



POLISH NATIONAL AGENCY
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PROGRAMME

name of the unit: PROTEIN CRYSTALLOGRAPHY LABORATORY Institute of Molecular and Industrial Biotechnology, Lodz University of Technology		symbol: I-51 http://www.binoz.p.lodz.pl
head of the unit: Prof. Grzegorz Bujacz PhD, DSc	potential promoters: Prof. Grzegorz Bujacz, PhD, DSc Anna Bujacz, PhD, DSc, TUL Prof.	contact person: Agnieszka Pietrzyk-Brzezińska PhD tel: 42-631-34-94 agnieszka.pietrzyk-brzezinska@p.lodz.pl
scope of activities: <ul style="list-style-type: none">- Crystallographic studies of proteins and their complexes with ligands, as well as peptides and small biomolecules;- Diffraction measurements of protein crystals and small molecules on synchrotron lines and on a laboratory diffractometer;- Determination of crystal structure of biomolecules on the basis of a monocrystal diffraction experiment;- Structural analysis of protein-ligand interactions e.g. enzyme-inhibitor, antibody-ligand; protein-protein; protein-nucleic acids;- Determination of protein structure - function relationship, analysis of the mechanism of reactions catalyzed by enzymes based on protein-ligand crystal structures;- Structural studies of biologically active compounds in terms of their use in medicine and biotechnology.		graphic material
present activities: <p>We are currently performing crystallographic studies of mammalian serum albumins. Albumins developed a dozen of binding pockets in the process of evolution that changed the selectivity and affinity for specific ligands. The team's research allows to trace the development of ligand binding sites and correlate this process with the evolution of vertebrates. The second currently conducted research topic is the structural study of psychrophilic enzymes. Determining the crystal structures of enzymes operating under extreme conditions allows for the explanation of the structural adaptations that are responsible for their unique properties. Psychrophilic enzymes have the ability to catalyze reactions at a lower temperature than mesophilic enzymes. It brings with it a number of advantages, the most important of which is the reduction of energy consumption costs during biotechnological processes. The next group of structurally studied macromolecules are transcription factors and signalling proteins responsible for the increase of antibiotic resistance of pathogenic bacteria. The study of the structure of these macromolecules is crucial in explaining the phenomenon of increasing drug and antiseptic resistance.</p>		
Future activities: <p>In the nearest future the team will be focused on a new project related enzymes involved in the arginine metabolic pathway in plants. Crystal structures of these enzymes will allow to better explain the mechanism of arginine production and conversion. Determined structures will be a good molecular target in the design of new herbicides and plant protection products.</p>		
Keywords: Crystallography, protein crystallization, crystal structure of biomolecules, structure-function relationship.		



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[Publications/patents, awards, projects:](#)

- Bujacz A., Rum J., Rutkiewicz M., Pietrzyk-Brzezinska A.J., Bujacz G. Structural Evidence of Active Site Adaptability towards Different Sized Substrates of Aromatic Amino Acid Aminotransferase from *Psychrobacter* Sp. B6. *Materials* **2021**, 14, 3351, 2-19.
- Pawlak T., Sudgen I., Bujacz G., Iuga D., Brown S.P., Potrzebowski M.J. Synergy of Solid-State NMR, Single-Crystal X-ray Diffraction, and Crystal Structure Prediction Methods: A Case Study of Teriflunomide (TFM). *Crystal Growth and Design* **2021**, 21:3328–3343.
- Rutkiewicz M., Wanarska M., Bujacz A. Mapping the Transglycosylation Relevant Sites of Cold-Adapted β -D-Galactosidase from *Arthrobacter* sp. 32cB. *International Journal of Molecular Sciences* **2020**, 21, 5354.
- Rutkiewicz M., Bujacz A., Bujacz G. Structural features of cold-adapted dimeric GH2 beta-D-galactosidase from *Arthrobacter* sp. 32cB. *Biochim. Biophys. Acta Proteins Proteom.* **2019**, 1867:776–786.
- Orlikowska M., Rostro-Alanis M. de J., Bujacz A. Hernández-Lunac C., Rubio R., Parra R., Bujacz G.* Structural studies of two thermostable laccases from the white-rot fungus *Pycnoporus sanguineus*. *International Journal of Biological Macromolecules* **2018**, Vol: 107, 1629-1640.
- Bujacz A., Talaj J.A., Zielinski K., Crystal structures of serum albumins from domesticated ruminants and their complexes with 3,5-diiodosalicylic acid. *Acta Cryst. D. Structural Biology* **2017**, Vol: 73: 896-909.
- Sekuła B. and Bujacz A. Structural insights into the competitive binding of diclofenac and naproxen by equine serum albumin. *Journal of Medicinal Chemistry* **2016**, Vol 59, 1, 82-89.
- Sekula B., Ciesielska A., Rytczak P., Koziolkiewicz M., Bujacz A. Structural evidence of the species-dependent albumin binding of the modified cyclic phosphatidic acid with cytotoxic properties. *Bioscience Reports* **2016**, Vol: 36 Article Number: e00338.

[List of internship proposal in this research team:](#)

Doctoral theses and internships will be in an agreement with the current group's research topics.