

## **Thesis topics of Organic Chemistry Department for the first semester of the 2022/2023 academic year**

**Prof. Tibor Kurtán**

Institute of Chemistry

Chemistry Building E-405

e-mail: [kurtan.tibor@science.unideb.hu](mailto:kurtan.tibor@science.unideb.hu)

### **BSc or MSc thesis topics**

#### **Synthesis of chiral biaryls with axial and central chirality elements.**

Stereoselective biaryl coupling reactions are to be studied to prepare bis-isochroman and other heterocyclic derivatives containing a chiral biaryl axis and central chirality elements for pharmacological studies. The stereochemistry of the target molecules is to be analyzed by chiroptical measurements supported with calculations. (1 student)

#### **Domino Knoevenagel-cyclization reactions for the preparation of condensed heterocycles.**

Stereoselective domino Knoevenagel-cyclization reactions are to be performed to prepare chiral condensed heterocycles for pharmacological studies. The stereoselectivity is analyzed by NMR and chiroptical spectroscopic methods and X-ray diffraction. (1 student)

**Dr. Bokor Éva**

Institute of Chemistry

Chemical Glycobiology Research Group

Chemistry Building E-423

e-mail: [bokor.eva@science.unideb.hu](mailto:bokor.eva@science.unideb.hu)

### **BSc or MSc thesis topics**

#### **Synthesis of new glycosyl heterocycles and their half-sandwich platinum metal complexes**

Platinum complexes (e. g. cisplatin, oxaliplatin) are widely used chemotherapeutic agents for the treatment of cancer. However, these drugs frequently cause serious side effects. Thus, there is a continuing search for other platinum metal complexes with better anticancer properties. In

this regard, the half-sandwich type complexes of platinum-group metals (e. g. Ru, Os, Rh, Ir) represent a promising compound class. Recently, we have synthesized a series of such type of complexes incorporating heterocyclic monosaccharides as N,N-bidentate ligands. Several of these derivatives have been shown to be active against different cancer cells. For a detailed structure-activity relationship the aim of the diploma work will be the synthesis of new glycopyranosyl heterocycles and their half-sandwich type complexes.

**Dr. Juhászné Dr. Tóth Éva and Dr. Juhász László**

Institute of Chemistry

Chemical Glycobiology Research Group

Chemistry Building E-409

e-mail: [toth.eva@science.unideb.hu](mailto:toth.eva@science.unideb.hu)

e-mail: [juhasz.laszlo@science.unideb.hu](mailto:juhasz.laszlo@science.unideb.hu)

**BSc thesis topic (1 student)**

***Investigation of photoredox reactions of 1-C substituted glycal derivatives***

Glycals are unsaturated carbohydrate derivatives in which there is a double bond between the C-1 and C-2 carbon atoms. As with alkenes, addition reactions are the most common modifications of these compounds, which may be ionic or radical depending on the reaction conditions. Glycal addition reactions are characterized by high regioselectivity, which can be explained by the outstanding stability of the resulting glycosyl ion or radical. 1-C substituted glycals are derivatives in which the substituents are attached to the anomeric center via a carbon atom. The 1-C substituted glycals to be studied contain a -CN, -COOMe, or -CONH<sub>2</sub> group at the anomeric center. The synthesis method for the preparation of these compounds was developed by our research group. The aim of the research is to investigate the functionalization reactions of anomerically substituted glycals under photoredox conditions (blue LED) (eg trifluoromethylalkynylation; trifluoromethylation; trifluoromethylsulfanylation).

**Vágvölgyiné Dr. Tóth Marietta**  
Institute of Chemistry  
Chemical Glycobiology Research Group  
Chemistry Building E-409  
e-mail: [toth.marietta@science.unideb.hu](mailto:toth.marietta@science.unideb.hu)

**BSc thesis topic (1 student)**

**Synthesis of 4-benzyl-1H-1,2,3-triazoles**

Gliflozins, renal sodium dependent glucose co-transporter 2 (SGLT2) inhibitors, are used as symptomatic remedies of type 2 diabetes (T2DM). The aim of the research work is the synthesis of 4-benzyl-1H-1,2,3-triazoles from 3-aryl-1-propynes using the „click” reaction. The synthesized derivatives can be applied for the synthesis of potential SGLT2 inhibitors, *O*-perbenzoylated 4-benzyl-2-β-D-glucopyranosyl-methyl-2H-1,2,3-triazoles.

**BSc thesis topic (2 students)**

**Synthesis of anhydro-aldimines for the synthesis of half-sandwich platinum-group metal complexes**

Half-sandwich platinum-group metal complexes have the potential to replace clinically used but unselective cytostatic Pt-complexes. Based on our recent results new bidentate carbohydrate ligands (e.g. *N*- and *C*-glycosyl heterocycles, sugar derived thiosemicarbazones) will be built in such complexes which can be cytostatic in various cancers and antibacterial against multiresistant bacteria. The aim of this research work is the synthesis of different anhydro-aldimines (sugar derived (thio)semicarbazones, benzoylhydrazones etc.).

**Dr. Timári István**

Institute of Chemistry

Structural Biology, Molecular Recognition and Interaction Research Group

NMR Facility

website: <https://debnmr.unideb.hu/>

Chemistry Building B-12

e-mail: [timari.istvan@science.unideb.hu](mailto:timari.istvan@science.unideb.hu)

**BSc or MSc thesis topics**

**Application of advanced NMR methods for structure elucidation of biologically active molecules**

The biological activity of any molecule is primarily determined by the structure of the given molecule. Nuclear magnetic resonance (NMR) spectroscopy is one of the most powerful techniques for investigation of molecular structure in atomic detail. Due to the growing number of regulatory requirements for example in drug development, and consequently the increasing number of measurements required, there is a continuous demand for innovative methods that can provide maximal information in the shortest time possible. We will apply our advanced NMR experiments to enhance the structure determination procedure of biologically active compounds, such as carbohydrates, peptides and metal ion complexes.