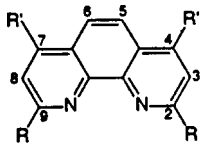
DNA-Binding Studies of $Cu(bcp)_2^+$ and $Cu(dmp)_2^+$: DNA Elongation without Intercalation of $Cu(bcp)_2^+$.

McMillin, D. R. *J. Am. Chem. Soc.* **1993**, *115*, 6699-6704.

UV-Topic: CD Spectroscopy

Chem Topic: DNA



	R	R'
phen	H	H
dmp	Me	H
bap	H	Ph
bcp	Me	Ph

Figure 1. Phenanthroline ligands.

Sigman uncovered the first chemical nuclease which acts via an essential, non-covalently bound intermediate. Non-covalent interactions usually are complexed cations with ligands that have extended hydrophobic regions. In the Sigman nuclease, a $Cu(phen)_2^+$ is bound to DNA. A major question concerns the mode of interaction.

Sigman: Surface binding in minor groove.

Williams: Partial intercalation.

Sigman: 5-Substituents don't affect binding (taken as reason against intercalation).

Here: CD and luminescence studies with variations in the ligands.

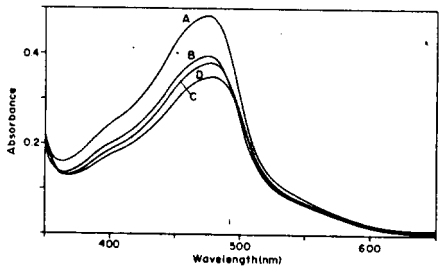


Figure 3. Absorption spectra of solutions containing $Cu(bcp)_2^+$ and ST DNA. DNA-P/Cu values are (A) 0, (B) 15, (C) 60, and (D) 80 in a phosphate/MeOH solution at 25 °C.

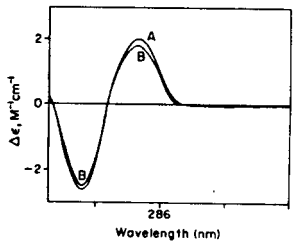


Figure 5. UV circular dichroic spectrum of ST DNA. Spectrum A was obtained in the absence of $Cu(bcp)_2^+$, while spectrum B was obtained at DNA-P/Cu = 31. The solvent was 2:1 (v/v) 0.025 M pH 7.8 tris/MeOH, and the temperature was 25 °C.

Left: CT absorption band of $Cu(dmp)_2^+$ exhibits a bathochromic shift and hypochromism in the presence of the DNA which is taken as indication of binding to DNA. (These effects are very small and one wonders whether this is rigorous! Bathochromic shifts of less than 6 nm, hypochromism of less than $\Delta\varepsilon < 16$!!) Right: CD spectrum also shows small change. Conclusion? The authors can't really say much but nevertheless indulge in long discussions basically saying that the spectra could indicate intercalation and also could indicate surface binding. Oh boy! Some viscosity data also are reported which the authors also don't really understand.