Characteristics and growth pattens of chromosomes research: a bibliomeric analysis / Ester Rosner

Abstract:

Chromosome research is a relatively new research field which began developing in the early fifties. Prior to that, in what is termed “the dark age”, knowledge about human chromosomes was scant and even their exact number was unknown. In 1956 Tjio and Levan discovered the existence of 46 human chromosomes, marking the advent of modern cytogenetics.

Since then it has undergone a considerable development due to the accelerated technological advancement, which brought us to the current ‘molecular period’, culminating with the huge ‘Human Genome’ Project.

The chromosome research area affects many other fields and is influenced by them. It utilizes technology and information from other fields and its discoveries contribute to them.

Purpose of the Study

The objective of the present study was to assess the growth and development of chromosome research literature published and indexed in the Cumulated *Index Medicus* throughout the last 45 years, using bibliometric techniques.

Methodology

The study was based on the bibliographical data published in the Cumulated *Index Medicus* (published by the National Library of Medicine in the US) from which ten yearly samples were taken, from 1950 up to 1995, in five-year increments. In each target year all entries listed under the subject-heading of ‘Chromosomes’, or any of its subheadings, were included in that year sample, and their bibliographical information was electronically recorded and then processed and analyzed by the Excel program.

Findings and Discussion

1. The number of publications rose from 5 in 1950 to 5034 in 1995, with a steep increase occurring from 1985 on. The average growth rate for the last

30 years was 5.5% with a 'doubling time' of 13 years. The subfield displaying the fastest growth was "human chromosome research", which included about 16% of all publications in 1970, but 50% in 1990.

2. The number of journals publishing research in this area grew from two in 1950 to 525 in 1995. The mean number of papers per journal rose from a range of 1.1-2.8 for the period of 1950-1965 to a range of 4.5-9.6 for the later period of 1970-1995.

The number of 'core' journals (in which 50% of the papers, indexed by *Index Medicus* in the field, were published) was between 12 and 20 for the 1965-1995 period. Until 1965 the list of core journals was identical to that of the 'central' ones (defined as journals with at least 10 papers a year in this field) but from 1970 on, the former list became shorter while the latter one grew longer, since more and more journals publish papers in the field. At the same time there is a trend of specialization, which means that a growing number of papers are concentrated in several very specialized journals. These two seemingly contrasting trends in fact manifest two different facets of the field: intensive research, focusing on chromosomes, DNA, genetics, etc., on one hand, and numerous peripheral subject fields using the chromosomes knowledge for their purposes, on the other hand.

3. General well-known scientific journals as *Nature,* Science and *Lancet,* appearing in the core list during the first period up to 1975, were replaced by more specialized journals representing the three main newly-developed subfields: human genetics, cancer and chromosomes and molecular research.

4. Dividing the descending-order list of journals carrying publications in the field, for each of the ten target years, into Bradford Zones yields between 6 to 11 zones, with the mean of Bradford Multiplier ranging between 1.47 and 2.53.

5. Non-English publications first appear in the *Index Medicus* in 1955. The number of different non-English languages between 1965 and 1995 ranges between 18 to 20 in each target-year, totaling in 29 different languages. The most common ones were: Russian, French, German, Japanese and Italian.

The number of non-English publications rose steadily from 1955 on, reaching a peak of over 500 in 1970. From 1975 on, however, it drops to less than 1995. During the first phase of 1955-1975 their share was relativey high ranging in between 23% and 36% of all publications indexed by *index Medicus* in this field. From 1975, however, it has consistently plummeted, reaching merely 5% in 1995.

This considerable decline can be explained by one or more of the following reasons:

(1) Research in this field is increasingly concentrated in English-speaking countries, mainly the US.

(2) A growing awareness of the English language as the 'lingua franca' in the fields of medicine and biology. Consequently, scientists living in non-English countries prefer to publish their research in English-language journals, whether international or even local ones.

(3) Possible English-language bias in the indexing policy of the *Index Medicus.*

All three explanations seem plausible, but it is difficult to determine the precise bearing of each one.

Conclusions

All indicators point to a rapidly expanding field of research which has not yet reached its 'saturation point' and is almost totally dominated by the English language.