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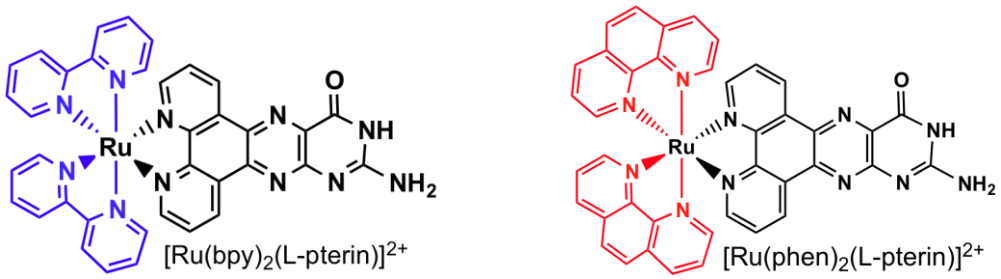
Abstract: The Synthesis and Characterization of $Ru(bpy)_2$(L-pteridine) and $Ru(phen)_2$(L-pteridine) complexes

Ruthenium (II) polypyridyl complexes are very important biochemical compounds because of their interactions with DNA. In this study, these complexes are analyzed to understand how their physical properties, chemical properties, and interactions with DNA are affected by structural differences of the L-pteridine ligands, and by exchanging the bipyridine (bpy) ligand for the phenanthroline (phen) ligand.

The Burgmayer group has currently synthesized eleven $[Ru(bpy)_2$(L-pteridine)$]^{2+}$complexes. One facet of this summer research involves the synthesis of $[Ru(phen)_2$(L-pteridine)$]^{2+}$analogs of the bpy versions that have been made by the Burgmayer group. The phen complexes and the bpy forms differ by the presence of an additional benzene ring on the phen ligand (see figure 1).



(1) (2)

Figure 1. (1) An example of a $Ru(bpy)_2$(L-pteridine)$]^{2+}$ complex, where the L-pteridine is the L-pterin ligand. (2) The phen version of the same compound.

The other facet of this summer research involves the photocleavage and DNA intercalation abilities of both the phen and bpy versions of the Ru(L-pteridine) compounds. When certain complexes are exposed to UV light, they are able to nick DNA, a process called photocleavage. The photocleavage ability of the various compounds is analyzed using gel electrophoresis. The relative rates of the compounds to intercalate DNA are analyzed by viscosity tests. It is known that with certain $Ru(bpy)_2$(L-pteridine) complexes, the L-pteridine ligand intercalates with DNA. There is evidence that with a similar compound, a ruthenium (II) tris-phen complex, the ligand intercalates

with DNA and the tris-phen ligand semi-intercalates with neighboring DNA. The tris-phen ligand is a more substituted version of the phen ligand used in this study. The additional semi-intercalation of the tris-phen ligand increases the Ru(tris-phen)complex's intercalation ability compared to $Ru(bpy)_2$(L-pteridine) complexes. Phen analogs of all the bpy complexes are made to observe the effects of substituted ligands on the intercalation abilities of the Ru (L-pteridine) complexes. This study of the intercalation of DNA has potential anti-cancer properties, in that compounds able to intercalate DNA could stopping the replication of cancerous cells.