

INTERNATIONAL VISIBILITY OF BULGARIAN MEMORY RESEARCH

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ABSTRACT

Contemporary neuroscience is characterized by intensive internationalization of basic and applied memory research. A scientometric analysis of the publications by Bulgarian authors abstracted in *MEDLINE* from 1966 till 2004 was carried. A total of 94 papers authored by 61 Bulgarian authors and published between 1980 and 2004 became internationally 'visible' through this widely used data-base. Four Bulgarian journals contain 38 articles but 25 foreign ones from 10 countries - 56 articles. A total of 50 papers were published in 22 mono-disciplinary journals from 11 countries, 36 - in 4 two-disciplinary journals from 4 countries, and 7 - in 2 journals from two countries. In 11 journals containing the term of 'pharmacology' in their title a total of 65 papers by Bulgarian authors were published. *Acta Physiologica et Pharmacologica Bulgarica* (Bulgaria) contained 32, *Methods and Findings in Experimental and Clinical Pharmacology* (Spain) - 15 and *European Neuropsychopharmacology* - 5 papers. International collaboration resulted in 5 papers published in Bulgarian and in 12 papers published in foreign journals. V. D. Petkov and V. V. Petkov from the Institute of Physiology of the Bulgarian Academy of Sciences (Sofia) were the most productive authors in this field with 36 and 30 papers, respectively. Recently, there is a trend of gradually improving international visibility of Bulgarian pharmacology dealing with memory in man and animals.

Key words: memory research, internationalization, Bulgarian pharmacological science, *MEDLINE*, scientometrics

INTRODUCTION

Nowadays scientific cooperation becomes an important precondition for effective research (3,4,7-9). Recently, science policy makers are strongly interested in the collaboration patterns of the countries of the European Union (2,6). Foreign authorship is one of the features of internationality of modern scholarly journals (17). Dynamic internationalization is a typical peculiarity of contemporary neuroscience. Scientists from big and small countries are involved in national and international teams attempting to solve the interdisciplinary problems in the rapidly advancing field of memory research. In the recent decades, Bulgaria takes part in the system of international scientific communications, too. In this way, our authors become gradually more visible on the world scientific information market (1).

Our previous investigations of the former (10,11) and present contemporary scientific communications in experimental and clinical memory research reveal an interrupted advance of this interdisciplinary field accompanied by manifested internationalization (12,14) and institutionalization of research (12,15,16). There exists outlined country stratification in science (5,13) and only some small countries are

of significant importance at international and world level. In this respect, identification of productive scientists from internationally less 'visible' countries requires a more careful and purposeful examination of the information flows reflected in large and popular databases such as *MEDLINE*, *EMBASE*, *SCI*, etc.

The aim of the present paper is to analyze the presentation in *MEDLINE* of the papers dealing with memory and published by Bulgarian authors.

MATERIAL AND METHODS

A retrospective search of the papers on human and animal memory written by Bulgarian investigators and subsequently abstracted in *MEDLINE* from 1966 till 2004 was carried out. The combined information retrieval of the terms of 'memory' and of 'Bulgaria*' revealed 79 relevant papers. Then, all the names of the Bulgarian authors were separately searched and 15 additional papers by these authors without the term of 'Bulgaria*' were identified. Our scientometric analysis included the following parameters: annual distribution of papers; names and addresses of authors; national and thematic belonging of journals, and addresses and thematic belonging of authors' institutions. Only some scientometric distributions were presented to illustrate the most significant peculiarities of the

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institutionalization and internationalization of Bulgarian memory research.

RESULTS AND DISCUSSION

A total of 94 papers on memory by Bulgarian authors were abstracted in *MEDLINE*. Between 1980 and 2003, a total of 38 papers were published in 4 Bulgarian journals. Between 1985 and 2004, a total of 56 papers were published in 25 foreign journals from 10 countries. The rising relative share of papers published abroad is illustrated on Fig. 1.

scientists in the field of pharmacology of memory presenting with 36 and 30 publications abstracted in *MEDLINE*, respectively. Next come some highly productive authors such as M. Lazarova-Bakarova (with 23 papers), A. Mosharof (with 14), M. Genkova-Papasova (with 13), V. Georgiev, R. Kehayov and D. Getova (with 12 papers each), etc. The distribution of the number of authors according to the number of their papers is demonstrated on Fig. 2. Thirty-one authors present with one article only. Five internationally co-authored papers were published between 1988 and 1998 in a Bulgarian journal but 12 ones -

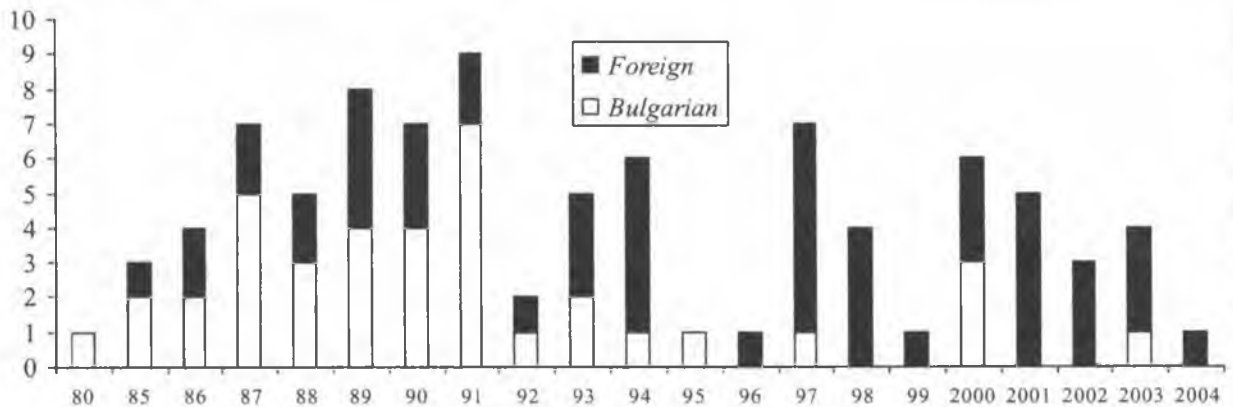


Fig. 1. Annual distribution of papers in Bulgarian and foreign journals

n (papers)

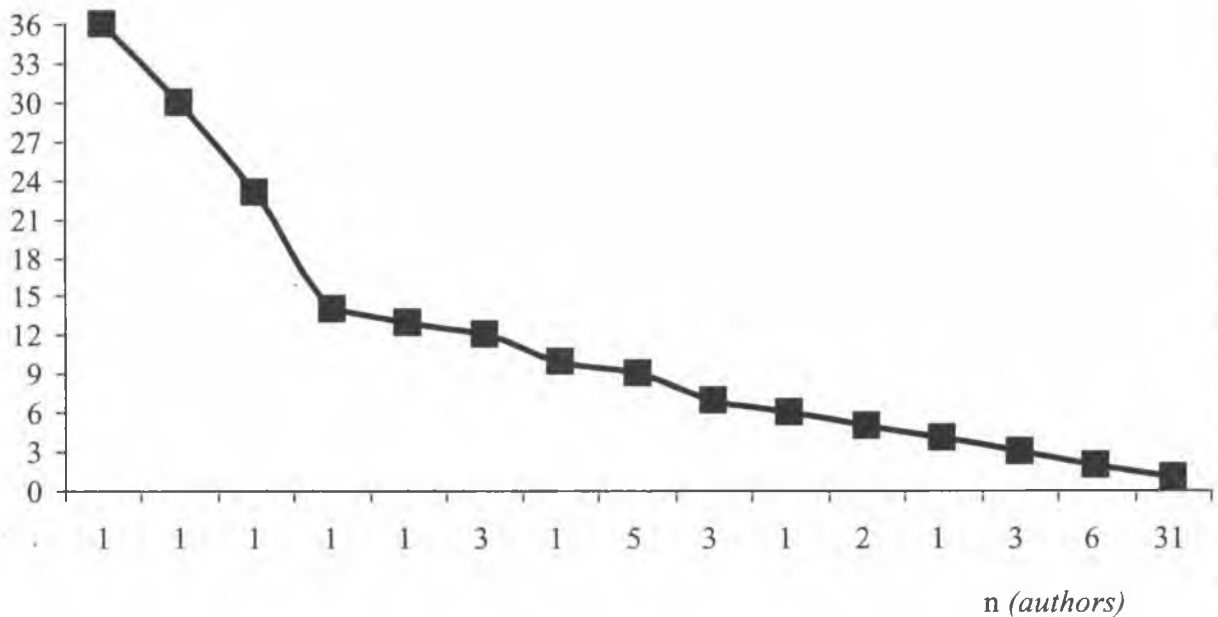


Fig. 2. Authors' distribution according to the number of their papers

According to the data from *MEDLINE*, a total of 61 Bulgarian authors participate in the scientific communications in this field during period. Their publication activity is different like in any scientometric distributions. Veselin D. Petkov and V. V. Petkov are the most productive Bulgarian

between 1986 and 2004 in foreign journals. Only in 2001-2004, 5 papers by international collectives were published in foreign journals. The distribution of the foreign countries according to the number of their journals containing papers on memory by Bulgarian authors is presented

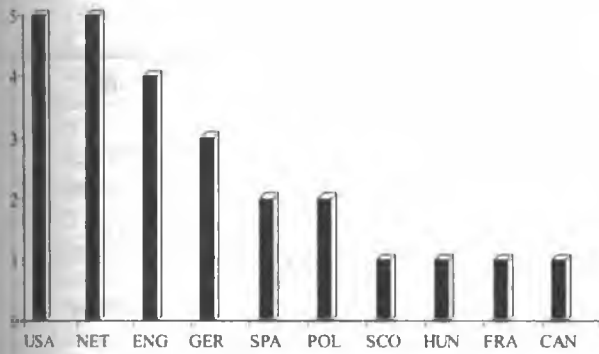


Fig. 3. Country distribution according to the number of journals

on Fig. 3 while that of these countries according to the number of the papers in these journals is shown on Fig. 4. *Acta Physiologica et Pharmacologica Bulgarica* (Bulgaria) contains 32 papers; *Methods and Findings in Experimental and Clinical Pharmacology* (Spain) - 15 papers and *European Neuropsychopharmacology* - 5 papers. A total of 50 papers were published in 22 mono-disciplinary journals from 11 countries; a total of 36 papers were published in 4 two-disciplinary journals from 4 countries, and 7 papers were published in 2 journals from two countries (Table 1).

In 11 journals containing the term of 'pharmacology' in their title a total of 65 papers by Bulgarian authors were published. Therefore, psychopharmacology dominates in the thematic belonging of the journals although most Bulgarians who have published these papers currently work in the Institute of Physiology of the Bulgarian Academy of Sciences.

Bulgaria participates with a total of 3 main institutions in the city of Sofia (Bulgarian Academy of Sciences, Medical University of Sofia and University of Forestry) and one - in the city of Plovdiv (Medical University of Plovdiv). A detailed characteristic of the institutionalization of Bulgarian memory research is summarized in Table 2. The successful creation and effective existence of highly specialized laboratories within the aforementioned Institute of Physiology indicates the substantial role of narrow-topic institutionalization of basic research. However, there is no institution in Bulgaria containing the term of 'memory' in its nomination yet. There are already a few 'memory' institutions in Germany, Finland, the UK, Denmark, France, Belgium, the USA and other countries (12,15,16).

There is convincing evidence of the gradual improvement of the international visibility of Bulgarian psychopharmacology in the recent decades. It is related with the accessibility of sufficiently prestigious foreign biomedical journals for 'hard science' manuscripts independently of the country of the authors, on the one hand, and with the obviously enhanced quality of research work of Bulgarian investigators performed in domestic and foreign research institutes and laboratories, on the other hand. However, much should be done to reach the scientific popularity at least of the colleagues from the other ex-socialist



Fig. 4. Country distribution according to the number of papers in their journals

Table 1. Journal distribution according to disciplinary profiles

Number of profiles	Profile	Journals	Countries	Papers
one	pharmacology	6	5	23
	neuroscience	5	4	10
	medicine (general)	2	2	4
	biochemistry	2	2	3
	phytotherapy	2	2	2
	other (5)	5	4	8
two	physiology and pharmacology	1	1	32
	neurology and biology	1	1	1
	psychology and pharmacology	1	1	2
	neurology and pharmacology	1	1	1
three	neurology, psychology and pharmacology	1	1	5
	pharmacology, biochemistry and psychology	1	1	2
one problem only	alcoholism	1	1	1
total		17	29	94

countries like Hungary, Poland and Czech Republic who are relatively more actively involved in memory research in the recent years.

Table 2. Institutionalization of Bulgarian memory research

City	Main Institution	Specialized Institution	Narrow Profile Institution	Thematic Profile
Sofia	Bulgarian Academy of Sciences	Institute of Physiology	Department of Experimental Pharmacology	Pharmacology
			Laboratory of CNS Pharmacology	Pharmacology
			Laboratory of Experimental Psychopharmacology	Psychopharmacology
			Department of Drug Toxicology	Pharmacology and Toxicology
	Brain Research Institute			Neuroscience
		Department of Neurotransmitter and Neuromodulator Mechanisms in the Brain	Neuroscience	
	Medical University	Medical Faculty	Department of Pharmacology and Toxicology	Pharmacology and Toxicology
			Department of Psychiatry	Psychiatry
			Clinic of Child Neurology	Neurology
		National Center of Hygiene, Medical Ecology and Nutrition	Hygiene and Ecology	
Institute of Pharmacology and Pharmacy		Pharmacology and Pharmacy		
University of Forestry	Faculty of Ecology	Department of Chemistry and Biochemistry	Chemistry and Biochemistry	
Plovdiv	Medical University	Medical Faculty	Department of Physiology	Physiology
			Department of Pharmacology and Toxicology	Pharmacology and Toxicology
			Department of Pharmacology	Pharmacology
Total	4	7	12	11

The rising socio-medical importance of memory disorders necessitates united efforts of the scientists from all over the world in order to solve these difficult interdisciplinary issues as successful as possible. Fortunately, Bulgaria strives to contribute in this aspect as much as possible, too.

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