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Indian Contribution in Animal Behaviour Research: A Scientometric Study

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Indian Contribution in Animal Behaviour Research: A Scientometric Study

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Abstract

The study analysed the characteristics of articles published by the Indian Scientists in the field of Animal Behaviour, a total 10030 Publications retrieved from the Scopus online database were analysed. There were as many as 120 countries actively engaged research with Indian researchers, which produced 10,030 publications during the study period. The most productive and the highest number of Collaboration with the United States of America (844), followed by Next the UK with 253, Germany (184), Australia (114), Japan (111) and Saudi Arabia (107). Among these institutions, Panjab University, Punjab topped in the list with 431 publications (57 H-Index) followed by Indian Institute of Science, Bengaluru, Bangalore with 349 (34 H-index) publications and University Institute of Pharmaceutical Sciences India with 332 publications (H-Index-23) and Banaras Hindu University with 304 Publications(38 H-Index). The most preferred journals were: Indian Journal of Experimental Biology topped in the list with 301(Cite Score-3.0, SJR-0.227 and SNIP-0.512) articles followed by PLOS ONE with 180(Cite Score-5.2, SJR-1.023 and SNIP-1.205) articles, Indian Journal Of Physiology And Pharmacology with 151 articles, European Journal Of Pharmacology 116(Cite Score-5.5, SJR-0.988 and SNIP-0.957) articles. However, the Indian based articles were kept rising from 1999 to 2020. The most prolific authors are: Kulkarni with 148 Publications from University Institute of Pharmaceutical Sciences India, Chandigarh, India followed by Chopra (17), Gadagkar (60), Bhattacharya (57), Singh (48), Mahesh(47), Kokare (45), Kumar P. (44) and Archunan (43) and Kumar V. respectively. The study noted that Bharathidasan University faculty G. Archunan presence in top ten authors.

Keywords: Scientometrics, Animal Behaviour Research, Highly Cited papers,
Most prolific Authors, Highly preferred Journals, CiteScore

INTRODUCTION

The study of animal behavior begins with understanding how an animal's physiology and anatomy are integrated with its behavior. Both external and internal stimuli prompt behaviors — external information (e.g., threats from other animals, sounds, smells) or weather and internal information (e.g., hunger, fear). Understanding how genes and the environment come together to shape animal behavior is also an important underpinning of the field. Genes capture the evolutionary responses of prior populations to selection on behavior. Environmental flexibility gives animals the opportunity to adjust to changes during their own lifetime.

Scientists are drawn to the study of animal behavior for varied reasons and the field is extremely broad, ranging from research on feeding behavior and habitat selection to mating behavior and social organizations. Many scientists study animal behavior because it sheds light on human beings. Research on non-human primates, for instance, continues to offer valuable perspectives into the causes and evolution of individual, social, and reproductive human actions. Understanding why some animals help others at the potential cost of their own survival and reproduction. Scientists are motivated by environmental concerns. When we gain insight into animal behavior, we are in a stronger position to understand vexing conservation problems, such as how to save endangered species, assess environmental quality, design nature preserves, and evaluate the importance of human-related threats to survival in otherwise fit animals. (Sara Tenney, Nature Edition, 2014).

Animal behavior is the bridge between the molecular and physiological aspects of biology and the ecological. Behavior is the link between organisms and environment and between the nervous system, and the ecosystem. Behavior is one of the most important properties of animal life. Behavior plays a critical role in biological adaptations. Behavior is how we humans define our own lives. Behavior is that part of an organism by which it interacts with its environment. Behavior is as much a part of an organisms as its coat, wings etc. The beauty of an animal includes its behavioral attributes. For the same reasons that we study the universe and subatomic particles there is intrinsic interest in the study of animals. In view of the amount of time that television devotes to animal films and the amount of money that people spend on nature books there is much more public interest in animal behavior than in neutrons and neurons. If human curiosity drives research, then animal behavior should be near the top of our priorities.

OBJECTIVES OF THE STUDY

The present study is own a comprehensive study of the publications on Animal behaviours, for the period 1930–2020 for analyzing with the subsequent objectives:

- To know the year wise distribution of Publications and citations;

- To measure the development of research productivity on Animal Behaviours Literature;
- To identify the Institution wise distribution of Publications;
- To identify the foremost prolific researchers throughout the period;
- To know the most preferred journals;
- To analyze the geographical distribution of Collaboration;
- To identify the document wise distribution of publications;
- To identify the highly cited works;
- To verify the H-Index of Institutions and Authors;

METHODOLOGY

The Scientometric study covers the Indian research publications on Animal Behaviour. The publication data of the subject Information has been drawn from Scopus database for the period 1930–2020. It accesses the contribution, impact of research and the keywords “Animal Behaviour” or “Animal Behavior” used as topic. During the study period, 10,030 research papers are retrieved. Aspects referring to type of document, journals, year wise publications, Highly Cited works, Institutions, Funding Sponsors etc., were analyzed.

DATA ANALYSIS AND INTERPRETATIONS

International Collaboration

Over the 90-year period, the 45 most prolific countries saw an increase generally in the number of publications and Citations. Table1 showed the number of these countries’ publications accounted for total number of publications worldwide. The most productive and the highest number of Collaboration with the United States of America(844), followed by Next the UK with 253, Germany (184), Australia (114), Japan (111) and Saudi Arabia (107). There are clear benefits to be had from international collaboration in research and researchers can access skills and experience from others scientists. Publications are an indicator that can be used for the detailed analysis of scientific output of a country. These can be used as a proxy measure to examine the relative strengths and weaknesses of a country. There were as many as 120

countries actively engaged in Animal Behaviours research which produced 10,030 publications during 1930-2020.

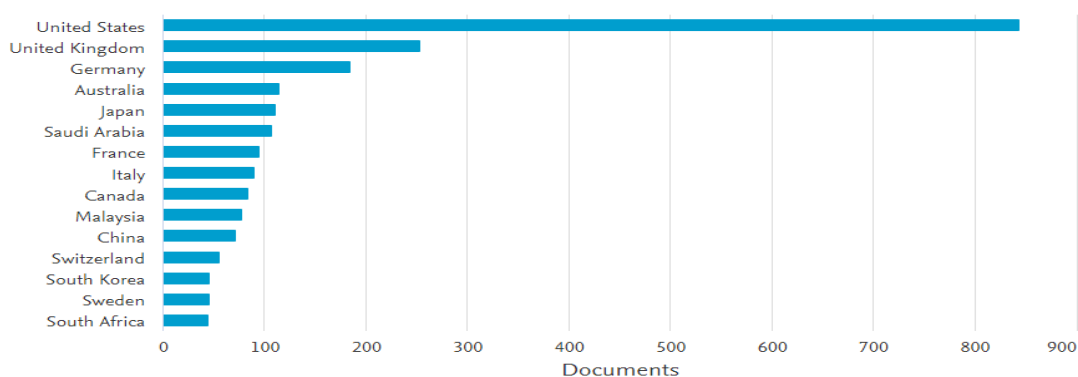
Table 1: International Collaboration

Country	Publications	Country	Publications
United States	844	Tanzania	5
United Kingdom	253	Bahrain	4
Germany	184	Cameroon	4
Australia	114	Qatar	4
Japan	111	Viet Nam	4
Saudi Arabia	107	Antigua and Barbuda	3
France	95	Chile	3
Italy	90	Grenada	3
Canada	83	Jordan	3
Malaysia	77	Kuwait	3
China	71	Myanmar	3
Switzerland	55	Peru	3
South Korea	46	Uganda	3
Sweden	45	Burkina Faso	2
South Africa	44	Costa Rica	2
Spain	44	Ecuador	2
Singapore	41	Macao	2
Netherlands	36	Mongolia	2
Israel	30	Puerto Rico	2
Taiwan	28	Serbia	2
Belgium	26	Sudan	2
Brazil	25	Uruguay	2
Norway	24	Venezuela	2
Poland	22	Afghanistan	1
Russian Federation	22	Armenia	1
Oman	21	Benin	1
Iran	20	Bhutan	1
United Arab Emirates	20	Bolivia	1
Austria	19	Bosnia and Herzegovina	1
Ireland	19	Botswana	1
Thailand	19	Brunei Darussalam	1
Finland	17	Cambodia	1
Mexico	17	Congo	1
Hungary	16	Cote d'Ivoire	1
Egypt	15	Croatia	1
Denmark	14	Cyprus	1
New Zealand	14	Iceland	1

Portugal	14	Iraq	1
Nepal	13	Jamaica	1
Pakistan	13	Laos	1
Czech Republic	12	Latvia	1
Kenya	12	Lebanon	1
Argentina	11	Madagascar	1
Nigeria	10	Malawi	1
Slovakia	10	Mali	1
Bangladesh	9	Malta	1
Ethiopia	9	Morocco	1
Sri Lanka	9	Namibia	1
Trinidad and Tobago	9	Niger	1
Indonesia	8	North Korea	1
Romania	8	North Macedonia	1
Colombia	7	Palestine	1
Panama	7	Papua New Guinea	1
Turkey	7	Paraguay	1
Bulgaria	6	Saint Kitts and Nevis	1
Hong Kong	6	Togo	1
Libyan Arab Jamahiriya	6	Tunisia	1
Philippines	6	Vanuatu	1
Estonia	5	Zambia	1
Greece	5		

Documents by country or territory

Compare the document counts for up to 15 countries/territories.



Most Productive Institutions

The total Indian output scattered all over the country. Table 2 presents publication productivity of top 22 institutions which have produced more than 100 publications and 64 Institutions produced more than 50 Publications during the period 1930-2020. These top 22 institutions contributed about one-third of

the total output in the field of Animal Behaviours research. Among these institutions, Panjab University, Punjab topped the list with 431 publications (57 H-Index) followed by Indian Institute of Science, Bengaluru, Bangalore with 349(34 H-index) publications and University Institute of Pharmaceutical Sciences India with 332 publications(H-Index-23) and Banaras Hindu University with 304 Publications (38 H-Index). The top 22 institutions list has a prominent presence of top education institutions. It is noted that Bharathidasan university ranked 27 with 93. Among these, Tata Institute of Fundamental Research, Mumbai, Tata Institute of Fundamental Research, Mumbai, Indian Institute of Science, Bengaluru, University of Calcutta and National Institute of Mental Health and Neuro Sciences are registered highest number of Citations (700-1569).

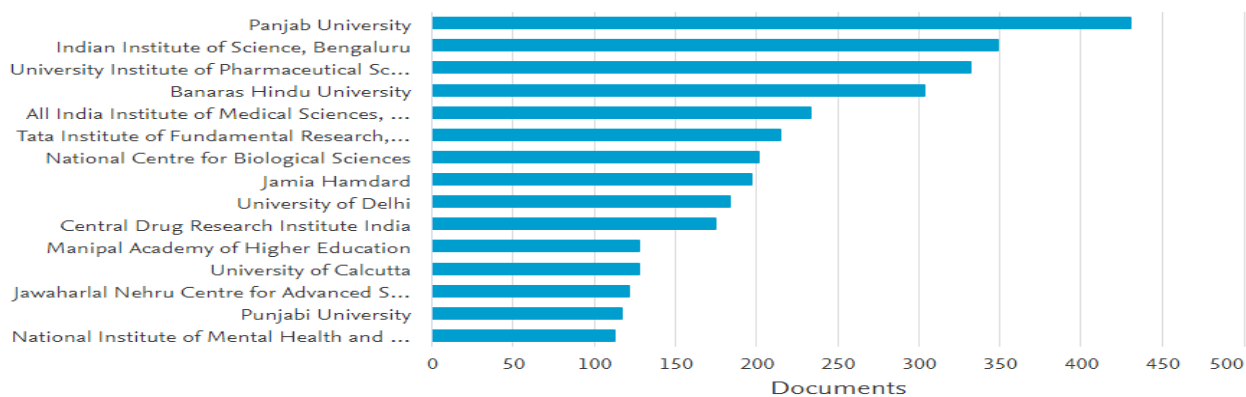
Table 2: Institution wise distribution of Publications

Institution	Publications	H-Index	Highly cited Paper
Panjab University	431	57	309
Indian Institute of Science, Bengaluru	349	34	1565
University Institute of Pharmaceutical Sciences India	332	59	213
Banaras Hindu University	304	38	200
All India Institute of Medical Sciences, New Delhi	234	38	258
Tata Institute of Fundamental Research, Mumbai	215	42	1569
National Centre for Biological Sciences	203	40	1569
JamiaHamdard	197	46	299
University of Delhi	184	32	299
Central Drug Research Institute India	175	31	262
Indian Institute of Toxicology Research	147	34	120
Manipal Academy of Higher Education	128	19	83
University of Calcutta	128	22	760
Jawaharlal Nehru Centre for Advanced Scientific Research	122	22	180
Punjabi University	117	29	186
National Institute of Mental Health and Neuro Sciences	113	27	700
Jadavpur University	113	26	175
University of Madras	112	25	118
Birla Institute of Technology and Science, Pilani	111	23	103
Banaras Hindu University, Institute of Medical Sciences	104	26	425
University of Lucknow	103	21	85

Rashtrasant Tukadoji Maharaj Nagpur University	102	30	196
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Documents by affiliation

Compare the document counts for up to 15 affiliations.



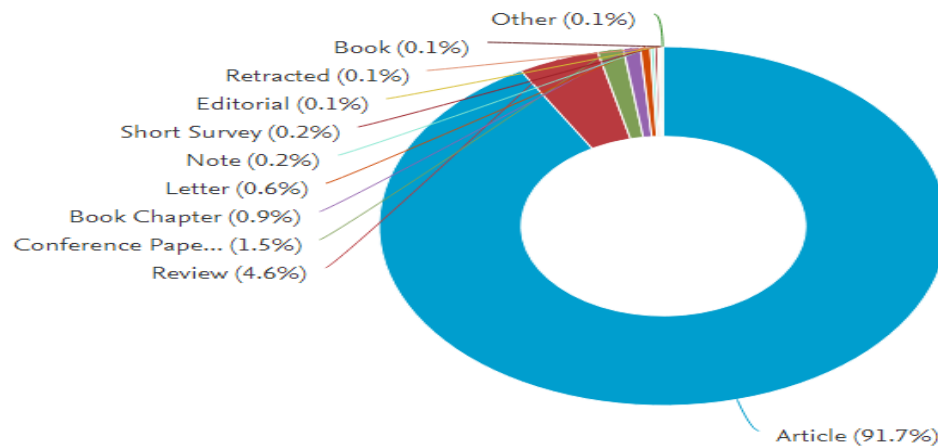
Document type

Document-Wise Distribution of Publications during the study period researchers have produced a total of 10030 publications. The highest numbers of publications were 9189 Journal articles (91.7%), followed by 464 Reviews (4.6%), Conference paper 148 (1.5%), Book Chapter with 95(0.9%), and 58 as letter (0.6).

Table 3: Document wise distribution of Publications

Document type	Publications	%
Article	9189	91.7
Review	464	4.6
Conference Paper	148	1.5
Book Chapter	95	0.9
Letter	58	0.6
Note	22	0.2
Short Survey	19	0.2
Editorial	10	0.1
Retracted	7	0.1
Book	6	0.1
Erratum	6	0.1
Undefined	2	0.1

Documents by type



Highly Preferred Sources

The total number of 10030 articles related to Animal Behaviours were scattered in different journals. The most preferred journals were: Indian Journal of Experimental Biology topped the list with 301(Cite Score-3.0, SJR-0.227 and SNIP-0.512) articles followed by PLOS ONE with 180(Cite Score-5.2, SJR-1.023 and SNIP-1.205) articles, Indian Journal of Physiology and Pharmacology with 151 articles, European Journal of Pharmacology 116 (Cite Score-5.5, SJR-0.988 and SNIP-0.957) articles.

Table 4: Highly Preferred Sources

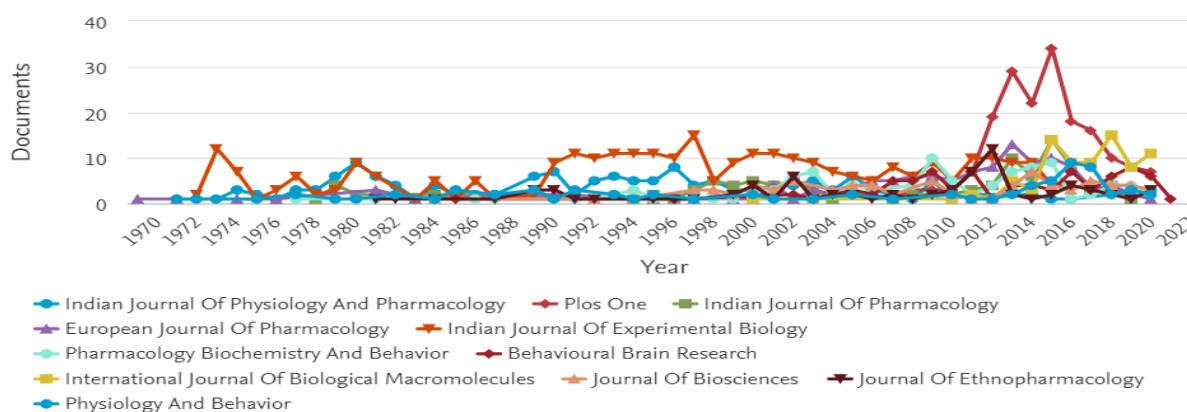
Source Title	Publications	Cite Score	SJR	SNIP
Indian Journal Of Experimental Biology	301	3.0	0.227	0.512
PLOS ONE	180	5.2	1.023	1.205
Indian Journal Of Physiology And Pharmacology	151	0.4	0.147	0.298
European Journal Of Pharmacology	116	5.5	0.988	0.957
Indian Journal Of Pharmacology	107	2.1	0.312	0.690
Pharmacology Biochemistry And Behavior	103	4.4	0.814	0.763
Behavioural Brain Research	83	5.3	1.179	0.901
International Journal Of Biological Macromolecules	80	6.9	0.972	1.449
Journal Of Biosciences	79	2.1	0.572	0.541
Journal Of Ethnopharmacology	79	6.3	0.898	1.599
Physiology And Behavior	74	5.1	0.993	1.023
Indian Journal Of Medical Research	73	2.2	0.507	0.989
International Journal Of Pharmacy And Pharmaceutical Sciences	73	1.2	0.165	0.823
Indian Journal Of Animal Sciences	65	0.4	0.186	0.418
Pharmacologyonline	65	0.4	0.129	0.303

Journal Of Environmental Biology	63	1.3	0.284	0.641
Scientific Reports	61	7.2	1.341	1.365
Asian Journal Of Pharmaceutical And Clinical Research	58	0.6	0.139	0.534
Brain Research	57	5.4	1.132	0.861
Neurochemical Research	55	5.5	0.910	0.805
Phytotherapy Research	54	6.7	0.905	1.423
Biomedicine And Pharmacotherapy	52	6.4	1.050	1.214
Drug Development And Industrial Pharmacy	50	4.2	0.521	0.800
International Journal Of Pharma And Bio Sciences	50	0.8	0.123	0.389

Documents per year by source

Compare the document counts for up to 10 sources.

[Compare sources and view CiteScore, SJR, and SNIP data](#)



It noted that most of the publications are index in highly impact journals like Scientific Reports (CiteScore-7.2), International Journal of Biological Macromolecules(Citescore-6.9), Phytotherapy Research (Citescore-6.7), Biomedicine and Pharmacotherapy (6.4) and Journal of Ethnopharmacology (6.3). It is also note that 24 Sources recorded more than 50 Publications and 6 more than 100 Publications.

Ranking of Authors based on Publications

In all, Authors have contributed 10030 papers on Animal Behaviours research in India. The most prolific authors are: Kulkarini 148 Publications from University Institute of Pharmaceutical Sciences India, Chandigarh, India followed by Chopra (71), from *University Institute of Pharmaceutical Sciences India, Chandigarh*, Gadagkar (60) from Indian Institute of Science-Bangalore, Bhattacharya (57) Banaras Hindu University, Institute of Medical Sciences, Varanasi, India, Singh (48) from Punjabi University, Patiala, India, Mahesh(47),

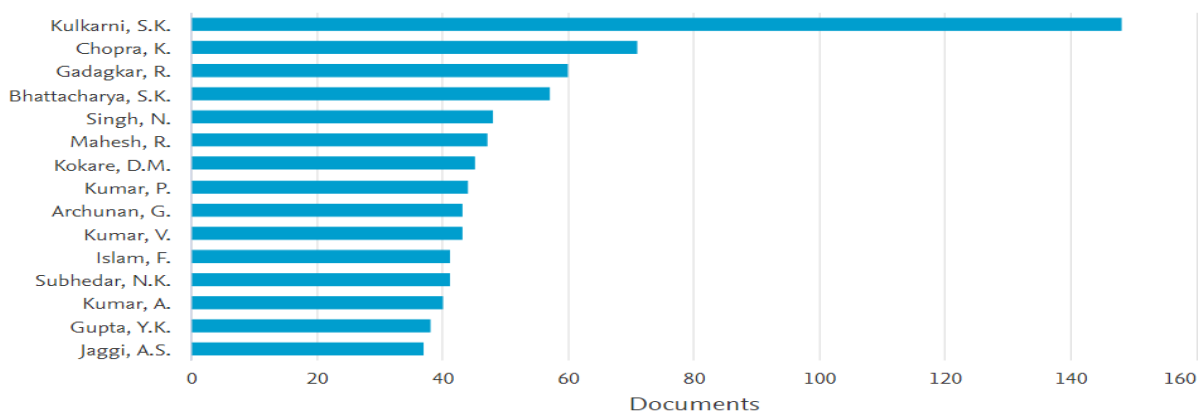
Kokare (45), Kumar P. (44) and Archunan (43) from Bharathidasan university, Tamilnadu and Kumar V. respectively. The study noted that Bharathidasan University Faculty G. Archunan presence in top ten authors.

Table 5: Most Prolific Authors

Author	Publications	Citations	Overall H-Index	Co-Authors
Kulkarni, S.K.	148	13207(505)	62	169
Chopra, K.	71	8632(241)	54	155
Gadagkar, R.	60	2242(164)	27	129
Bhattacharya, S.K.	57	6374(277)	41	219
Singh, N.	48	5815(217)	39	154
Mahesh, R.	47	951(69)	18	52
Kokare, D.M.	45	1523(73)	25	83
Kumar, P.	44	2810(98)	28	91
Archunan, G.	43	1665(164)	22	282
Kumar, V.	43	3037(232)	29	203
Islam, F.	41	5106(108)	43	163
Subhedar, N.K.	41	2311(129)	28	109
Kumar, A.	40	2572(72)	25	906
Gupta, Y.K.	38	6525(300)	41	460
Jaggi, A.S.	37	4615(177)	36	153
Singh, B.N.	35	1893(162)	22	26
Kumar, A.	34	5044(238)	36	2797
Seth, P.K.	33	5299(281)	36	290
Balsara, J.J.	31	420(63)	11	35
Parle, M.	31	1724(75)	24	55
Singh, M.	31	1106(107)	18	96
Vohora, D.	31	1741(129)	22	161
Bishnoi, M.	30	2421(104)	26	157

Documents by author

Compare the document counts for up to 15 authors.

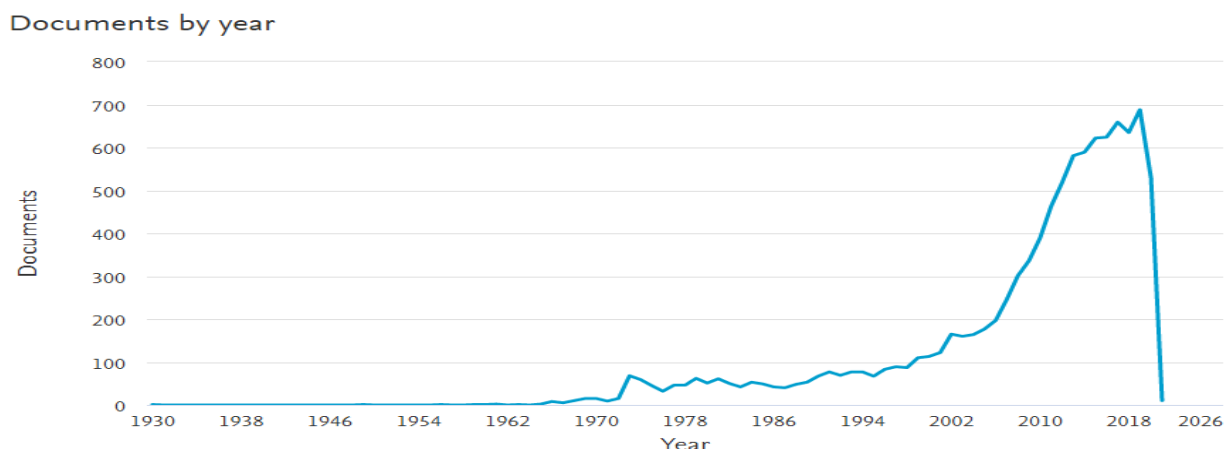


Year wise distribution of Publications

Indian authors have published 10030 papers during the study period of. Table 6 presents the year-wise publication and trend of growth rate of Indian Animal Behaviour research output. It indicates that initially from 1930 to 1966, there is single digit of Publication. Thereafter, from 1968 to 1998, publications output grew gradually increased single digit to double digit (10-89) and reached at a level of 688 papers in 2019. An increasing trend in growth rate is observed from the table 6. The highest number of publications represented in 2019 with 688 Publications followed by 2017 with (659), 2018 with (635), 2015 with 622). It is noted that last one decade covered 50% Publications. The publications are peaked from 1999-2019 with the range of 110-688.

Table 6: Year wise distribution of Publications

Year	Publications	Year	Publications	Year	Publications
2019	688	1999	110	1977	46
2017	659	1997	89	1975	45
2018	635	1998	87	1986	42
2016	624	1996	83	1983	42
2015	622	1994	77	1987	40
2014	589	1993	77	1976	32
2013	581	1991	77	1972	15
2020	529	1992	69	1970	15
2012	519	1973	68	1969	15
2011	463	1995	67	2021	10
2010	389	1990	67	1968	10
2009	336	1979	62	1971	9
2008	301	1981	61	1966	8
2007	246	1974	59	1967	5
2006	197	1989	53	1965	2
2005	177	1984	53	1961	2
2002	165	1980	51	1963	1
2004	164	1982	50	1960	1
2003	160	1985	49	1959	1
2001	122	1988	48	1956	1
2000	113	1978	46	1949	1
				1930	1



Funding Sponsors

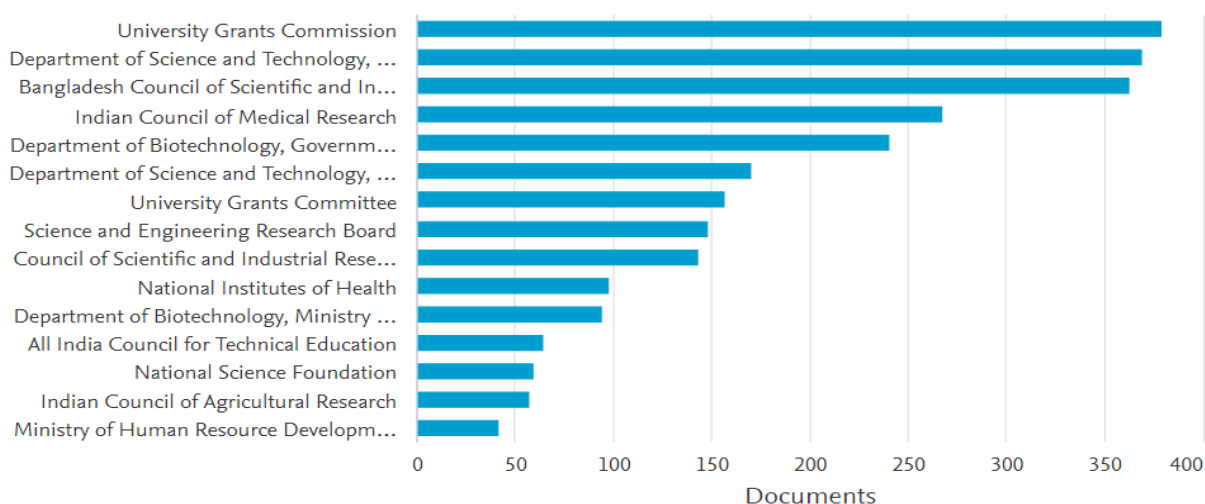
Table 7 shows that the University Grants Commission, Delhi leads with 536 of publications being featured in the funding agency followed by the Department of Science and Technology, Government of Kerala with 369 publications, Bangladesh Council of Scientific and Industrial Research with 362 of publications, Indian Council of Medical Research with 267 of Publications, Department of Biotechnology, Government of West Bengal with 240 of publications. The study found that 52 Funding agencies are supported the minimum of 10 Publications and 8 with more than 100 Publications.

Table 7: Funding Sponsors

Funding Sponsor	Publications
University Grants Commission	536
Department of Science and Technology, Government of Kerala	369
Bangladesh Council of Scientific and Industrial Research	362
Indian Council of Medical Research	267
Department of Biotechnology, Government of West Bengal	240
Department of Science and Technology, Ministry of Science and Technology, India	170
Science and Engineering Research Board	148
Council of Scientific and Industrial Research, India	143
National Institutes of Health	97
Department of Biotechnology, Ministry of Science and Technology, India	94
All India Council for Technical Education	64
National Science Foundation	59
Indian Council of Agricultural Research	57

Documents by funding sponsor

Compare the document counts for up to 15 funding sponsors.



Subject Areas

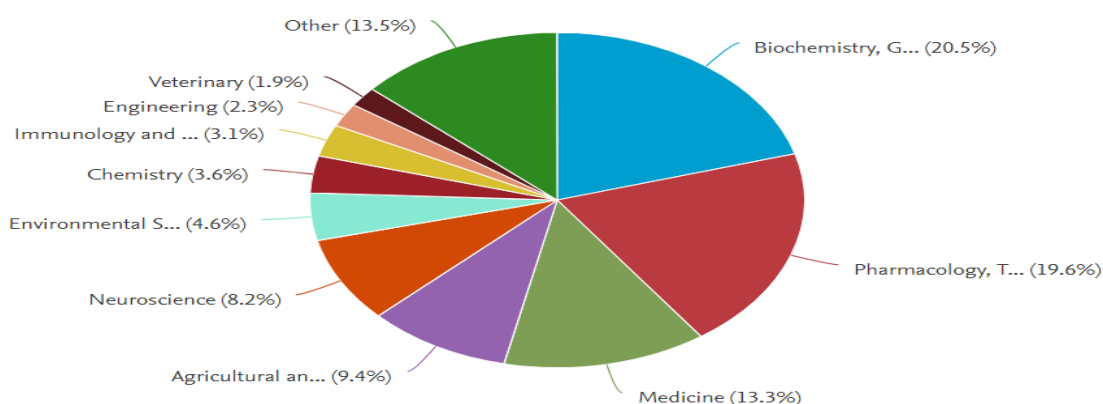
The Indian research output in Animal Behaviours researchers have been published in different sub subject disciplines. The highest number of publications output from Biochemistry, Genetics and Molecular Biology with 3676, and Pharmacology, Toxicology and Pharmaceutics with 3503 publications. Both subject areas it covered one third of publications followed by Medicine with 2385, Agricultural and Biological Sciences with 1683 and Neuroscience with 1475. The study found that 20 subject categories recorded more than 100 publications.

Table 8: Subject Areas wise distribution of Publications

Subject Areas	Publications
Biochemistry, Genetics and Molecular Biology	3676
Pharmacology, Toxicology and Pharmaceutics	3503
Medicine	2385
Agricultural and Biological Sciences	1683
Neuroscience	1475
Environmental Science	818
Chemistry	640
Immunology and Microbiology	555
Engineering	403
Veterinary	341
Materials Science	340
Multidisciplinary	334
Chemical Engineering	312

Physics and Astronomy	265
Mathematics	189
Computer Science	183
Psychology	171
Energy	119
Nursing	118
Social Sciences	103
Economics, Econometrics and Finance	84
Earth and Planetary Sciences	60
Health Professions	55
Arts and Humanities	31
Business, Management and Accounting	16
Decision Sciences	14
Dentistry	13
Undefined	4

Documents by subject area



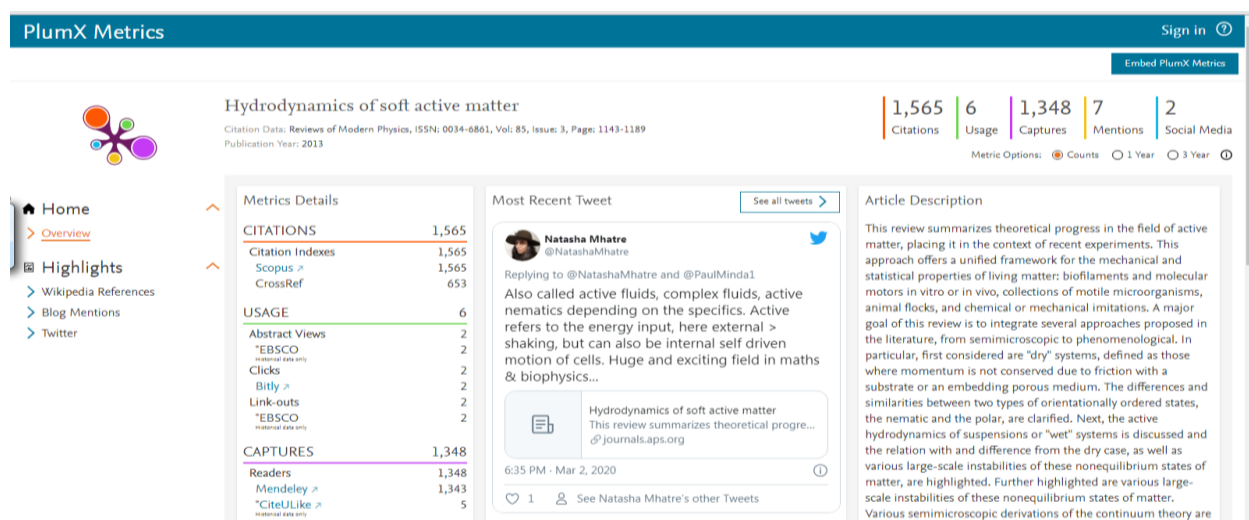
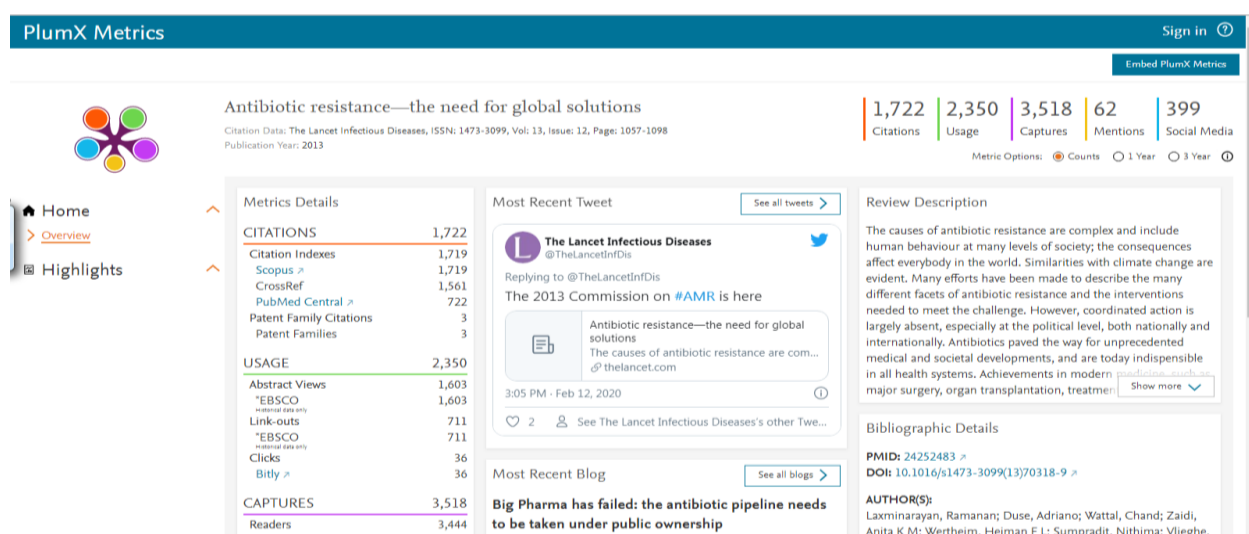
Highly cited works

Table 9 presents the list 20 papers which are cited 300 times or more in the field of Animal Behaviours. Out of these 20 papers, most of the papers are produced with international collaboration. Papers listed at the top position is cited 1719 times (**Laxminarayan, R. et al. (2013)** Antibiotic resistance—the need for global solutions, *The Lancet Infectious Diseases*, ISSN: 1473-3099, Vol: 13, Issue: 12, Page: 1057-1098 published in the year 2013 from Public Health Foundation of India, New Delhi, India and collaboration with USA followed by a paper cited 1565 times (**Marchetti, M.C et al. (2013)** Hydrodynamics of soft active matter, *Reviews of Modern Physics* Volume 85, Issue 3, 19 July 2013, Pages 1143-1189) published in the year 2013 from Department of Physics, Indian Institute of Science, Bangalore, TIFR Centre for Interdisciplinary

Sciences, 21 Brundavan Colony Narsingi, Hyderabad 500 075, India and collaboration with USA and France can be considered as all-time classics. The remaining papers are displayed in the below table.

Table 9: Highly Cited Papers

	Documents	Citations	<2016	2016	2017	2018	2019	2020	Subtotal	>2020	Total
	Total		11720	1735	1804	1850	1955	1942	9286	31	21037
☐ 1	Antibiotic resistance-the need for global solutions	2013	258	225	284	282	339	325	1455	6	1719
☐ 2	Hydrodynamics of soft active matter	2013	296	191	240	266	278	294	1269		1565
☐ 3	Emergent properties of networks of biological signaling path...	1999	1036	26	33	26	36	19	140		1176
☐ 4	Developmental plasticity and human health	2004	812	85	64	70	50	40	309	1	1122
☐ 5	Stress, memory and the amygdala	2009	596	91	78	73	102	72	416	1	1013
☐ 6	The laboratory rat: Relating its age with human's	2013	72	88	118	132	148	197	683	2	757
☐ 7	Correction of Fragile X Syndrome in Mice	2007	500	58	42	39	29	31	199	1	700
☐ 8	Chitosan - as a Biomaterial	1990	496	38	28	18	25	19	128		624
☐ 9	Loss of presenilin function causes impairments of memory and...	2004	456	29	28	20	24	25	126		582
☐ 10	Stem and progenitor-like cells contribute to the aggressive ...	2005	350	37	41	34	41	35	188		538
☐ 11	MAP kinase phosphatase as a locus of flexibility in a mitoge...	2002	458	14	8	10	9	3	44		502
☐ 12	Values and their relationship to environmental concern and c...	2005	235	52	47	44	60	54	257	1	493
☒ 13	Complexity in biological signaling systems	1999	388	15	13	8	11	7	54		442
☐ 14	Therapeutics of Alzheimer's disease: Past, present and futur...	2014	61	63	62	77	87	74	363	1	425
☐ 15	Hyperforin as a possible antidepressant component of hyperic...	1998	366	11	8	19	12	9	59		425
☐ 16	Stress duration modulates the spatiotemporal patterns of spi...	2005	262	38	24	29	33	37	161		423
☐ 17	Tigers and their prey: Predicting carnivore densities from p...	2004	239	24	37	22	30	39	152		391
☐ 18	Estradiol loaded PLGA nanoparticles for oral administration:...	2007	196	29	48	41	34	31	183	1	380
☐ 19	Development of biomaterial scaffold for nerve tissue enginee...	2009	146	34	35	40	46	38	193	1	340
☐ 20	Ammonia in the atmosphere: A review on emission sources, atm...	2013	26	31	44	55	62	94	286	7	319



PlumX Metrics data for Highly Cited Papers

FINDINGS AND CONCLUSION

The study analysed the characteristics of articles published by the Indian Scientists in the field of Animal Behaviours. The most productive and the highest number of Collaboration with the United States of America (844), followed by Next the UK with 253. Among these institutions, Panjab University, Punjab topped the list with 431 publications (57 H-Index) followed by Indian Institute of Science, Bengaluru, Bangalore with 349(34 H-index) publications. It noted that most of the publications are index in highly impact journals like Scientific Reports (CiteScore-7.2), International Journal of Biological Macromolecules(Citescore-6.9), Phytotherapy Research (Citescore-6.7), Biomedicine and Pharmacotherapy (6.4) and Journal of Ethnopharmacology

(6.3). It is also note that 24 Sources recorded more than 50 Publications and 6 more than 100 Publications. However, the Indian based articles were kept rising from 1999 to 2020. The most prolific authors are: Kulkarini 148 Publications followed by Chopra (17), The study noted that Bharathidasan University Faculty G. Archunan presence in top ten authors.

Research on animal behavior and behavioral ecology has been burgeoning in recent years' despite below inflation increases (and often decreases) in research funding. While the study of animal behavior is important as a scientific field on its own, our science has made important contributions to other disciplines with applications to the study of human behavior, to the neurosciences, to the environment and resource management, to the study of animal welfare and to the education of future generations of scientists. **(Charles T. Snowdon).**

Behavioural research has immensely contributed to the betterment of mankind and experimental animals occupy centre stage of such achievement. Although, advances in laboratory technologies and techniques have replaced conventional procedures involving intensive animal experimentations. The emergence and re-emergence of infectious agents especially pathogenic viruses yet times compel to make use of alternative animal models to quickly identify and characterise the pathogen.

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