

ANNIVERSARIES AND DATES



ALEKSANDR FEDOROVICH POZHARSKII

(To his seventieth anniversary)

On December 8, 2008 Prof. Aleksandr Fedorovich Pozharskii, leader of the Department of Organic Chemistry at the Southern Federal University and Doctor of Chemical Sciences, celebrates his 70th jubilee.

A. F. Pozharskii is one of the most brilliant Russian organic chemists, whose work in the field of organic and heterocyclic chemistry has received wide international recognition. He is the author of seven books, 352 scientific papers and reviews published by the leading national and foreign scientific publishers, and also of 35 inventor's certificates.

In 1956 A. F. Pozharskii entered the chemistry faculty of Rostov State University. His choice of profession was not accidental. Aleksandr Fedorovich's father Fedor Tikhonovich Pozharskii, who worked as associate professor in the Department of Organic Chemistry, was a great person and a brilliant teacher, still remembered by the older generation of collaborators and graduates of the chemistry faculty. His mother, Irina Konstantinovna, taught chemistry and biology in middle school.

His encounter with Prof. Andrei Mikhailovich Simonov was crucial. In 1957 at the invitation of the rector of Rostov State University, Yu. A. Zhdanov, Prof. A. M. Simonov moved from Moscow to Rostov-on-Don and headed the Department of Organic Chemistry. This remarkable scientist educated a whole galaxy of brilliant students and founded the Rostov school of organic chemists. Under the leadership of Prof. Simonov Aleksandr Pozharskii completed his own first scientific work entitled "Synthesis of 1-alkyl-2-furfurylidene-aminobenzimidazoles", which was published in the Russian Journal of General Chemistry in 1961 and has subsequently been cited many times. In 1963 A. F. Pozharskii completed his postgraduate study a year early and

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defended a candidate's thesis on "Research in the region of N-substituted benzimidazoles". His opponents were the now legendary chemists L. S. Efros and V. I. Minkin.

In February 1964 Aleksandr Fedorovich was appointed to the staff of the department in the position of assistant. A. F. Pozharskii devoted his researches of this period and of the next decade to a detailed study of the Chichibabin reaction and related transformations. The amination of perimidines, benzoquinolines, many derivatives of benzimidazoles, and a series of other polynuclear heterosystems was realized for the first time. Thanks to the use of physicochemical methods substantial refinements were made to the Ziegler mechanism of the heterogeneous Chichibabin reaction (acid autocatalysis at the stage of addition of the nucleophile, the dependence of the ease of the reaction on the basicity of the substrate, the "*ortho*-dimethoxy effect", bifunctional catalyst at the stage of aromatization of the σ adduct). Direct hydroxylation with molten alkali, extended to five-membered nitrogen heterocycles and perimidines, became an important method for the synthesis of N-substituted imidazolones and perimidones.

A significant contribution to the establishment of A. F. Pozharskii as a scientist and simply as a personality, and his personal recognition, was made in 1968-1969 by a period of probation in the laboratory of Prof. A. R. Katritzky at the University of East Anglia. The collaboration of the two scientists that has continued for all these years resulted in the publication at the end of the 1990's of monographs on the chemistry of heterocyclic compounds (A. F. Pozharskii, A. T. Soldatenkov, and A. R. Katritzky, *Heterocycles in Life and Society*, J. Wiley & Sons, Chichester, 1997, 301 pp.; A. R. Katritzky and A. F. Pozharskii, *Handbook of Heterocyclic Chemistry*, 2nd ed., Pergamon, Amsterdam, 2000, 734 pp.).

At the end of 1972 A. F. Pozharskii defended a doctoral thesis on "Research in the region of N-heteroaromatic amines", and two years later he was made a professor. This period coincided with the beginning of investigations into the chemistry of perimidines and other *peri*-condensed systems. The results of A. F. Pozharskii's work in this field, published in 75 communications under the heading "Heterocyclic analogs of pleiadene", are well-known. They include the unexpected nitration of perimidines by nitrous acid right up to the di- and trinitro derivatives, the recyclization of 1-R-3-arylperimidinium salts to 1-R-2-arylperimidines, hydride transfer from 1,3-dimethyl-2,3-dihydroperimidines to 1,3,5-trinitrobenzene leading to the formation of perimidinium salts with Meisenheimer σ -complexes as counterion, etc. The unique behavior of perimidine, capable of reacting equally well with electrophiles and nucleophiles, of being reduced and oxidized, and of being a strong electron donor and at the same time readily accepting an electron with the formation of a radical-anion prompted Aleksandr Fedorovich to re-examine certain theoretical concepts of the chemistry of heterocyclic compounds. As a result the concept of π -excess and π -deficiency, proposed in the middle of the 1950's by the Australian chemist A. Albert, was developed and extended on a quantitative basis. A. F. Pozharskii introduced the concept of π -amphotericity, proposed a structural index of aromaticity based on quantitative assessment of the degree of levelling of the orders of the ring bonds in the molecules of heterocycles. Perhaps, however, the principal outcome of these investigations was the monograph "Theoretical Principles of the Chemistry of Heterocycles" (Khimiya, Moscow, 1985, 278 pp.) – one of the best text books on the chemistry of heterocycles worldwide.

In 1981 A. F. Pozharskii became head of the Department of Organic Chemistry of Rostov University. His scientific work included new directions connected with the chemistry of N-aminoazoles, condensed systems based on uracil, and the so-called "proton sponges". The results of investigations on N-aminoazoles are summarized in a review prepared at the request of Prof. A. R. Katritzky, editor of "Advances in Heterocyclic Chemistry" [V. V. Kuzmenko, A. F. Pozharskii, N-Aminoazoles, *Adv. Heterocycl. Chem.*, **53**, 85 (1992)]. Among the most important results in this region is the synthesis of various N-aminoazoles by direct electrophilic N-amination, cyclization, and functionalization, investigation of their key physicochemical characteristics (basicity, NH-acidity, stereochemistry, dipole moments, oxidation potentials, etc.), use of the N-amino group as a convenient protecting group for the production of difficultly obtainable derivatives of azoles and xanthenes, and the synthesis of natural antibiotics reumycin and fervenulin by the oxidation of 9-amino-xanthenes.

Fruitful in the scientific scheme and useful in practise were the investigations of condensed systems consisting of uracil and azine rings. A suitable industrial method was developed for the synthesis of reumycin, which has antitumor activity. An azadiene synthesis that makes it possible to transform triazinouracils into pyridouracils was discovered. It was shown that the nucleophilic substitution of hydrogen provides an effective method for the functionalization of azinouracils and can also be used as the basis of comprehensive synthetically useful tandem and complex cascade transformations. Novel tandem substitutions of two *ortho*-hydrogen atoms in the diazine ring, leading to annulation of 1,4-diazacycloalkane, pyrrole, imidazole, imidazoline, and a series of other rings, were discovered for pyridazinouracils. A series of condensed pyrrolo-, furo-, thieno-, pyrido-, and pyranopteridines, structural analogs of certain natural pteridines, were obtained on the basis of mono- and *o*-dialkynyl derivatives of lumazine. The results of these investigations have been presented in recent reviews. In the last 20 years Aleksandr Fedorovich scientific interests have been largely focused on the chemistry of proton sponges [1,8-bis(dialkylamino)naphthalenes] and strong organic bases, where he has become one of the recognized leaders and widely cited scientists. It is typical that he entered this field while developing his own investigations into the chemistry of nitrogen heterocycles and primarily perimidines. Thus, he developed an original method for the production of naphthalene proton sponges starting from 1,1,3-trialkylperimidinium salts. Compounds of the perimidine series also became the basis of the production of mono-, di-, and tri-N-alkyl-substituted 1,8-diaminonaphthalenes. It was recently shown in A. F. Pozharskii's group that the proton sponges themselves can in a number of cases be used for the production of difficultly obtainable derivatives of perimidine. The increasingly widespread use of heterocyclic entities in the chemistry of proton sponges is one of the notable trends in Pozharskii's recent research.

Professor A. F. Pozharskii is not only a scientist but also an active popularizer of science. A shining example of his creativity is the book "Ring Molecules" written in co-authorship with A. T. Soldatenkov and devoted to the role of heterocycles in the environment. Each word of the book shows not only a deep understanding of the chemistry of heterocycles but also the soul of the authors. It is not by accident that the book was republished abroad with the participation of Prof. A. R. Katritzky (A. F. Pozharskii, A. T. Soldatenkov, A. R. Katritzky, *Heterocycles in Life and Society*, J. Wiley & Sons, Chichester 1997, 301 pp.) and translated into Greek. A new edition of this book is currently being prepared.

Aleksandr Fedorovich Pozharskii is a talented teacher and creator of a scientific school. Four doctoral and 30 candidate's theses have been defended under his supervision. His students work successfully and head departments in the nation's other universities.

In various years A. F. Pozharskii has worked on the organizing and programming committees of international and all-union conferences and symposia on the problems of organic chemistry. He has been a plenary speaker at conferences in Russia, Belgium, and Slovakia. He was invited to present lectures on theoretical organic and heterocyclic chemistry at universities in Belgium, Great Britain, Poland, Slovakia, Lithuania, Ukraine, and a number of other countries. A. F. Pozharskii is a member of the editorial boards of the journals "Chemistry of Heterocyclic Compounds" (Latvia) and "Polish Journal of Chemistry" (Poland).

For active participation in the training of highly qualified specialists and fruitful scientific work in 2000 A. F. Pozharskii was awarded the Honourable Charter of the Ministry of General and Professional Education of the Russian Federation. For achievements in the chemistry of heterocyclic compounds in 2006 he was awarded the medal "In memory of Prof. A. N. Kost" and the diploma of the International "Science Partnership" Foundation, M. V. Lomonosov Moscow State University, and the D. I. Mendeleev Russian Chemical Society.

On behalf of his colleagues and students I congratulate Aleksandr Fedorovich on his birthday and wish him robust health and long years of productive work.

A. V. Gulevskaya

The editorial board and staff of "Chemistry of Heterocyclic Compounds" congratulate Aleksandr Fedorovich on his birthday, wish him health, new achievements and successes in his work, and express the hope for continued fruitful collaboration.

PUBLICATIONS OF A. F. POZHARSKII 2004-2008

Books, Reviews

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