

Scientific Publications of Academician N. N. Vorozhtsov Jr.: Bibliometric Essay

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Abstract

Bibliometric analysis of scientific publications of academician N. N. Vorozhtsov Jr. (1907–1979), the director, founder of the Novosibirsk Institute of Organic Chemistry (NIOCh), Siberian Branch of the Russian Academy of Sciences, has been performed with the use of Chemical Abstracts (CA) and Science Citation Index (SCI) databases (DB) of the STN International Scientific and Technical Network. Comparison with the official list of works has demonstrated that CA DB takes into account 90 % of publications of N. N. Vorozhtsov in 1929–1977. Based on the SCI DB, citation of publications of N. N. Vorozhtsov has been studied and the works most referenced in 1974–2006 have been identified.

INTRODUCTION

Academician Nikolay Nikolayevich Vorozhtsov Jr. (1907–1979) is an outstanding organic chemist, the founder and the first director (1958–1975) of the Novosibirsk Institute of Organic Chemistry (NIOCh), Siberian Branch of the Russian Academy of Sciences, that was named after him since 1997. He is among the founders of chemistry of polyfluorinated aromatic and heterogeneous ring compounds, and his main works [1] fall into this category, together with chemistry of “conventional” aromatic substances.

This article performs a bibliometric analysis of scientific publications of N. N. Vorozhtsov for a period from 1929 till 1977 with the use of Chemical Abstracts (CA) [2] and Science Citation Index (SCISearch[®], hereinafter SCI) [3] databases (DB) of the STN International scientific and technical network [4] and investigates their citation in 1974–2006. CA Database (the retrospective review to 1907) reviews about 9500 scientific magazines on chemical and certain related subjects, together with patents, works of conferences, technical reports, books, dissertations, *etc.* The abstracted journals include about 380 Russian journals, and about 80 of them are included into the list of so-called leading (core) journals of Chemical Ab-

stracts Service [5]. Since 1996, CA DB takes into account citation of publications. SCI Database (the retrospective review of publications and citation to 1974) reviews about 5900 leading scientific, technical, and medicine magazines.

Combined use of CA DB and SCI DB allows one to carry out an extended bibliometric research of various aspects of the Russian chemical science, including those of retrospective (historical) nature. It is possible, in particular, to study scientific work of both individual scientists, and of greater exploratory collectives. General methodology of a research of this kind is described in detail earlier [6, 7].

BIBLIOMETRIC ANALYSE

The search for scientific publications of academician N. N. Vorozhtsov Jr. has been conducted online in CA DB in January 2007. The main problems in the process have been traditionally related to the transliteration of Russian names and names of the organizations and with the lack of standardization of the last-mentioned [6, 7]. A peculiar problem laid in the fact that Nikolay Nikolayevich Vorozhtsov Sr. (1881–1941), father of N. N. Vorozhtsov Jr., was also the large organic chemist [1], many publications of which are taken into account

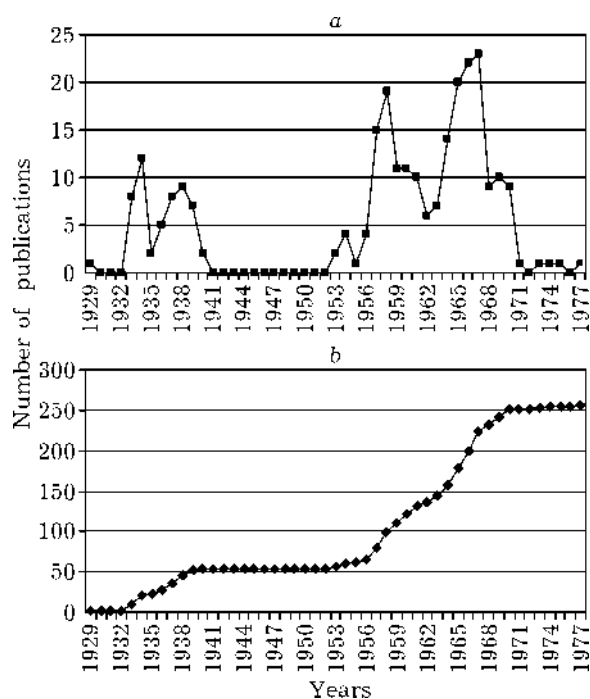


Fig. 1. Publications of N. N. Vorozhtsov Jr.: a - year-to-year distribution, b - accumulation in the course of time.

in DB CA. Although academician Vorozhtsov typically signed his works as N. N. Vorozhtsov Jr., the refinement "Jr." was omitted in several publications found in the DB, which made difficult their attribution and required additional data to refer to.

Total of 257 publications of N. N. Vorozhtsov Jr. have been found for a period from 1929 to 1977 that account for about 90 % of works that have been given in the official list of works [8]. The refinement "Jr." is absent from 28 of them (*i. e.* more than 10 %). 257 publications include three monographs, 198 journal articles (including five surveys), 52 patents (certificates of authorship), and theses of four reports at conferences. An increase in the number of pub-

lications in the course of time and their year-to-year distribution are disclosed in Fig. 1. It is evident that the maximum of creative activity of N. N. Vorozhtsov falls on 1958–1970, *i. e.* virtually on the first decade of the existence of NIOCh, SB RAS.

Included in DB CA, the monographs of N. N. Vorozhtsov (Table 1) deal with isomerization of organic compounds and synthesis of intermediate products and dyes. First of them, written in the co-authorship with V. A. Koptug, was an English translation of the book that had been originally published in Russian. The book on chemistry of dyes constitutes a monograph of N. N. Vorozhtsov Sr. that was updated by N. N. Vorozhtsov Jr. and republished later in Germany.

Articles of N. N. Vorozhtsov have been published in 27 magazines, which include (the number of publications is given in parentheses): Zhurnal Obshchey Khimii (83, *i. e.* 42 % of all articles), Doklady AN SSSR (18), Izvestiya AN SSSR. Seriya Khimicheskaya (13), Khimicheskaya Nauka i Promyshlennost' (12), Zhurnal Vsesoyuznogo Khimicheskogo Obshchestva im. D. I. Mendeleeva (11), *etc.* From 52 patents that are taken into account in CA DB, 20 of them fall on the RSFSR inventor's certificates (1933–1938) and 28 – the USSR (1956–1975), and on patents of Germany, France, the Great Britain, and the USA – one each. It should be noted that the patents are approximately 20 % of the total number of publications of N. N. Vorozhtsov, which is fairly unusual for a so-called academic scientist.

According to DB CA, N. N. Vorozhtsov had 119 unique (not repeated) co-authors who 728 times occurred in the publications, *i. e.* an average of 2.85 per publication. Table 2 gives

TABLE 1

Monographs of N. N. Vorozhtsov Jr.

Isomerization of Aromatic Compounds / Koptug, V. A.; Vorozhtsov, N. N., Jr.; Editors. – New York: D. Davey, 1965. – 181 pp. Translated from:

V. A. Koptug and N. N. Vorozhtsov (Eds.), Isomerization of Aromatic Compounds, Published in the U.S.A. by D. Davey, New York, 1965. Translated from Russian: N. N. Vorozhtsov Jr. (Ed.), Izomerizatsiya Aromaticheskikh Soyedineniy, Izd-vo SO AN SSSR, Novosibirsk, 1963.

N. N. Vorozhtsov Jr. (Ed.), Osnovy Sinteza Promezhutochnykh Produktov i Krasiteley (Educational Assistance for Chemical Engineering Institutes), 4th ed., Goskhimizdat, Moscow, 1955.

N. N. Vorozhtsov Jr., Grundlagen der Synthese von Zwischenprodukten und Farbstoffen Akademie Verlag, Berlin, 1966.

TABLE 2

Most active co-authors of N. N. Vorozhtsov Jr.

Co-authors	Number of joint publications
G. G. Yakobson	77
V. A. Barkhash	32
V. A. Koptuyug	26
V. D. Shteingarts	15
T. N. Gerasimova	14
S. M. Shein	13
T. D. Petrova (Rubina)	13
V. E. Platonov	12
A. T. Troshchenko	11
V. A. Kobelev	10

the names of most active of them (10 and more joint publications with N. N. Vorozhtsov). Nearly all of them are collaborators of NIOCh, SB RAS.

CA DB gives the place of work only for the first author in its publications. In the case of N. N. Vorozhtsov, it is given only for 165 (~62 %) works since 1953. The Institute of Organic

Chemistry in Novosibirsk (since 1966 – NIOCh) is present in 99 documents starting from 1961, and the D. Mendeleev Institute of Chemical Technology of Russia in Moscow where N. N. Vorozhtsov had been supervising over a sub-faculty before he moved to Novosibirsk is specified in 52 publications.

The rubrication and controllable terminology of CA DB define the general thematic qualification of the publications of N. N. Vorozhtsov as chemistry of aromatic and heterogeneous ring compounds (Table 3). Table 4 presents controllable terms of most often occurrence.

According to DB SCI, publications of N. N. Vorozhtsov got 874 citations starting from 1974, and 181 citations starting from 1996, according to DB CA. The most cited was the updated book of N. N. Vorozhtsov Sr. (DB SCI – 131 references, DB CA – 14 references) and the monograph “Isomerization of Aromatic Compounds” that was published in the USA (DB SCI – 52 references, DB CA – 2 references). Shown in Fig. 2 is the year-to-year distribution of cited journal publications. By and large,

TABLE 3

CA DB headings that publications of N. N. Vorozhtsov Jr. are attributed to

CA heading	Number of publications, %
Organic Chemistry, 1906–1958	73 (27.3)
Non-condensed Aromatic Compounds	62 (23.2)
Organic Chemistry: Condensed Carcocyclic Compounds	28 (10.5)
Condensed Aromatic Compounds	24 (8.9)
Organic Chemistry: Benzene Derivatives	16 (6.0)
Heterocyclic Compounds (One Hetero Atom)	11(4.1)
Dyes and Textile Chemistry; Dyes; Dyes, Fluorescent Brightening Agents, and Photosensitizers; Dyes, Fluorescent Whitening Agents, and Photosensitizers	10 (3.7)
Heterocyclic Compounds (More Than One Hetero Atom)	9 (3.4)
Physical Organic Chemistry	9 (3.4)
General and Physical Chemistry	8 (3.0)

TABLE 4

Controllable terms of CA DB that are attributed to publications of N. N. Vorozhtsov Jr.

Controllable term	Number of publications, %
Isomerization	21 (7.9)
Reaction Kinetics and (or) Velocity	15 (5.6)
Substitution Reactions	13 (4.9)
Catalysts	12 (4.5)
Spectra, Visible and Ultraviolet	11 (4.1)
Catalysts and Catalysis	9 (3.4)

TABLE 5

Most cited journal publications of N. N. Vorozhtsov Jr.

Articles	Number of references in the DB	
	SCI	CA
N. N. Vorozhtsov Jr., V. A. Barkhash, A. T. Prudchenko, T. I. Khomenko, <i>Dokl. AN SSSR</i> , 164, 5 (1965) 1046.	21	11
N. N. Vorozhtsov Jr., V. A. Barkhash, N. G. Ivanova, S. A. Anichkina, O. I. Andreevskaya, <i>Dokl. AN SSSR</i> , 159, 1 (1964) 125.	19	4
G. G. Yakobson, V. D. Shteingarts, A. I. Miroshnikov, N. N. Vorozhtsov Jr., <i>Dokl. AN SSSR</i> , 159, 5 (1964) 1109.	18	5
V. D. Shteingarts, O. I. Osina, G. G. Yakobson, N. N. Vorozhtsov Jr., <i>Zh. Vsesoyuz. Khim. Ob-va im. D. I. Mendeleeva</i> , 11, 1 (1966) 115.	18	3
V. D. Shteingarts, A. G. Budnik, G. G. Yakobson, N. N. Vorozhtsov Jr., <i>Zh. Obshch. Khim.</i> , 37, 7 (1967) 1537.	17	2
V. D. Shteingarts, G. G. Yakobson, N. N. Vorozhtsov Jr., <i>Dokl. Akad. Nauk SSSR</i> , 170, 6 (1966) 1348.	15	1
G. G. Yakobson, V. E. Platonov, N. N. Vorozhtsov Jr., <i>Zh. Obshch. Khim.</i> , 37, 5 (1965) 1158.	14	6
G. G. Yakobson, V. D. Shteingarts, N. N. Vorozhtsov Jr., <i>Izv. AN SSSR. Ser. Khim.</i> , 8 (1964) 1551.	13	4
G. G. Yakobson, T. D. Petrova, L. I. Kann, T. I. Savchenko, A. K. Petrov, N. N. Vorozhtsov Jr., <i>Dokl. Akad. Nauk SSSR</i> , 158, 4 (1964) 926.	13	2
N. N. Vorozhtsov Jr., V. A. Barkhash, A. T. Prudchenko, T. I. Khomenko, <i>Zh. Obshch. Khim.</i> , 35, 8 (1965) 1501.	13	7
V. E. Platonov, N. V. Ermolenko, G. G. Yakobson, N. N. Vorozhtsov Jr., <i>Izv. AN SSSR. Ser. Khim.</i> , 12 (1968) 2752.	13	1
N. N. Vorozhtsov Jr., V. E. Platonov, G. G. Yakobson, <i>Izv. AN SSSR. Ser. Khim.</i> , 8 (1963) 1524.	12	12
G. G. Yakobson, V. N. Odinkov, N. N. Vorozhtsov Jr., <i>Zh. Obshch. Khim.</i> , 36, 1 (1966) 139.	12	2
N. N. Vorozhtsov Jr., N. V. Ermolenko, S. A. Mazalov, O. I. Osina, V. E. Platonov et al., <i>Izv. AN SSSR. Ser. Khim.</i> , 1 (1969) 196.	12	0
G. G. Yakobson, G. G. Furin, L. S. Kobrina, N. N. Vorozhtsov Jr., <i>Zh. Obshch. Khim.</i> , 37, 6 (1967) 1285.	11	3
N. N. Vorozhtsov Jr., <i>Zh. Vsesoyuz. Khim. Ob-va im. D. I. Mendeleeva</i> , 15, 1 (1970) 52.	11	5
N. N. Vorozhtsov Jr., G. G. Yakobson, <i>Zh. Obshch. Khim.</i> , 27, 6 (1957) 1672.	10	2
N. N. Vorozhtsov Jr., V. A. Barkhash, S. A. Anichkina, <i>Dokl. AN SSSR</i> , 166, 3 (1966) 598.	10	1

publications of 1963–1969 got the greatest citation (more than 50 % of all references), 473 and 131 in SCI DB and CA DB, respectively. It is remarkable that all journal articles that got the greatest citation (10 and more references) are related to chemistry of polyfluorinated aromatic and heterogeneous ring compounds (Table 5).

227 publications that cite articles of N. N. Vorozhtsov have been found in SCI DB,

and 69 publications in CA DB. The publications with citation are articles for the most part, including surveys. Accordingly, 21 surveys of 1974–2006 have been found in SCI DB, and 12 surveys of 1997–2006, in CA DB (Table 6). It should be remarked that the number of publications that cite the works of N. N. Vorozhtsov accrues monotonically until now, *i. e.* more than a quarter of a century later after he had com-

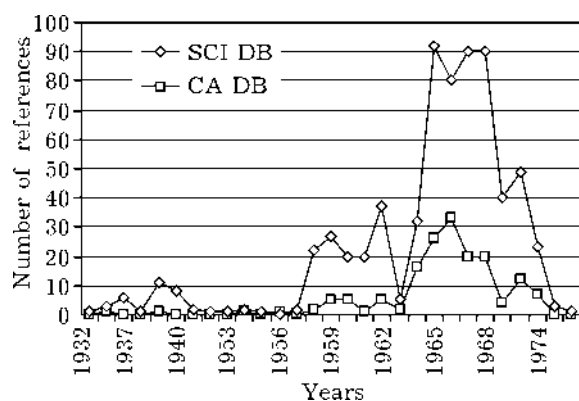


Fig. 2. Year-to-year distribution of the cited journal publications of N. N. Vorozhtsov Jr.

pleted his scientific career (Fig. 3). This steady growth of citation in the course of time is more important for an insight into the influence of N. N. Vorozhtsov on the development of chemistry of polyfluorinated aromatic and heterogeneous ring compounds (see Table 5), than the formal citation index.

The publications of citation are distributed over various magazines, including those international. Among Russian magazines, more than a half of them fall on *Zhurnal Organicheskoy Khimii*; *Izvestiya AN SSSR. Seriya Khimicheskaya*, *Uspekhi Khimii*, *Izvestiya SO AN SSSR. Seriya Khimicheskikh Nauk*; among foreign magazines – *Journal of Fluorine Chemistry*, *Journal of the Chemical Society*, *Journal of Organic Chemistry*, etc. (Table 7).

According to SCI DB, in 1974–2006, the publications of N. N. Vorozhtsov were more often cited by collaborators of NIOCh, SB RAS, his disciples and co-authors (Table 8, the 2nd column; compare with Table 2).

During the last decade (according to CA DB), the authors of publications that most often cited works of N. N. Vorozhtsov were represented

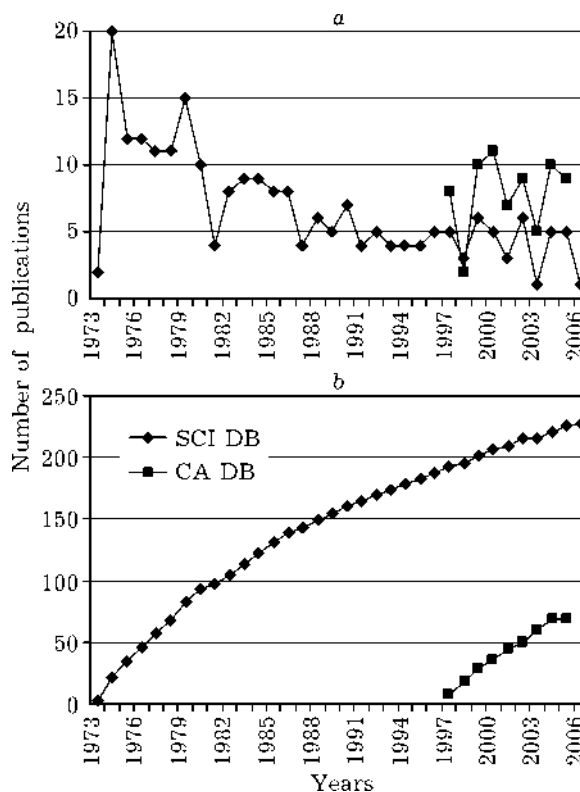


Fig. 3. Publications that cite the works of N. N. Vorozhtsov Jr.: a – year-to-year distribution, b – accumulation in the course of time.

by collaborators of alternative organizations (see Table 8, 3rd column), for the most part, the Postovsky Institute of Organic Synthesis (IOS), Ural Branch of the Russian Academy of Sciences.

According to SCI DB, “the leading authors” of the publications with citation (that refer to as the reprint term in 146 documents in the DB) in 1974–2006 worked in 19 countries, namely, most often in the USSR (Russia), as well as in the USA, England, Japan (Table 9), and Germany. According to CA DB, the first authors of these publications in 1997–2006 worked in 11

TABLE 6

Types of publications that cite the works of N. N. Vorozhtsov Jr. (DB SCI, since 1974; DB CA, since 1997)

Types of publications in SCI DB	Number of publications	Types of publications in CA DB	Number of publications
Journal	227	Journal	64
Article	190	Conference	4
General Review	21	General Review	12
Note	14	Patent	1
Letter	2		

TABLE 7

Journal-to-journal distribution of the publications that cite the works of N. N. Vorozhtsov Jr.

Journals	Number of publications in the DB	
	SCI	CA
Zhurnal Organicheskoy Khimii	49	18
Journal of Fluorine Chemistry	40	14
Izvestiya Akademii Nauk. Seriya Khimicheskaya	18	5
Uspekhi Khimii	11	–
Izvestiya Sibirskogo Otdeleniya AN SSSR. Seriya Khimicheskikh Nauk.	11	–

TABLE 8

The authors that most often cite the works of N. N. Vorozhtsov Jr.

Number of publications in SCI DB (1974–the present time)	Author	Author	Number of publications in CA DB (1996 – the present time)
29	V. D. Shteingarts	V. I. Saloutin	12
27	G. G. Yakobson	Ya. V. Burgart	9
19	V. E. Platonov	S. P. Kisil	8
16	T. N. Gerasimova	V. D. Shteingarts	8
15	V. M. Vlasov	O. N. Chupakhin	5

TABLE 9

Geographic distribution of the publications that cite the works of N. N. Vorozhtsov Jr.

Country (reprint term)	Number of publications	
	SCI DB	CA DB
The USSR	61	–
Russia	32	41
England	14	–
The USA	12	8
Japan	9	5

countries, predominantly in Russia, the USA, Japan (see Table 9), and Germany.

Among the domestic organizations that cite the works of N. N. Vorozhtsov, NIOCh, SB RAS, and IOS, UrB RAS are in the lead (Table 10).

CONCLUSION

Academician N. N. Vorozhtsov Jr. has left a big scientific heritage that has been rather completely documented in authoritative DBs, by means of which the world scientific community, as a rule, gets an insight into the scientific efficiency of one or another scientist and his (her) impact upon the development of the appropriate scientific disciplines. Unfortunately, the accessible DBs have allowed us to study the citation of publications of N. N. Vorozhtsov Jr. only since 1974, *i. e.* actually since the time he completed his nearly 50-year scientific career. However, it is moreover important (and this is the main result of the present work) that, according to DB SCI and DB CA, citation of publications of N. N. Vorozhtsov Jr. kept increasing

TABLE 10

Domestic organizations that cite most often the works of N. N. Vorozhtsov Jr.

Country (reprint term)	Number of documents in the SCI DB	Institute	Number of documents in the CA DB
		NIOCh, SB RAS (the USSR)	36
NIOCh, SB RAS (Russia)	19	IOS, UrB RAS (Russia)	12

monotonically in 1974–2006. The tendency is the best argument for the scientific importance of the scientist. The data about co-authors of publications of N. N. Vorozhtsov and the authors of the publications that cite his works testify that the cause of N. N. Vorozhtsov Jr. is continued by his disciples and followers that work in the Institute named after him.

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