From CO2 and Cyanide to Flavin Exploring Prebiotic Pathways in Organic Chemistry

Christian Held Hansena,\* Jiwoong Leea,b

aDepartment of Chemistry, University of Copenhagen, Universitetsparken 5, 2100, Copenhagen ø, Denmark

bThe Novo Nordisk Foundation CO2 Research Center, Gustav Wields Vej 10 C, 8000 Aarhus, Denmark

\*chh@chem.ku.dk



The origin of life poses one of science's most compelling questions, with organic chemistry providing crucial insights. This study presents a novel method for synthesizing 3,4-dihydroquinoxalin-2-amine, a key precursor of flavin compounds, through potentially prebiotic transformations. By utilizing simple building blocks such as carbon dioxide, cyanide, and formaldehyde, we demonstrate how these fundamental precursors can assemble into biologically significant cofactors. Our findings indicate that the synthesis pathways for 3,4-dihydroquinoxalin-2-amine not only offer a viable route for flavin formation but also illuminate the chemical processes that may have contributed to the emergence of life on Earth. This research highlights the importance of organic chemistry in unraveling the mysteries of life's origins and emphasizes the capacity of simple reactions to generate complex biological structures.

A. Kirschning, *Angew. Chem. Int. Ed.* **2021**, *60*, 6242.