Heterocycle Synthesis via $\pi$-Acid Catalysis

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A significant part of traditional heterocycle synthesis relies on carbonyl condensation reactions. Although the primacy of this chemistry is undisputed, it is worthwhile and necessary to contemplate possible alternatives. Since the C-atom of a carbonyl compound has formally the same oxidation state as that of an alkyne, any method that renders a triple bond susceptible to attack by a heteroatom nucleophile potentially opens orthogonal gateways.

It is in this context that the advent of $\pi$-acid catalysis in general and gold catalysis in particular have had a major impact. After a short discussion of the reasons for the exponential growth of this research area since the turn of the millennium, a few specific case studies will be outlined that are meant to illustrate the power of the concept [1]. Emphasis will be put on applications to the total synthesis of structurally complex heterocyclic targets of biological significance [2-6].