

DANCE ROUND

WE DANCE ROUND IN A RING AND SUPPOSE, BUT
THE SECRET SITS IN THE MIDDLE AND KNOWS.

ROBERT FROST

CONTEMPORARY NEUROTROPHIC FACTOR RESEARCH: TOWARDS A MORE HUMAN PARADIGM

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The nerve growth factor (NGF) has been discovered by Rita Levi-Montalcini in the early 1950's (1,2). This paradigmatic cell growth factor has gradually attracted the attention of many investigators from all over the world. In the very beginning, experimental research prevailed taking into consideration the still rather fundamental approach to the possible role of NGF and the subsequently discovered other neurotrophic factors in the living organism. Later on, an increasingly stable orientation of the scientific community towards the human beings, including a more outlined clinical research policy, has been emerging.

Modern computerized scientometrics is capable of identifying not only the most essential communication patterns of the uninterrupted advancement of science in broader or narrower fields but also of demonstrating the role of different, relatively objective indicators and their constellations for the effective management of individual and collaborative research activity at local, regional, national and even international level (3-7).

In order to reveal the extent of humanization, maturity, and scientific critique in the field of "nerve growth factors", a comprehensive bibliometric study of the publication activity in *MEDLINE* on CD-ROM through EBSCO Publ. during the period from 1966 till 1999 has been carried out. A set of the following main parameters have been examined: number of publications; number of authors per paper, number of reviews and letters; language of articles; number of papers dealing separately with animals and humans, and in combination of both.

There is a dramatic increase of the number of publications in

the last two decades. It should be noted that the descriptor "nerve growth factor" (NGF) first occurred in *MESH of Index Medicus* (National Library of Medicine, Bethesda, MD, USA) in 1972. In 1980, however, this descriptor was replaced by "nerve growth factors". Meanwhile, the family of neurotrophins rapidly enlarged and included a series of definitive items such as brain-derived neurotrophic factor, neurotrophin-3 (NT-3), NT-4/ 5, NT-6, and NT-7. There are several factors exerting a neurotrophic effect such as ciliary-derived neurotrophic factor, glial cell line-derived neurotrophic factor, stem cell factor, hepa-tocyte growth factor, leukemia inhibitory factor, insulin-like growth factor, interleukin-3, -6, etc (see this volume of *Bio-medical Reviews*).

During the aforementioned period, a total of 9465 publications have been retrieved in *MEDLINE* on CD-ROM. There are a total of 9120 papers (96.35 % of the publications) published in English, 1092 reviews (11.53 %), and 57 letters to the editor (0.6 %). In 1966-1969, there are a total of 87 papers only. Interestingly, already in the next decade (1970-1979), the number of papers dramatically increases up to 659. This exponential growth tendency persists in the next decades: in 1980-1989, 1963 papers and in 1990-1999, 6756 papers have been published. Besides there is a stable augmentation of the relative share of the English language articles: from 82.76 % in 1966-1969 to 93.62 % in 1970-1979 and from 94.91 % in 1980-1989 to 97.22% in 1990-1999 ($p < 0.001$). The statistically significant rate of growth ($p < 0.01$) of the total number of publications on NGF and of those in English during the last decades is illustrated on Figure 1.

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The regular publishing of review articles characterizes the maturity of a given field. An accumulated theoretical and applied knowledge needs a proper concise interpretation reflecting the dynamics of the corresponding paradigm. The publishing of letters to the editor and/or comments proves the vitality of scientific critique within the interdisciplinary and mainly international community. No problem-oriented bibliometric analysis that emphasizes the significance of identifying the publication patterns of both review articles and letters has been reported yet. In our opinion, the investigations of these specific communication parameters could help the better understanding of the accelerated information flows taking place in promising research topics.

The dynamics of the number of review articles and letters is summarized in Figure 2, 3, respectively. Single scientists have authored most letters. Up to four authors have jointly published a total of 42 letters (73.7 %). Eight and nine authors have coauthored one letter each. Three letters are anonymous. Thus the authorship patterns are similar to those of the other types of scientific publication.

Indeed, authors' recent orientation towards human beings is obvious. A total of 2425 papers (25.62 %) represent a clinical research while in a total of 3965 ones (41.89 %) the clinical examinations are combined with animal experiments (Fig. 4). The percentage of papers dealing with humans only continuously raises as well (from 12.44 % in 1970-1979 to 19.87 % in 1980-1989 and to 28.74 % in 1990-1999). This humanistic trend reflects the true fundamental significance of the achievements in this interdisciplinary area, on the one hand, and the social needs for a more rapid and intensive clinical application of these intriguing and rather promising research results derived from experiments on animals, on the other hand. Humanization of contemporary scientific activity is a major concern of science policy (8,9). A humanistic approach is simply necessary to meet the requirements of thousands of patients in the whole world suffering from hardly manageable diseases when means and methods of traditional and conventional medicine are used only. It is noteworthy that large teams are already involved in both fundamental and clinical research providing a serious argumentation for the existing links between these dogmatically separated intrinsic features of the paradigm. The present volume of *Biomedical Reviews* convincingly illustrates the successful bridging between "purely" fundamental biomedical investigators and more practically oriented clinicians from the rising international community directly involved in this field.

Interdisciplinarity and Internationalization of both experimental and clinical neuroscience creates preconditions for involvement of research groups from small countries into the world family of enthusiasts who aim at helping the solution of the difficult tasks the nature offers to everyday practice (10-12).

According to our own concept of the unity of the interdisciplinarity, internationalization, and institutionalization of

modern science and university education (10), these serious challenges of contemporary scientometrics need a much more detailed analysis.

From a scientometric point of view, internationalization of research is characterized by some significant peculiarities such as: (i) effective collaboration between authors from different countries, (ii) publishing of: (a) monographs and textbooks by international authors' collectives and publishers, (b) manuscripts in foreign journals and congress proceedings, (c) book reviews by foreign authors in domestic and foreign journals, and (d) journals of international nature as indicated not only by their titles but also by the presence of foreign editors and editorial-board members, (Hi) organizing of international scientific meetings, (iv) translating of scientific texts into foreign languages, (v) disseminating of national and foreign scientific information through information centres' data-bases and other secondary sources, and (vi) realizing of interpersonal communications through telecommunication network systems such as *Internet*, teleconferences, etc.

Institutionalization of research includes the intrinsic features of historically established disciplinary organization of scientific and higher educational structures concordant with enhanced present requirements and already gained social recognition of the topic (10). Thus it is a component of the mature scientific discipline or subdiscipline. The acknowledged problem-oriented denominations of single institutions of different organizational type, the foundation of national and international societies, the regular publication of narrow-profile journals and the successful organization of scientific meetings creating a dynamic scientific paradigm are the other basic peculiarities typical of institutionalized research in a given field.

The interdisciplinary investigations are accomplished using main methodological instruments of two or even more disciplines either by authors' groups which members belong to different scientific disciplines or sciences, or by authors working in scientific institutions of primarily interdisciplinary nature (10). The results obtained are then published mainly in primary information sources of predominantly interdisciplinary nature, in multidisciplinary, or in miscellaneous sources, or they are presented in scientific meetings of such character. As a rule, the authors cite publications not only from their own interdisciplinary field, but also from other science topics. This specific research is performed by specialists capable of jointly making use of their own experience and knowledge in the same and in other disciplines in order to achieve an integrated knowledge as new scientific information about the object under study as a whole or about its components only. On the other hand, multidisciplinary research does not provide any integrated knowledge of the object of study while interdisciplinary one does.

With the present *Dance round* we could, hopefully, contribute to the further progress of this socially important area of modern basic and applied neuroscience.

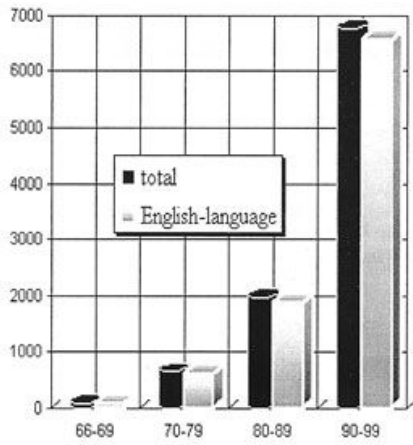


Figure 1. Dynamics of the publications on nerve growth factor.

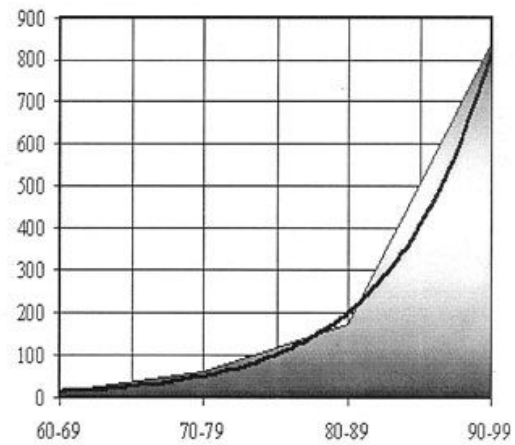


Figure 2. Dynamics of the number of review articles.

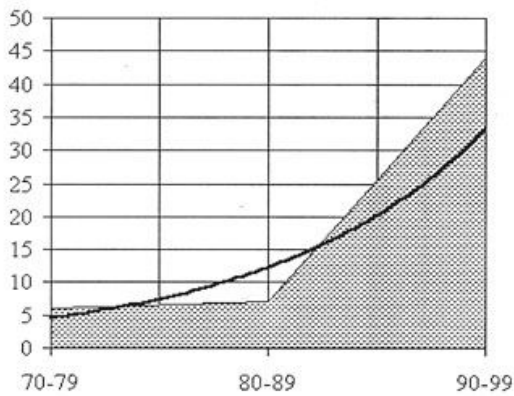


Figure 3. Dynamics of the number of letters.

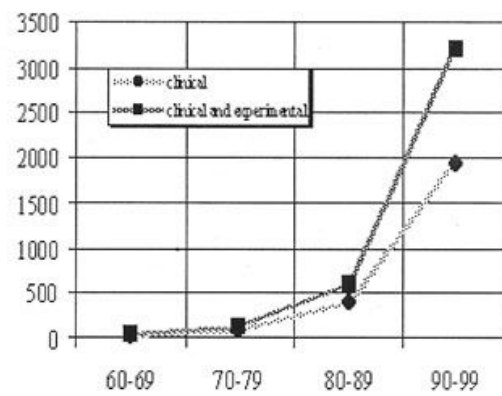


Figure 4. Publications in clinical and clinical and experimental nerve growth factor research.

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