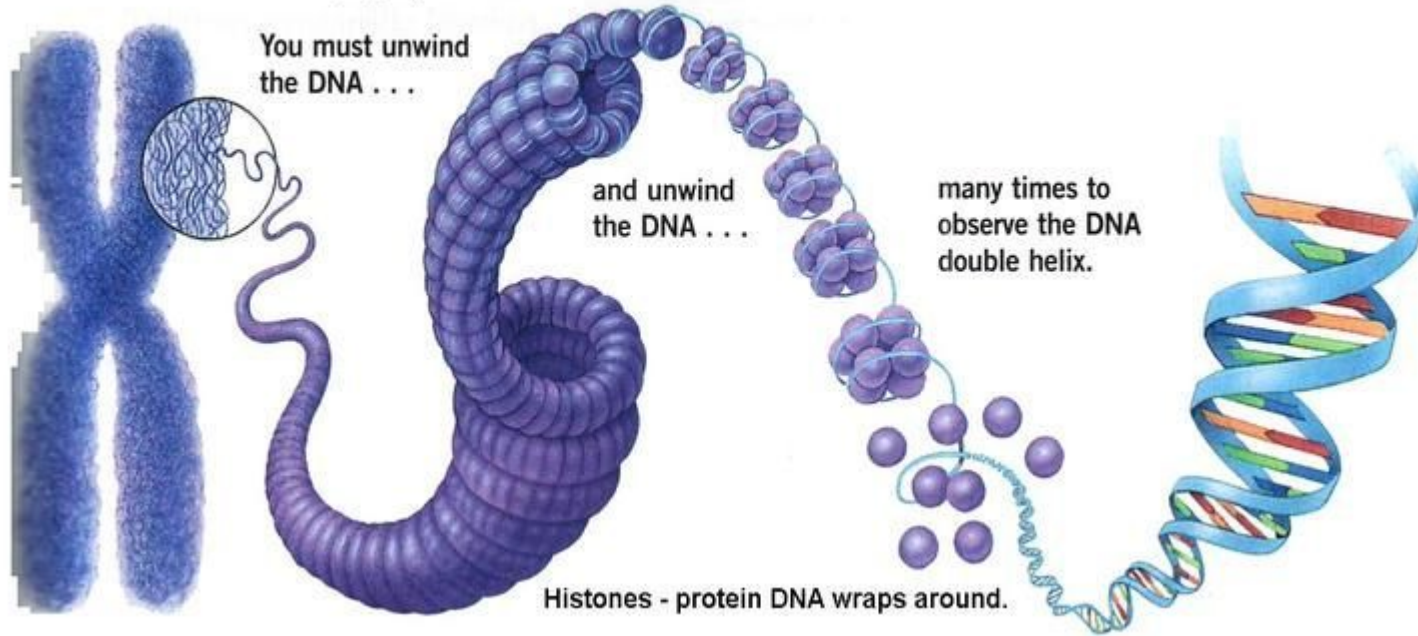
# Technique 3: Creating Helices



# Technique 4: Animating Helices

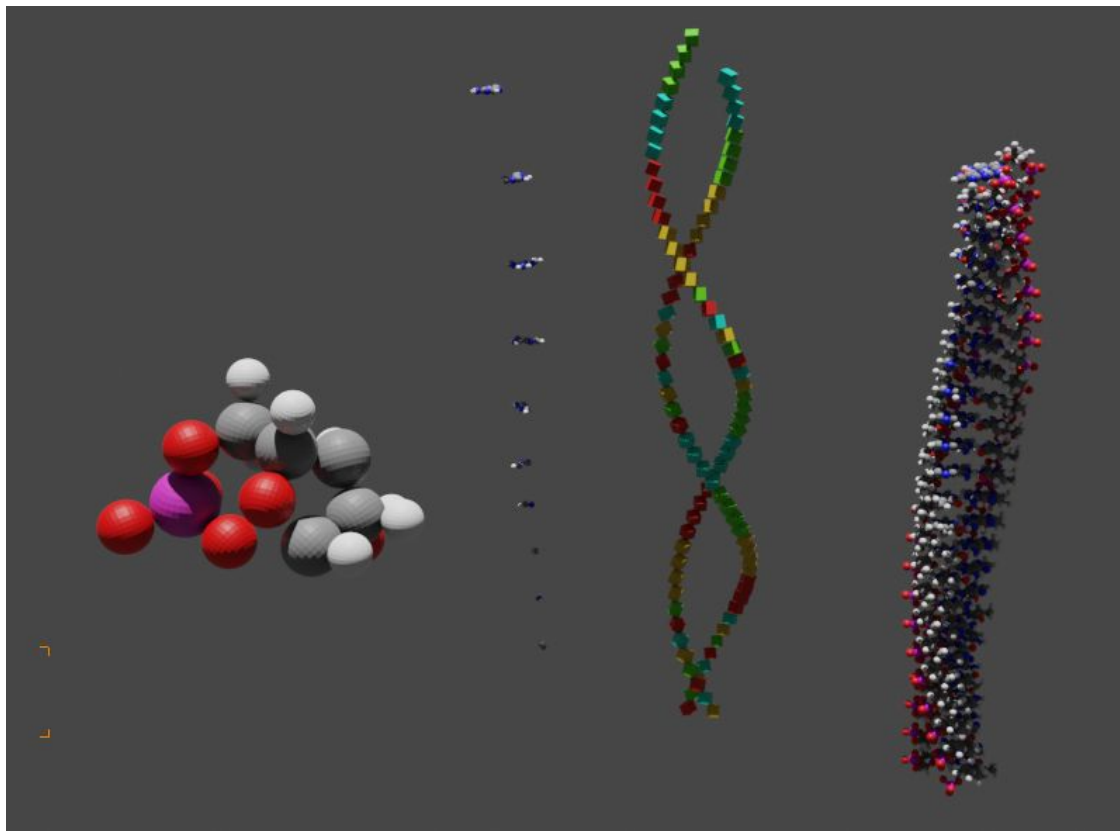
**FIGURE 7.7 Chromosome Structure**

Chromosomes contain very tightly wound DNA





# Techniques 1-4: Putting it Together!



# Acknowledgements

I thank Dr. Julie Dorsey, Zach Wang, and all of you for a great and inspiring class! :)

[http://www.cryst.bbk.ac.uk/PPS95/course/3\\_geometry/rama.html](http://www.cryst.bbk.ac.uk/PPS95/course/3_geometry/rama.html)

<https://www.web-books.com/MoBio/Free/images/Ch2B3.gif>

[http://www.phschool.com/science/biology\\_place/biocoach/biokit/chnops.html](http://www.phschool.com/science/biology_place/biocoach/biokit/chnops.html)

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[https://www.researchgate.net/profile/Robin\\_Strickstroek/publication/324056789/figure/fig5/AS:609047246024705@1522219587228/Potential-energy-curve-of-the-rotation-about-the-C-C-bond-in-ethane-Depending-on-the.png](https://www.researchgate.net/profile/Robin_Strickstroek/publication/324056789/figure/fig5/AS:609047246024705@1522219587228/Potential-energy-curve-of-the-rotation-about-the-C-C-bond-in-ethane-Depending-on-the.png)

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# Questions?

Thank you for your time and attention!