

# BIBLIOMETRIC ANALYSIS OF BIOPHYSICS LITERATURE OUTPUT IN SCOPUS DATABASE DURING 1970 to 2010

<sup>1</sup>C.Sivakumar, <sup>2</sup>M.Sudha

<sup>1</sup>Librarian, Bharathiar University arts and Science College, Modakkurichi, Erode, Tamilnadu, India

<sup>2</sup>Sengunthar College of Engineering, Trichengode, Tamilnadu, India

## ABSTRACT

This study is a bibliometric analysis of research output about biophysics. The data are collected from Scopus database from the period of 1970 to 2010. From the statistical analysis it is found that Brabec V has published 11 literatures among top twenty author contributions. In the year 2009 the number of publication was about 549, with percentage of 19.57. It is found that majority of authors were produced their publications in English language. 77 countries were involved in biophysics research among these USA stands first with 633 research publications.

**Keywords: Bibliometric, Authorship pattern, Bio Physics, Journals distribution**

## 1. INTRODUCTION

Biophysics an interdisciplinary subject it is a bridge between biology and physics. Biology studies life in its variety and complexity. It describes how organisms go about getting food, communicating, sensing the environment, and reproducing. On the other hand, physics looks for mathematical laws of nature and makes detailed predictions about the forces that drive idealized systems. Spanning the distance between the complexity of life and the simplicity of physical laws is the challenge of biophysics. Looking for the patterns in life and analyzing them with maths and physics is a powerful way to gain insights. Biophysics study has its life at every level, from atoms and molecules to cells, organisms, and environments. As innovations come out of physics and biology labs, biophysicists find new areas to explore where they can apply their expertise, create new tools, and learn new things. The work always aims to find out how biological systems work.

## 2. METHODOLOGY

The study is based on bibliographical publication data from the period 1970 to 2010, take out and download from the science citation index (web of science) of Thomson scientific by used followed keywords biophysics, bio, biological and physics, bio science.

## 3. DATA ANALYSIS

The number of papers published during the 1970 to 2010 is 2805. To analyze the literature and measure quality and quantity of literature by used bibliometrics methods are used.

## 4. OBJECTIVES

**This studies objective is**

- ❖ To study author wise major distributions of literature
- ❖ To study year wise distributions of literature
- ❖ To study journal wise distributions of literature

- ❖ To study language wise of distributions of literature
- ❖ To study institution wise distributions of literature
- ❖ To study country wise distributions of literature

#### 4.1 Author wise major distributions of literature

In this studies totally 7283 authors were contributed. Top twenty author's wise document distributions are shown in the Table 1 the topest author among a twenty was Brabec V with 11(0.38%) papers, Lakowicz JR stands second with 10(0.35%) and Chan V, Eisenberg H, Sackmann E stands third with 8(0.28%) papers. Remaining author has been published 7,6 (0.24%),(0.21%) papers respectively.

**Table 1. Author wise major distribution of literature during 1970 to 2010**

S.no	Author	Recs	%
1	Brabec V	11	0.38
2	Lakowicz JR	10	0.35
3	Chan V	8	0.28
4	Eisenberg H	8	0.28
5	Sackmann E	8	0.28
6	Kasparkova J	7	0.24
7	Kim S	7	0.24
8	Kumar S	7	0.24
9	Lang MJ	7	0.24
10	Nattel S	7	0.24
11	Tien HT	7	0.24
12	Arnebrant T	6	0.21
13	Bischof JC	6	0.21
14	Ferrer JM	6	0.21
15	Green PB	6	0.21
16	Harrison DD	6	0.21
17	Ivanitskii GR	6	0.21
18	Koch AL	6	0.21
19	Lee SY	6	0.21
20	Lober G	6	0.21

#### 4.2 Year wise distribution of literature

Table 2 clearly shows the article output performance. Totally 2805 articles were collected from scopus database. In this study period in the year 2009, 19.57 % articles were produced. It is the highest percentage of in this whole study period. Initially there were 0.24 % of articles, from the table it is clearly seen that year after year there was gradual increase and decrease of articles publications which seems that publications was not regular during this period of study.

**Table 2. Year wise distribution of literature**

S.no	Publication Year	Recs.	%
1	1970	7	0.24
2	1971	14	0.50
3	1972	13	0.46
4	1973	11	0.39

5	1974	12	0.42
6	1975	16	0.57
7	1976	14	0.50
8	1977	19	0.67
9	1978	22	0.78
10	1979	10	0.35
11	1980	19	0.67
12	1981	12	0.42
13	1982	22	0.78
14	1983	22	0.78
15	1984	21	0.74
16	1985	22	0.78
17	1986	17	0.60
18	1987	21	0.74
19	1988	17	0.60
20	1989	8	0.28
21	1990	30	1.06
22	1991	54	1.92
23	1992	41	1.46
24	1993	53	1.88
25	1994	43	1.53
26	1995	54	1.92
27	1996	63	2.24
28	1997	78	2.78
29	1998	67	2.38
30	1999	80	2.85
31	2000	79	2.81
32	2001	102	3.63
33	2002	109	3.88
34	2003	115	4.09
35	2004	117	4.17
36	2005	140	5.00
37	2006	160	5.70
38	2007	133	4.74
39	2008	25	0.89
40	2009	549	19.57
41	2010	394	13.85

### 4.3 Journal wise distribution of literature

Table 3 shows that the 20 most productive journals. In this Journal of Chemical Physics is top productive journal. It has been published 176 (6.27%) papers about the biophysics. Followed by Physical Review E with 144 (5.13%) is the second highest productive journal and applied physics letters is 93 (3.31%) respectively.

**Table 3. Journal wise distribution of literature**

S.no	Journals	Recs	%	TL CS	TG CS
1	JOURNAL OF CHEMICAL PHYSICS	176	6.27	0	528
2	PHYSICAL REVIEW E	144	5.13	1	460
3	APPLIED PHYSICS LETTERS	93	3.31	0	191
4	BIOPHYSICAL JOURNAL	72	2.56	21	1234

5	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA	47	1.67	21	2461
6	EUROPEAN BIOPHYSICS JOURNAL WITH BIOPHYSICS LETTERS	46	1.63	5	261
7	NATURE	45	1.60	4	1252
8	JOURNAL OF APPLIED PHYSICS	41	1.46	0	87
9	STUDIA BIOPHYSICA	35	1.24	1	8
10	BIOFIZIKA	30	1.06	1	42
11	EUROPHYSICS LETTERS	30	1.06	9	918
12	BIOMICROFLUIDICS	28	0.99	0	45
13	BIOINTERPHASES	26	0.92	0	92
14	CHEMPHYSICHEM	25	0.89	8	537
15	REVIEW OF SCIENTIFIC INSTRUMENTS	20	0.71	3	441
16	SCIENCE	19	0.67	19	1092
17	ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY	17	0.60	0	1
18	BIOCHIMICA ET BIOPHYSICA ACTA-BIOMEMBRANES	17	0.60	11	383
19	JOURNAL OF BIOMECHANICAL ENGINEERING-TRANSACTIONS OF THE ASME	17	0.60	0	36
20	ACTA BIOCHIMICA ET BIOPHYSICA HUNGARICA	16	0.57	0	7

**Table 4. Language wise distribution of literature**

S.no	Languages	Recs	TLCS	TGCS
1	English	2660	554	43646
2	Russian	66	3	69
3	German	24	8	125
4	French	21	1	34
5	Spanish	10	1	6
6	Czech	7	0	0
7	Chinese	4	0	2
8	Portuguese	3	0	0
9	Japanese	2	0	0
10	Polish	2	0	0
11	Dutch	1	0	0
12	Italian	1	0	0
13	Lithuanian	1	0	0
14	Rumanian	1	0	0
15	Swedish	1	0	0
16	Turkish	1	0	0

#### 4.4 language wise of distribution of literature

Language wise distribution documents were shown in Table 4 reveals that the more number of papers about 2660 were published in English language, which that implies that many of the authors were interested to publish their research works in the common language.

#### 4.5 Institution wise distribution of literature

A table 5 shows many of the institutions were interested in doing research in biophysics since bio physics is concern with environment. Among these institutions the Harvard University has been published 34 literatures and Stanford university 29 literature during the study period. Other institutions were also produced their literature much closer to these institutions.

**Table 5. Institution wise distribution of literature**

S.no	Institution	Recs	TLCS	TGCS
1	Unknown	209	19	441
2	Harvard Univ	34	8	1282
3	Stanford Univ	29	28	1543
4	Univ Calif San Diego	27	12	1662
5	Russian Acad Sci	25	4	307
6	Univ Penn	25	2	402
7	Univ Illinois	23	9	641
8	Univ Oxford	22	5	721
9	Li	22	0	37
10	Lee	21	0	28
11	Boston Univ	20	5	1023
12	Johns Hopkins Univ	20	3	273
13	MIT	19	15	1314
14	Univ Calif Berkeley	19	5	284
15	Yale Univ	19	4	526
16	Kim	19	0	39
17	Univ Maryland	18	6	1006
18	Wang	18	0	18
19	Univ Minnesota	17	5	678
20	Univ Texas	17	3	471
21	Chen	17	0	25

#### 4.6 Country wise distribution of literature

Table 6 shows the country wise literature distribution, there were about 77 countries were involved in the research of biophysics field. USA produces 633 literature with 22.7% which clearly shows more number of literature were produced in the field. Germany produces 262 literatures with a percentage of 9.34, followed by UK produces 215 literature with the percentage of 7.66.

**Table 6. Country wise distribution of literature**

S.no	Country	Recs.	%	TLCS	TGCS
1	USA	633	22.57	309	27027
2	Germany	262	9.34	62	5309
3	UK	215	7.66	57	4801
4	Unknown	209	7.45	19	441
5	France	145	5.17	21	2574
6	Italy	115	4.10	23	1281
7	Japan	108	3.85	18	1326
8	Canada	102	3.64	11	2193
9	Russia	95	3.39	7	704
10	Peoples R China	74	2.64	5	242
11	Switzerland	63	2.25	9	1369
12	Australia	58	2.07	14	1190
13	Spain	52	1.85	7	763
14	Israel	51	1.82	20	1700

15	Netherlands	51	1.82	13	763
16	Sweden	43	1.53	12	931
17	India	40	1.43	2	117
18	South Korea	36	1.28	5	124
19	Brazil	32	1.14	3	231
20	Belgium	31	1.11	11	744
21	Denmark	30	1.07	24	334
22	Czech Republic	27	0.96	10	406
23	Singapore	27	0.96	4	110
24	Poland	24	0.86	0	50
25	Taiwan	20	0.71	0	58
26	Hungary	19	0.68	2	113
27	FRG	16	0.57	1	137
28	Argentina	14	0.50	1	75
29	Austria	14	0.50	1	153
30	Ukraine	14	0.50	1	270
31	Portugal	13	0.46	3	235
32	USSR	13	0.46	1	78
33	Mexico	12	0.43	0	156
34	Romania	12	0.43	2	17
35	Turkey	12	0.43	2	273
36	Greece	10	0.36	1	162
37	New Zealand	10	0.36	1	133
38	Slovakia	10	0.36	3	198
39	Finland	9	0.32	2	126
40	GDR	8	0.29	0	5
41	Bulgaria	6	0.21	2	41
42	Czechoslovakia	6	0.21	0	3
43	Iran	5	0.18	0	3
44	Slovenia	5	0.18	0	114
45	Colombia	4	0.14	0	40
46	Norway	4	0.14	0	26
47	Yugoslavia	4	0.14	0	10
48	Ireland	3	0.11	0	6
49	Byelarus	2	0.07	0	129
50	Croatia	2	0.07	0	1
51	Cuba	2	0.07	1	40
52	Kenya	2	0.07	0	19
53	Lebanon	2	0.07	0	8
54	Lithuania	2	0.07	0	0
55	Rep of Georgia	2	0.07	0	0
56	Serbia Monteneg	2	0.07	0	0
57	Thailand	2	0.07	2	7

58	Venezuela	2	0.07	0	11
59	Cameroon	1	0.04	0	0
60	Chile	1	0.04	0	34
61	Egypt	1	0.04	0	0
62	Estonia	1	0.04	0	1
63	Guadeloupe	1	0.04	0	5
64	Hong Kong	1	0.04	0	12
65	Iraq	1	0.04	0	1
66	Jordan	1	0.04	0	0
67	Kazakhstan	1	0.04	0	4
68	Latvia	1	0.04	0	38
69	Malagasy Republ	1	0.04	2	22
70	Malaysia	1	0.04	0	0
71	Morocco	1	0.04	0	0
72	Pakistan	1	0.04	0	0
73	Reunion	1	0.04	0	1
74	Senegal	1	0.04	0	8
75	Serbia	1	0.04	0	4
76	Tunisia	1	0.04	0	6
77	Uruguay	1	0.04	0	0

## Conclusion

From the reports this study conclude that USA was topest country which has 633 literatures. Among the top twenty authors Brabec V has been published 11 literatures with the 0.38 percentage. It is obviously acknowledged the biophysics research growth have been increased during the study period. In the year 2009, 19.57 % of literature were produced it is highest in study period. Maximum of authors has published their reviews in the English language. The Harvard University has published 34 literatures with first rank among top twenty intuitions.

## References

1. Abbasi, F. and Biglu, M. H., Scientometrics study of scientific productions of Iranian medical sciences Universities in web of science during 1999-2008. *Information Sciences and Technology*, 26(2), 355-371, 2011.
2. Arunachalam, S. & Garg, K. C., Science on the periphery - A Scientometric analysis of science in the Asian countries. *Journal of Information Science*, 12(3), 105-117, 1986.
3. Arunachalam, Subbiah and Garg and Kailash C., Science on the periphery - a scientometric analysis of science in the Asian countries. *Journal of Information Science*, 12(3), 105-117, 1986.
4. Arunachalam, Subbiah, Singh and Udai N., Sophisticated science in a small country: a scientometric analysis of superconductivity research in Israel. *Journal of Information Science*, 10(4), 165-171,1985.
5. Bharvi, D., Garg, K. C., and Bali, A., Scientometrics of the international journal scientometrics, *Scientometrics*, 56(1), 81-93. 2003.
6. Bjurström, Andreas and Polk, Merritt., Physical and economic bias in climate change research: A

- scientometric study of IPCC Third Assessment Report, *Climatic Change*, 108(1), 1-22, 2011.
7. Builova, N.M. and Osipov, A.I., Scientometric Analysis of Papers Submitted to the Second International Nanotechnology Forum (Moscow, 2009). *Scientific and Technical Information Processing*, 37(2), 94-101, 2010.
  8. Builova, N.M. and Osipov, A.I., Scientometric analysis of papers submitted to the third international nanotechnology forum (Moscow, 2010). *Scientific and Technical Information Processing*, 38(1), 49-54. 2011.
  9. Cahlik, T. and Jioina, M., Scientometric analysis of artificial neural networks scientific field. *Neural Network World*, 6(5), 847-860, 1996.
  10. Chen, C. [et al.], Mapping Scientometrics 1981-2001, *Proceedings of the ASIST Annual Meeting*, 39, 25-34, 2002.
  11. Cheng, Y., and Liu, N. C., A first approach to the classification of the top 500 world universities by their disciplinary characteristics using scientometrics. *Scientometric*, 68(1), 135-150, 2006.

