Project 2.15. Photochemical rearrangement of lactams: A ring-expansion approach towards structurally diverse heterocycles.

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Background:
The proposed research project will consist of four main tasks.
The first will focus on the development of a fully automated process for the synthesis of six-membered enaminones; versatile building blocks in natural product synthesis.
The second task will concern the novel, metal-free, synthesis of functionalized quinolones, benzoazepines and related analogues. These scaffolds are present in a vast number of natural compounds and pharmacologically active substances. The proposed strategy is based on the photo-induced rearrangement of N-aryllactams. The power and utility of this transformation will be demonstrated through the synthesis of an important precursor to Tolvaptan, an aquaretic drug used to treat hyponatremia.
The next goal of this proposal is to apply the photochemical rearrangement of N-alkenyllactams to the synthesis of polycyclic nitrogen-based heterocycles. These common structural subunits are present in numerous alkaloid natural products and serve as important scaffolds in biologically active and pharmaceutically significant compounds.
The last task of current proposal will be devoted to studies on the photochemical insertion of alkenes and alkynes into lactams, lactones or thiolactones. The utility of this reactivity will be demonstrated by the synthesis of higher gliflozin drug analogues. Gliflozin drugs are a newly developed class of oral hypoglycaemic agents used for the treatment of type-II diabetes mellitus.

Aim:
This project comprises a collection of innovative approaches aimed at revealing the underrated potential of photo-induced rearrangements of N-substituted lactams. Several different research directions will be pursed, with the common purpose to demonstrate the attractiveness and usefulness of the proposed reactivity in the synthesis of structurally diverse heterocycles.

Requirements:
Candidate must have successfully completed scientific higher education in Chemistry with an emphasis on Organic Chemistry and possess practical laboratory, analytical, and writing skills.