New synthetic routes for potential biologically active *O*- and *N*-heterocycles

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Oxygen and nitrogen heterocyclic compounds constitute the largest and most varied families of organic compounds, which comprises a great number of classes according to the size, number of heteroatoms and oxidation of the heterocyclic ring. There is a huge number of marketed drugs and food additives based in these two types of compounds. The important industrial and biological applications of these compounds and also some problems associated with their application, such multiple drug resistance to some nitrogen heterocycles and potential carcinogenesis of high doses of oxygen heterocyclic-based antioxidants, led us to develop new synthetic methods for novel derivatives of both families of the referred heterocyclic compounds.

We have been devoted time to the development of new syntheses for flavones [1] and 2- and 3-styrylchromones [2] and also on their transformation into nitrogen heterocyclic compounds (e.g. pyrroles, pyrazoles, 1,2,3-triazoles and dyads of pyrazole-1,2,3-triazoles) [3]. These studies were also accompanied with the evaluation of the antioxidant and anti-inflammatory activities of these chromone-type compounds [4]. Recently, we have reported on the synthesis of a bioactive natural prenylated (*E*)-2-styrychromone [5] and also on enantiopure 2-*C*-glycosyl-3-nitrochromenes [6].

New synthetic methods for several types of novel xanthones, some of them possessing potent antioxidant activity, have also been established [7].

Another line of research involved in the development of new synthetic methods for quinolones and 4-quinolones and also the transformation of 4-quinolones to acridones [8].

In the present communication we present and discuss some of our recent results on the chemistry and some biological applications of the referred heterocyclic compounds.

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References

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[3]. e.g. *Synlett*, **2011**, 2740-2744; *Eur. J. Org. Chem.*, **2012**, 132-143; *Tetrahedron Lett.*, **2013**, *54*, 5391–5394 and 9701-9709.
[4]. e.g. *Eur. J. Med. Chem.*, **2013**, *67*, 280-292. *Eur. J. Med. Chem.*, **2014**, *72*, 137-145.
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[6]. *J. Org. Chem.*, **2013**, *78*, 12831−12836.
[7]. e.g. *Eur. J. Org. Chem.*, **2009**, 2642-2660; *Bioorg. Med. Chem.*, **2010**, *18*, 6776-6784; *Synlett*, **2011**, 1403-1406; *Synlett*, **2011**, 2005-2008; *Synlett*, **2012**, *23*, 559-564; *Org. Biomol. Chem.*, **2012**, *10*, 2068–2076; *Tetrahedron Lett.*, **2013**, *54*, 85-90.
[8]. *e.g. Synlett*, **2008**, 2593-2596; *Synlett*, **2010**, 2565-2570; *Synlett*, **2011**, 2955-2958; *Synlett*, **2012**, *23*, 889-892; *Tetrahedron*, **2014**, *70*, 5310-5320.