Ribonucleotide reductases catalyze a reaction that is essential for all DNA-based life: the conversion of ribonucleotides to deoxyribonucleotides. Because of its crucial role in nucleotide metabolism, this family of enzymes displays remarkable forms of allostery. In this talk, I'll discuss how the tools of structural biology can give insight into the evolutionary history of an allosteric enzyme with ancient roots.