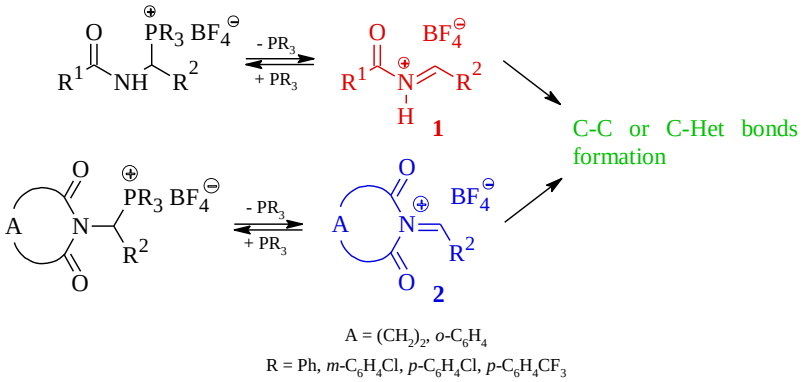
DESCRIPTION FOR THE GENERAL PUBLIC

α-Aminoalkylation reactions play an important role in organic synthesis. The Mannich reaction, which is the most important α-aminoalkylation reaction, has some important disadvantages: (*i*) it is limited, with a few exceptions, to α-aminomethylation, and (*ii*) aminomethylation products (Mannich bases) easily undergo a variety of secondary reactions that are difficult to avoid.

Amidoalkylation reactions, being a valuable alternative to and extension of the aminomethylation Mannich reaction, are one of the crucial methods for the formation of C-C and C-Het bonds used, *inter alia*, for the formation of the β-aminocarbonyl substructure and for the construction of new carbo- or heterocyclic systems, especially in pharmaceutical chemistry and in the synthesis of natural products.

1-(*N*-Acylamino)alkylcarbenium cations **1** are one of the most important, highly reactive intermediates with broad application in organic synthesis. However, the reactivity of *1-(N*-acylamino)alkylcarbenium cations toward some nucleophiles of low reactivity (e.g. aromatic systems without electron donating substituents) is insufficient. It limits the scope of α-amidoalkylation reactions of aromatic systems (including important intramolecular α-amidoalkylations with formation of new carbo- or heterocyclic cycles), to aromatic system with strong electron donating substituents (e.g. alkoxy-, polyalkoxy- and aminoarenes), and some active heterocyclic systems like indol.

The formation of a new C_{Ar}-C bond by the intramolecular amidoalkylation of an aromatic ring using modern amidoalkylating reagents and properly selected catalytic systems could be one of the most important method for the formation of carbo- and heterocyclic systems.



Scheme 1.

The submitted project concerns the development of new methods for the synthesis of carbo- and heterocyclic systems by intramolecular α-amidoalkylation reactions of aromatic rings based on the specific amidoalkylating properties of 1-(*N*-acylamino)- and 1-imidoalkylcarbenium cations 1-2. The general idea of the submitted project consists in the synthesis of new types of 1-(*N*-acylamino)alkylphosphonium salts and 1-imidoalkylphosphonium salts derived from triarylphosphines with electron withdrawing substituents, with modulated strength of the C_{α}-P^{+} bond, able to generate 1-(*N*-acylamino)alkylcarbenium cations 1 and hitherto unknown, highly reactive 1-imidoalkylcarbenium 2 cations without a catalyst, at relatively low temperature.

To achieve the objectives of the submitted project the following research schedule is proposed:

1. Optimisation of methods for the synthesis of the 1-(*N*-acylamino)alkylphosphonium and 1-imidoalkylphosphonium salts derived from electron-deficient triarylphosphines and full characterisation of their properties.
2. Experimental studies on the mechanisms, of the process of splitting of the C_{α}-P^{+} bond in 1-(*N*-acylamino)alkylphosphonium and 1-imidoalkylphosphonium salts
3. Theoretical studies on the C_{α}-P^{+} bond splitting based on the molecular mechanics methods and quantum-chemical method.
4. Comparative and optimisation studies on reactivity of highly active amidoalkylating systems based on 1-(*N*-acylamino)alkylphosphonium and 1-imidoalkylphosphonium salts.
5. Studies on the synthesis of selected carbo- and heterocyclic systems by intramolecular cyclisations of 1-(*N*-acylamino)alkylphosphonium salts and 1-imidoalkylphosphonium salts.
6. Studies on development and optimisation of a new strategy for the synthesis of papaverine and drotaverine.