International Journal of Information Movement Vol.2 Issue VIII (December 2017)
Website: www.ijim.in ISSN: 2456-0553 (online) Pages 75-81

A SCIENTOMETRIC SKETCH OF THE JOURNAL PLOS GENETICS

Asha Peter
Research Scholar
Department of Library & Information Science
University of Kerala
Thiruvananthapuram-695034
E-mail: ashapeter555@gmail.com

Dr. B. Mini Devi
Assistant Professor & Head
Department of Library & Information Science
University of Kerala
Thiruvananthapuram-695034
E-mail: minidevi_b@yahoo.co.in

Abstract: The present study analyses the productivity of the journal 'PLOS Genetics' the period 2005-2016. The data were sourced from Web of Science database to understand the leading authors, leading affiliated institutions, applicability of Lotka's law etc. A total of 6292 papers were refined as research output. Multiple authorship patterns (97.06%) dominated over single authorship. Lotka's inverse square law of scientific productivity is not fitted during the particular period. Albert Hofman, is the most prolific author from Erasmus MC, Dept. of Epidemiol, Rotterdam, Netherlands with 59 papers.

Keywords: Scientometric analysis, Scientific Productivity, Genetics, Agriculture, PLOS Genetics, Journal productivity.

1.0 Introduction: Scholarly journals play a vital role in the distribution of research outputs. They are considered as primary sources. The research output on agriculture has been dispersed by a number of scholarly journals. ***PLOS Genetics*** is one among them, (formerly known as ***PLoS Genetics.*** It's an open access peer-reviewed academic journal published monthly by **PLOS** (for **Public Library of Science**) based in San Francisco, California. PLOS is a nonprofit open access scientific publishing project aimed at creating a library of open access journals and other scientific literature under an open content license. In 2003 PLOS launched its first journal, PLOS Biology. The main source of income for publications is payments from the authors (Journals.plos.org, 2017). The area of PLOS Genetics for publication includes human studies, research papers on organisms which provide significant insight into a biological process or processes. Topics include are gene discovery and function, population genetics, genome projects, comparative and functional genomics, medical genetics, disease biology, evolution, gene expression, complex traits, chromosome biology, and epigenetics **(**Journals.plos.org, 2017).

In 2005, Wayne N. Frankel started the journal ***PLOS Genetics*** with the endeavor to reflect the full span and interdisciplinary nature of genetics and genomics research by publishing original contributions in all areas of biology. Now tha journal is published by the international editorial board led by the Editors-in-Chief Gregory S. Barsh (Hudson Alpha, and Stanford University School of Medicine) and Gregory P. Copenhaver (University of North Carolina at Chapel Hill) under the Creative Commons Attribution (CC BY) license. In 2016 the journal has 6.100 impact factor **(**Journals.plos.org, 2017). But now as with all PLOS journals, *PLOS Genetics* uses article-level metrics (ALMs) to measure the impact of articles based on their individual merits rather than using the journal impact factor.

2.0 Objectives of the Study

1. To determine the authorship pattern of publications.
2. To identify the most prolific authors.
3. To examine the applicability of Lotka's law.
4. To find out the year wise productivity of publications.
5. To identify affiliated institutions.

3.0 Methodology

Scientometrics is the quantitative technique used to analyze scientific literature or research literature, based upon citations and other parameters, and this method can be used to evaluate the impact on the academic community of a research paper, an individual researcher, a research group or institution, or a journal. In this study the journal ***PLOS Genetics*** has analyzed by using scientometric parameters to find out the year-wise productivity, applicability of Lotka's law, leading authors, leading affiliated institutions etc. Data retrieved for the study from Thomson Reutor's Web of Science database core collections during 2005-2016. The keyword 'SO=plos genetics' is used to retrieve data.

4.0 Review of Literature

Dwivedi (2017) analyzed global research productivity on dengue fever during 1989-2015 by using a three dimensional approach. Vietnam was the highest impact (quality) country whereas India held the last position. University of Texas medical branch Galveston had the highest consistency 0.33, whereas University of Massachusetts system had the lowest consistency 0.03. Subramanyan, Krishnamurthy & Asundi (2017) analyzed the coverage, services and gaps in the database IndMed. Journals were indexed on 110 subjects and subject-wise coverage revealed that most of the documents were in General Medicine (8) followed by Surgery and ENT (5), then clinical science (4) and Dentistry (4). Ramesh, Raju & Rao (2016) carried out a bibliometric analysis on *Indian Journal of Plant Physiology* during 2006-2015. 2008 is the most productive year and 2012 is the least one. Full length communication is high during 2014 and low during 2010. Tsafe, Basaka & Mohammed (2016) evaluated the scholarly publications of University libraries in Nigeria during the period 2000-2012. The total publication output by the librarians was 373 and 56.9% of them had bring out at least one article.

Barik & Jena (2013) carried out an analysis to find out the productivity of the journal '*Journal of Knowledge Management and Practice*'. A total number of 21 issues including 180 articles were published during the period 2008-2012. The average number of publication per year is 36 articles. The journal is enriched with articles from 38 countries. USA (34) is the most productive country, followed by Malaysia (29) and India (24). Average number of citations per articles is 19. Bartol (2010) analyzed the characteristics of documents published in national journals and other publications in the countries which participate on the editorial board of an international journal JCEA. In total more than 89 agriculture-related documents were identified in the period 2000-2008 with journal articles predominating, followed by proceedings (conference papers).

5.0 Data Analysis and Interpretations

5.1 Authorship Pattern

During the study period 12 years, a total of 6292 papers were retrieved as journal output. Most of the articles appeared under joint authorship. Among that 566 papers (9.00%) were written by two authors, next position (9.33%) holds by three authors. 9.81% of the papers were written by four authors whereas only 2.94% is the contribution of single authors. The contributions by more than four authors were 59.77 % (table 1). The authorship pattern analysis reveals that lion's share of articles (97.06%) is multi authored.

Table 1- AUTHORSHIP PATTERN OF PAPERS

Sr. No.	No. of Authors	No. of Papers	%age
1	Single	185	2.94
2	Two authored	566	9.00
3	Three authored	587	9.33
4	Four authored	617	9.81
5	More than four authored	3761	59.77

5.2 Most Prolific Authors

The Author wise productivity of contributions based on the web of Science database is enlisted in table 2 & figure 1. The most productive author is Albert Hofman, from Erasmus MC, Dept. of Epidemiol, Rotterdam, Netherlands with 59 papers. Next position occupied by Jane Gitschier from University of California, San Francisco, USA with 43 papers. Tim D. Spector from Kings Coll London, Dept. of Twin Research & Genetics Epidemiol, London and Andre GUitterlinden from Erasmus MC, Dept. of Internal Medicine, Rotterdam, Netherlands have occupied third position

by publishing 39 research papers each. Fifth position reached by Fernando Rivadeneira from Netherlands Consortium Health Ageing, Rotterdam, Netherlands with 34 publications.

Table 2- Author-wise Distribution of Publications

Name of Author & Institution	Country	Rank No.	TP	TC	Self-Citations	ACPP	h-index
Albert Hofman, Erasmus MC, Dept. of Epidemiol	Netherlands	1	59	2587	10	68.08	29
Jane Gitschier, University of California, San Francisco	USA	2	43	38	0	0.88	3
Tim D. Spector, Dept. of Twin Research & Genetics Epidemiol	England	3	39	3284	20	84.15	29
Andre G. Uitterlinden, Erasmus MC, Dept. of Internal Medicine	Netherlands	4	39	2773	10	74.95	29
Fernando Rivadeneira, Netherlands Consortium Health Ageing	Netherlands	5	34	2414	10	73.15	28
Mark I McCarthy, Wellcome Trust Centre Human Genetics, University of Oxford	England	6	32	2948	17	95.10	25
Eric Boerwinkle, University of Texas Health Science Ctre, Human Genetics	USA	7	28	1406	4	54.08	19
Carlos D. Bustamante, Dept. of Genetics, Stanford University	USA	8	28	3094	14	114.59	22
Tamara B Harris, NIA, Laboratory of Epidemiol Demog & Biometry	USA	9	27	1967	14	78.68	24
Panos Deloukas, Wellcome Trust Sanger Institute, Hinxton	England	10	26	3174	15	122.08	23
Veikko Salomaa, National Institute of Health & Welfare, Helsinki	Finland	11	26	1807	12	72.28	18
Christian Gieger, Inst. of Genetics Epidemiol, German Research Centre	Germany	12	25	2000	12	83.33	17
Luigi Ferrucci, NIA, Longitudinal Studies Clinical Research Branch	USA	13	24	2366	17	98.58	22
Kari Stefansson, University of Iceland, Reykjavik	Iceland	14	24	1625	5	70.65	18
Cornelia M. Van Duijn, Erasmus MC, Dept. of Epidemiol, Rotterdam.	Netherlands	15	24	1602	6	69.65	19
Erich H. Wichmann Helmholtz Zentrum Munchen, Inst. Epidemiol, Neuherberg.	Germany	16	24	2836	10	118.17	22
Emmanouil T. Dermitzakis University of Geneva, School of Medicine, Geneva.	Switzerland	17	22	2591	21	117.77	21
Brian E. Henderson University of South California, School of Medicine, Los Angeles	USA	18	22	1349	11	61.32	19
Joel N. Hirschhorn Childrens Hospital, Division of Genetics & Endocrinology, Boston	USA	19	22	2177	10	108.85	18
Terho Lehtimaki University of Tampere, School of Medicine, Tampere	Finland	20	22	1087	8	51.76	17

TP=Total Papers TC= Total Citations ACPP= Average Citations per Paper

Out of the twenty most prolific authors, seven authors are from USA. The most prolific authors such as Albert Hofman, Tim D. Spector and Andre G. Uitterlinden received 29 as h-index value whereas Jane Gitschier received 3 as h-index value even though of having 43 publications. Fernando Rivadeneira, Mark I McCarthy and Tamara B Harris have received 28, 25 and 24 as h-index values. Most cited authors are Tim D. Spector (3284), Panos Deloukas (3174) and Carlos D. Bustamante (3094). And also Panos Deloukas received the highest average citations per year i.e., 112.08. Emmanouil T. Dermitzakis from University of Geneva, Switzerland has cited his own publications 21 times.

6.0 Application of Lotka's Law

Alfred J. Lotka (1926) proposed an inverse square law relating to scientific papers. It is the one among the classic laws of bibliometrics. The generalized form of Lotka's law is:

$$x^n y = k, \quad (1)$$

where y is the frequency of authors making n contributions each and k is a constant.

In the journal PLOS Genetics the scientific productivity during the period 2005-2016 is analyzed in order to find out the fitness of Lotka's law. The observed value of authors with one publication is 29623 (50.82%), authors with two publications is 5752 (9.87%), authors with three publications is 1888 (3.24%), authors with four publications is 923 (1.58%), authors with five publications is 436 (0.75%), authors with six publications is 263 (0.45%) and authors with seven publications is 171 (0.29%). On the basis of Lotka's law the expected value of authors will be like: authors with one publication is 29623 (50.82%), authors with two publications is 7406 (12.70%), authors with three publications is 3291 (5.65%), authors with four publications is 1851 (3.18%), authors with five publications is 1185 (2.03%), authors with six publications is 823 (1.41%) and authors with seven publications is 605 (1.04%) (Table 3 & figure 2). From the analysis it is evident that the observed value and expected value are not equal. Hence the literature output of PLOS Genetics is not fitted to the Lotka's law.

Table 3- Application of Lotka's Law in Genetics Literature

No. of Contributions	Observed Value		Expected Value	
	No. of authors	%	No. of authors	%
1	29623	50.82	29623	50.82
2	5752	9.87	7406	12.7
3	1888	3.24	3291	5.65
4	923	1.58	1851	3.18
5	436	0.75	1185	2.03
6	263	0.45	823	1.41
7	171	0.29	605	1.04

7.0 Year-wise Distribution

Year-wise analysis of literature published from 2005 to 2016 (table 4), shows that majority of the publications i.e., 873 are backpacked in the year 2013 and the succeeding productivity level i.e., 844 attained during 2014. The years 2015, 2012, 2016 and 2011 have produced an output of 791, 720, 686 and 565 respectively. The average number of articles per year is 524.33. The chronological wise analysis of average citation per paper shows decreasing growth, 2005 received the highest number of average citations per year i.e., 106.95.

Subramanyam's formula is used to determine the degree of collaboration. It is the ratio of the number of collaborative research papers to the total number of research papers in the discipline during a certain period of time (Subramanyam, 1983).

$$C = \frac{Nm}{Nm+Ns} \quad (2)$$

Where C = degree of collaboration in a discipline, Nm = number of multi-authored research papers in the discipline and Ns = number of single authored research papers in the discipline. Thus degree of collaboration in authorship pattern of the journal is 0.97. This clearly points out the dominance of multiple authorship patterns over single authorship.

Table 4- Year-Wise Distribution

Publication Years	TP	%	Cumulative %	Rank No.	DC	ACPP	H-index
2013	873	13.88	13.88	1	0.98	28.19	63
2014	844	13.41	27.29	2	0.95	18.76	50
2015	791	12.57	39.86	3	0.97	10.68	31
2012	720	11.44	51.3	4	0.98	36.53	72
2016	686	10.9	62.2	5	0.97	4.35	16
2011	565	8.98	71.18	6	0.98	50.96	85
2010	473	7.52	78.7	7	0.97	55.61	83
2009	473	7.52	86.22	8	0.95	71.53	95
2008	354	5.63	91.85	9	0.97	72.6	86
2007	229	3.64	95.49	10	0.97	88.01	81
2006	207	3.29	98.78	11	0.98	89.92	78
2005	77	1.22	100	12	0.97	106.95	51
2005-2016	6292	100			0.97	38.17	177

TP=Total Papers DC= Degree of collaboration ACPP= Average Citations per Paper

7.1 Institution-Wise Distribution

Table 5- Institution Wise Distribution

Affiliated Institutes	Country	Rank no.	TP	%	Affiliated Institutes	Country	Rank no.	TP	%
University of California System	USA	1	932	14.81	Va Boston Healthcare System	USA	11	189	3.03
Harvard University	USA	2	486	7.72	University of Oxford	England	12	188	2.99
Centre National De La Recherché Scientifique	France	3	388	6.17	Inserm	France	13	179	2.84
University of Washington	USA	4	378	6	Broad Institute	USA	14	170	2.7
National Institutes of Health, NIH	USA	5	330	5.24	University of Cambridge	England	15	168	2.67
Howard Hughes Medical Institute	USA	6	314	4.99	University of North Carolina	USA	16	164	2.61
Stanford University	USA	7	239	3.8	Cornell University	USA	17	157	2.49
Massachusetts Institute of Technology, MIT	USA	8	235	3.73	Chinese Academy of Sciences	China	18	152	2.42
Max Planck Society	Germany	9	212	3.37	University of Chicago	USA	19	142	2.26
University of London	England	10	204	3.24	University of Toronto	Canada	20	142	2.26

The institution wise analysis of the journal output reveals that University of California from USA is the most productive among other institutes with 932 publications, second most productive institute is also from USA, Harvard University with 486 publications, followed Centre National De La Recherche Scientifique CNRS, France with 388

publications, University of Washington, USA with 378 publications and National Institute of Health, USA with 330 publications (Table 5). Out of the twenty most productive universities twelve of them belonged to USA.

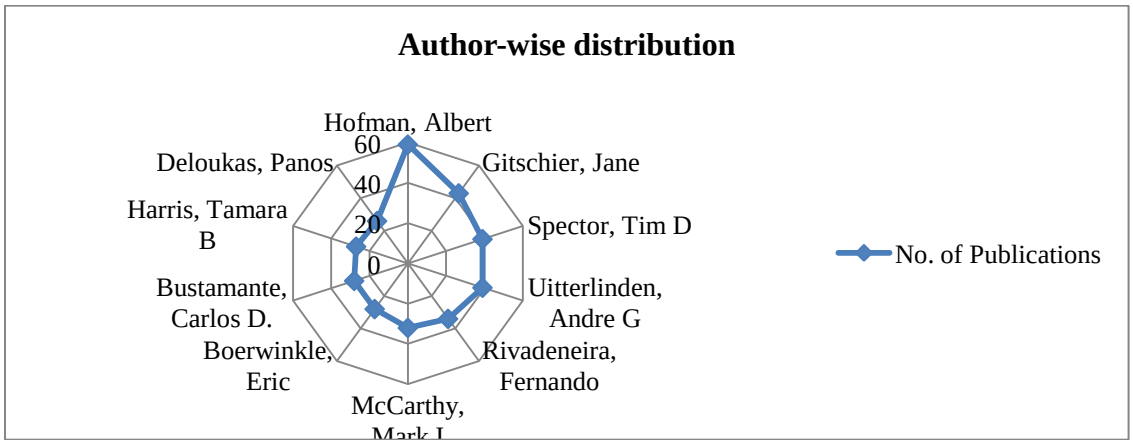

Fig.1 A Graph Showing Author-Wise Distribution of PLOS Genetics

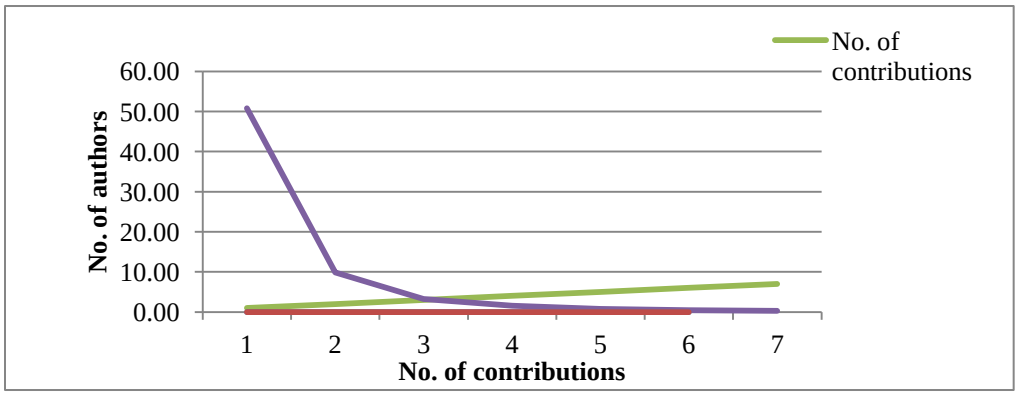

Fig.2 A graph showing application of Lotka's law in PLOS Genetics

8.0 Findings and Conclusion

The scientometric analysis of the journal PLOS Genetics reveals that lion's share of articles appeared under multiple authorship (97.06%). Single authored contribution is very few. Albert Hofman from Netherland is the most productive author, followed by Jane Gitschier from USA. Inverse square law of Lotkas is not fitted to the literature in PLOS Genetics. 2013 is the most productive year and University of California is the most productive affiliated institution. The major chunk of literature is imparted from institutions of United States of America i.e., majority of research works on genetics and allied subjects were take part in the research institutions of USA. The journal has been playing an important role in this scientific community as the disseminator of research outputs.

9.0 Acknowledgement

University Grants Commission (UGC), New Delhi, India is gratefully acknowledged for the financial assistance.

10.0 References

1. Barik, N. & Jena P. (2013). Bibliometric Analysis of Journal of Knowledge Management Practice, 2008-2012. *Library Philosophy and Practice (e-journal).* Paper 1020. http://digitalcommons.unl.edu/libphilprac/1020
2. Bartol, T. (2010). Indicators in agriculture in the JCEA member countries. *Journal of Central European Agriculture, 11*(1), 1-10.

3. Dwivedi, S. (2017). Dengue research: three dimensional Bibliometric study of the global research output during 1989-2015. *DESIDOC Journal of Library & Information Technology*, *37*(3), 180-185.
4. Frankel WN (2005). Introducing PLOS Genetics. *PLOS Genet 1*(1): e21. doi:10.1371/journal.pgen.0010021.
5. Journals.plos.org. (2017). *PLOS Genetics: A Peer-Reviewed Open-Access Journal*. [online] Available at: http://journals.plos.org/plosgenetics
6. Lotka, A. J. (1926). The frequency distribution of scientific productivity. *Journal of Washington Academy of Sciences*, *16*, 317-323.
7. Ramesh, L. S. R. C. V., Raju, A. V. S. S. N & Rao, D. M. (2016). Indian Journal of Plant Physiology from 2006-2015: a bibliometric study. *Indian Journal of Library, Information &Society*, *29*(3-4)333-338.
8. Subramanyan, N., Krishnamurthy, M., & Asundi, A. Y. (2017). IndMed: an evaluative study on the coverage of Indian Medical literature. *SRELS Journal ofInformation Management*, *54*(1), 31-36.
9. Subramanyan, K. (1983). Bibliometric studies of research collaboration: a review. *Journal of Information Science, 6* (1), 33-38.
10. Tsafe, G. A., Basaka, B. A. A. N., & Mohammed, C. U. (2016). Scholarly Publications of Librarians in Universities in Nigeria: 2000 2012 - a bibliometric analysis. *Library Philosophy and Practice (e-journal).* from http://digitalcommons.unl.edu/libphilprac/1394