

---

## Professor Jacek Młochowski

### A Tribute



---

Dedicated to Prof. Jacek Młochowski on the occasion of his 80<sup>th</sup> anniversary

Published on line 06-07-2016

It is my honor to open the special issue of *ARKIVOC* dedicated to Professor Jacek Młochowski on the occasion of his 80th birthday. It has been my undoubted pleasure to know the Honoree for over 20 years. I first met him at the Wrocław University of Technology (Wrocław, Poland) where I studied for a Ph.D in the Department of Organic Chemistry, Biochemistry and Biotechnology headed by Prof. Młochowski. He was always ready to share his experience with young colleagues and collaborators and his advice was of great value to many scientific careers. I will always remember that he chaired the public defense of my doctoral thesis; his calm and kindness helped me to survive. Now, after his retirement, Prof. Młochowski remains very active as an author, reviewer and expert. For him, chemistry has been not just a profession, but also a life's passion. Now, since he does not have to take care of administrative duties, he has more time for family and other favourite activities including traveling and photography.

Jacek Młochowski was born in Warsaw (Poland) on the 12<sup>th</sup> of February 1937. After World War II, his family moved to Lubań in Lower Silesia. He received his secondary school education in Jelenia Góra and he enrolled in the chemistry course at Wrocław University of Technology in 1954. He obtained a M.Sc. diploma in Chemical Technology in 1960 from the Department of Coal Chemistry and Technology, working on the analysis of crude anthracene derivatives from coal tar under the guidance of Professor Stefan Jasieńko. Between 1960 and 1963, he worked in the Department of Mechanical Engineering of the same University, directed by Professor Egon Dworzak, studying the analysis of steel and non-ferrous metal alloys. In 1963, he enrolled as a PhD student at the Department of Coal Chemistry and Technology and his scientific career began with a strong focus on reactions of coal tar components. His science concentrated on the refinement of crude naphthalene isolated from coal tar. Four years later, he presented his dissertation prepared under the supervision of Prof. Błażej Roga. This topic brought him to organic chemistry, a discipline to which he subsequently devoted his entire career. In 1967 Dr. Młochowski joined the Chair of Organic Chemistry headed by Prof. Zofia Skrowaczewska. In the beginning, his main research interest focused on symmetrical triazines, particularly melamine. In the seventies, he extended his interest to the synthesis and reactivity of di- and tricyclic azaaromatic heterocycles – quinolines, isoquinolines, naphthyridines, acridines, azafluorenones and phenanthrolines. He also paid research visits to the University of Chemistry and Technology in Prague and the Moscow Mendeleev Institute of Chemical Technology. In 1975, he was awarded a D.Sc. degree (habilitation) for his research on structure, synthesis and reactivity of phenanthrolines and was appointed Assistant Professor (Docent). In 1983, he was promoted to Associate Professor and in 1992 he became full professor of Organic Chemistry at the Faculty of Chemistry, Wrocław University of Technology a position he retained until his retirement in 2007.

His scientific profile was very varied and included areas such as synthesis of nitrogen, sulphur, oxygen and selenium heterocycles, the investigation of catalytic cycles, biomimetic applications of oxidation processes with hydroperoxides in synthetic practice and evaluation of biological activity of selenium compounds. Since the start of his career, Jacek Młochowski has collaborated with colleagues within his own Faculty, from other institutions in Poland, and also worldwide. He combined his knowledge and enthusiasm for chemistry with his conviction that all available tools should be used to solve challenging problems. His collaborations ranged from theoretical chemistry, physical chemistry, and spectroscopy to synthetic, bioorganic and medicinal chemistry. In collaboration with the biomedical research laboratories of Professors M. Fikus, A. D. Inglot, M. Mordarski, E. Piasecki, R. Gryglewski, W. Peczyńska-Czoch and B. B. Billack, he discovered new derivatives of 1,8-diazafluorenones, oxiranylquinones, oxiranylazines, organic diselenides and selenium-containing heterocyclic compounds as enzyme inhibitors, cytokine inducers, DNA intercalators, antimicrobial and antiviral agents. The

studies carried out in cooperation with theoretical and structural chemists (Professors H.-J. Timpe, A. Konnecke, J. Gawroński, L. Stefaniak, T. Krygowski, and M. Cyrański) afforded a better understanding of the structure of the compounds investigated. In the mid-eighties he began a fruitful cooperation with Professors Ludwik Syper and Jacek Skarzewski and made important contributions to the development of synthetically useful oxidations of organic compounds with transition metal complexes, seleninic acids and dimethylselenoxide. Some years later, he discovered that some organodiselenides and azaselenaheterocycles, acting as mimetics of selenoenzyme glutathione peroxidase, are excellent oxygen-transfer agents from hydrogen peroxide and *t*-butyl hydroperoxide to organic substrates. Numerous catalytic oxidative transformations of practical importance in organic synthesis were elaborated in his laboratory and their mechanisms studied. Furthermore, synthetic methods of new classes of organoselenium compounds, designed as oxygen-transfer agents and biological response modifiers, were developed. Professor Młochowski together with his enthusiastic collaborators, started the school of chemistry of heteroorganic compounds directed towards synthetic methodology and medicinal chemistry. The quality of the scientific results from Professor Młochowski's group was largely due to the positive atmosphere and strong commitment of his collaborators. His personality and relentless efforts for science set an example to his group. He made sure that all the results reported by his co-workers were up to his high standards and he taught his collaborators how to be well organized and how to consider all data in validating one's theories. Close to a hundred students prepared their Master Theses and twelve persons (M. Jastrzębska-Głapa, Z. Szulc, E. Kubicz, J. Palus, S.B. Said, S. Mhizha, M. Osajda, M. Brząszcz, P. Potaczek, M. Chojnacka, M. Piętka and R. Lisiak) received their Ph. D. degree under the supervision of Prof. Młochowski. Over the years, several postdocs and visiting scientists spent part of their career in his laboratory. Professor Młochowski has been an invited lecturer in numerous international conferences and symposia. He has given lectures on his research at many universities and academic institutions worldwide. Due to his experience and knowledge of organic and bioorganic chemistry, he is an esteemed referee of many international, high-ranking journals.

Professor Jacek Młochowski has published over 200 papers. His books include university textbooks "General chemistry", "Fundamentals of Chemistry" and an excellent "Chemistry of Heterocyclic Compounds". His papers have been cited in various textbooks and monographs, e.g. J. March: *Advanced Organic Chemistry* (J. Wiley), *Fieser's Reagents for Organic Synthesis* (J. Wiley), *The Chemistry of Organic Selenium and Tellurium Compounds*; Rappaport, Z. ed. (Wiley&Sons), *Comprehensive Heterocyclic Chemistry*. Katritzky, A. R. ed., (Elsevier). He was very active in academic life, often acting as a reviewer and a member of various committees for the employment and promotion of colleagues at universities and other academic institutions. He held significant academic positions at Wrocław University of Technology - Deputy Dean of Chemistry Faculty (1972-1978), Vice Director (1978-1984) and Director (1984-1985) of Institute of Organic and Physical Chemistry and Director of Institute of Organic Chemistry, Biochemistry and Biotechnology (1996-2002). For many years (1978-2006) he was head of the organic research group.

Professor Młochowski was also elected member of numerous scientific bodies including the Committee of Chemistry, Polish Academy of Sciences (1987-1993, 1999-2002); the Scientific Council of Industrial Chemistry Research Institute, Warsaw (2003-2005); the Scientific Council of Institute of Organic Chemistry, Polish Academy of Sciences (1989-2010) and President of the Organic Branch of the Polish Chemical Society (1989-1992).

In recognition of his scientific achievements and academic activities, he was honoured with the Knight's Cross of the Order of Polonia Restituta, 1988; the Polish Academy of Sciences Award, 1990; the Kostanecki

Medal of the Polish Chemical Society, 1995; and the Gold Badge with Diamond of Wrocław University of Technology 2007. Over the years, he received several awards from the Wrocław University of Technology and the Polish Ministry of Education.

Professor Młochowski remains active as a reviewer and expert of the Polish Ministry of Science and Higher Education, the National Science Centre, the National Centre from Research and Development, and as a member of the editorial boards of several journals: *International Scholarly Research Notices: Organic Chemistry*, *Current Catalysis*, *American Journal of Organic Chemistry*, *Chemine Technologija: Chemical Technology*, and *Karbala International Journal of Modern Science*.

Elżbieta Wojaczyńska  
Department of Organic Chemistry  
Faculty of Chemistry  
Wrocław University of Technology  
Wybrzeże Wyspiańskiego 27  
50 370 Wrocław, Poland

## References

1. Syper, L.; Kloc, K.; Młochowski, J.; Szulc, Z. An improved synthesis of benzo- and naphthoquinones from hydroquinone dimethyl ethers. *Synthesis*. **1979**, 521-522.  
<http://dx.doi.org/10.1055/s-1979-28739>
2. Syper, L.; Kloc, K.; Młochowski, J. Synthesis of ubiquinone and menaquinone analogues by oxidative demethylation of alkenylhydroquinone ethers with argentic oxide or ceric ammonium nitrate in the presence of 2,4,6-pyridinetricarboxylic acid. *Tetrahedron*. **1980**, 36, 123-129.  
[http://dx.doi.org/10.1016/0040-4020\(80\)85034-4](http://dx.doi.org/10.1016/0040-4020(80)85034-4)
3. Syper, L.; Młochowski, J. The convenient syntheses of organoselenium reagents. *Synthesis*. **1984**, 439-422.  
<http://dx.doi.org/10.1055/s-1984-30869>
4. Syper, L.; Młochowski, J. A convenient oxidation of halomethylarenes and alcohols to aldehydes with dimethyl selenoxide and potassium benzeneselenite. *Synthesis*. **1984**, 747-752.  
<http://dx.doi.org/10.1055/s-1984-30956>
5. Kloc, K.; Młochowski, J.; Syper, L. Mordarski, M. Synthesis of (3',3'dimethyloxiranyl)quinones and (dimethylacetyl)quinones as potential cytostatics. *J. Pract. Chem.* **1986**, 328, 419-429.  
<http://dx.doi.org/10.1002/prac.19863280318>
6. Syper, L.; Młochowski, J. Benzeneperoxyselelenic acids – synthesis and properties. *Tetrahedron* **1987**, 43, 207-213.  
[http://dx.doi.org/10.1016/S0040-4020\(01\)89946-4](http://dx.doi.org/10.1016/S0040-4020(01)89946-4)
7. Syper, L.; Młochowski, J. Lithium diselenide in aprotic medium – a convenient reagent for synthesis of organic diselenides. *Tetrahedron* **1988**, 44, 6119-6130.  
[http://dx.doi.org/10.1016/S0040-4020\(01\)89801-X](http://dx.doi.org/10.1016/S0040-4020(01)89801-X)

8. Siedlecka, R.; Skarżewski, J.; Młochowski, J. Selective oxidation of primary hydroxy-groups in primary-secondary diols. *Tetrahedron Lett.* **1990**, *31*, 2177-2180.  
[http://dx.doi.org/10.1016/0040-4039\(90\)80102-R](http://dx.doi.org/10.1016/0040-4039(90)80102-R)
9. Młochowski, J.; Kloc, K.; Syper, L.; Inglot, A. D.; Piasecki, E. Aromatic and azaaromatic diselenides, benzoselenazolones and related compounds active in humans: Synthesis and properties. *Liebigs Ann. Chem.* **1993**, 1239-1244.  
<http://dx.doi.org/10.1002/jlac.1993199301201>
10. Młochowski, J.; Gryglewski, R. J.; Inglot, A. D.; Jakubowski, A.; Juchniewicz, L.; Kloc, K. Synthesis and properties of 2-carboxyalkyl-1,2-benzisoselenazol-3(2H)-ones and related organoselenium compounds as nitric oxide synthase inhibitors and cytokine inducers. *Liebigs Ann.* **1996**, 1751-1755.  
<http://dx.doi.org/10.1002/jlac.199619961108>
11. Gawroński, J.; Młochowski, J.; Juchniewicz, L. Chiroptical properties of 2-carboxyalkyl-1,2-benzisoselenazol-3(2H)-ones. *Enantiomer*, **1997**, *2*, 343-348.
12. Giurg, M.; Młochowski, J. Oxidative ring contraction of cycloalkanones: a facile method for synthesis of medium ring cycloalkane carboxylic acids. *Synth. Commun.* **1999**, *29*, 2281-2291.  
<http://dx.doi.org/10.1080/00397919908086230>
13. Wójtowicz, H.; Brząszcz, M.; Kloc, K.; Młochowski, J. Selective oxidation of aromatic aldehydes to arenecarboxylic acids using ebselen - *tert*-butyl hydroperoxide catalytic system. *Tetrahedron* **2001**, *57*, 9743-9748.  
[http://dx.doi.org/10.1016/S0040-4020\(01\)00961-9](http://dx.doi.org/10.1016/S0040-4020(01)00961-9)
14. Młochowski, J.; Brząszcz, M.; Giurg, M.; Palus, J.; Wójtowicz, H. Selenium-promoted oxidation of organic compounds: reactions and mechanisms. *Eur. J. Org. Chem.* **2003**, 4329-4339.  
<http://dx.doi.org/10.1002/ejoc.200300230>
15. Stępień, B. T.; Krygowski, T. M.; Cyrański, M. K.; Młochowski, J.; Orioli, P.; Abbate, F. How far is the  $\pi$ -electron delocalization of the phenanthrene moiety modified in the aza-analogues and their *N*-oxides? *ARKIVOC* **2004**, (iii), 185-201.
16. Wójtowicz-Młochowska, H.; Młochowski, J.; Syper, L.; Yadav, H. S. *t*-Butyl hydroperoxide oxidative dealkylation of hydroquinone ethers to 1,4-quinones. *Synth. Commun.* **2006**, *36*, 1991-2000.  
<http://dx.doi.org/10.1080/00397910600634175>
17. Młochowski, J.; Kloc, K.; Lisiak, R.; Potaczek, P.; Wójtowicz-Młochowska, H. Developments in the chemistry of selenaheterocyclic compounds of practical importance in synthesis and medicinal biology. *ARKIVOC* **2007**, (vi), 14-46.  
<http://dx.doi.org/10.1002/chin.200711265>
18. Młochowski, J. 1,2-Selenazoles in: *Comprehensive Heterocyclic Chemistry III*. Vol. 4. Five-membered rings with two heteroatoms, each with their fused carbocyclic derivatives. Executive ed. A. R. Katritzky, vol. ed. J. Joule. Amsterdam: Elsevier, **2008**. pp. 755-790.
19. Giurg, M.; Kowal, E.; Muchalski, H.; Syper, L.; Młochowski, J. Catalytic oxidation domino degradation of alkyl phenols towards 2- and 3-substituted muconolactones. *Synth. Commun.* **2008**, *38*, 251-266.  
<http://dx.doi.org/10.1080/00397910802369687>
20. Młochowski, J.; Giurg, M. New trends in chemistry and application of aromatic and related selenaheterocycles. *Top. Heterocycl. Chem.* **2009**, *19*, 287-340.  
[http://dx.doi.org/10.1007/978-3-540-68343-8\\_7](http://dx.doi.org/10.1007/978-3-540-68343-8_7)

21. Piętka-Ottlik, M.; Potaczek, P.; Piasecki, E.; Młochowski, J. Crucial role of selenium in the virucidal activity of benzoselenazol-3(2H)-ones and related diselenides. *Molecules*, **2010**, *15*, 8214-8228.  
<http://dx.doi.org/10.3390/molecules15118214>
22. Młochowski J.; Lisiak, R.; Wójtowicz-Młochowska, H. Organoselenium and organotellurium oxidation and reduction in: *The Chemistry of Organic Selenium and Tellurium Compounds*; Rappaport, Z. Ed.; Wiley&Sons: Chichester; **2012**, Vol. 3, Chap. 38, pp 1083-1161.
23. Lulla, A.; Pino, M. A.; Piętka-Ottlik, M.; Młochowski, J.; Sparavalo, O.; Billack, B. Ebselen reduces the toxicity of mechlorethamine in A-431 cells via inhibition of apoptosis. *J. Biochem. Mol. Toxicol.* **2013**, *27*, 313-322.  
<http://dx.doi.org/10.1002/jbt.21490>