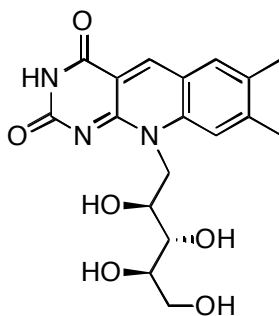


## Synthesis of the elusive 5-deazariboflavin: a probe for the study of electron transfer mechanisms

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The electron transfer mechanisms in the multi domain redox enzyme Nitric Oxide Synthase (**NOS**) can be studied by utilizing laser flash photolysis techniques. However, before this aspect of study can be pursued, a photochemical initiator of the electron transfer process is required. A photosensitive probe molecule such as 5-deazariboflavin (**DRF**), when in conjunction with a hydrogen donor, is one strategy that can be employed. **DRF**, when excited with a laser flash, generates the triplet state, which is reductively quenched by the hydrogen donor. This reduction results in the formation of the **DRF** semiquinone radical, which in the presence of **NOS**, can transfer its electron to the **NOS** oxidized redox center. Thus, the synthesis of **DRF** is essential to the study. Its synthesis is not a novel one, but many past literature accounts contain irreproducible steps, thus making the probe synthesis quite challenging. **DRF** can be generated by reacting D-ribose and 3,4-xylydine to create the precursor N-D-ribityl-3,4-xylydine. This molecule is then used in the troublesome synthesis of 6-(N-D-ribityl-3,4-xylydino)uracil where a uracil molecule is functionalized with the ribitylated aniline. After protection of the alcohol groups of the ribose sugar group, the Vilsmeier reagent is used to further cyclise the dual ring system. Deprotection then yields the **DRF** molecule.



**DRF**