Pesquisa científica e integridade acadêmica

XXVII Escola de Verão de Geofísica

Métricas e indexadores

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USP

2025

Métricas e indexadores

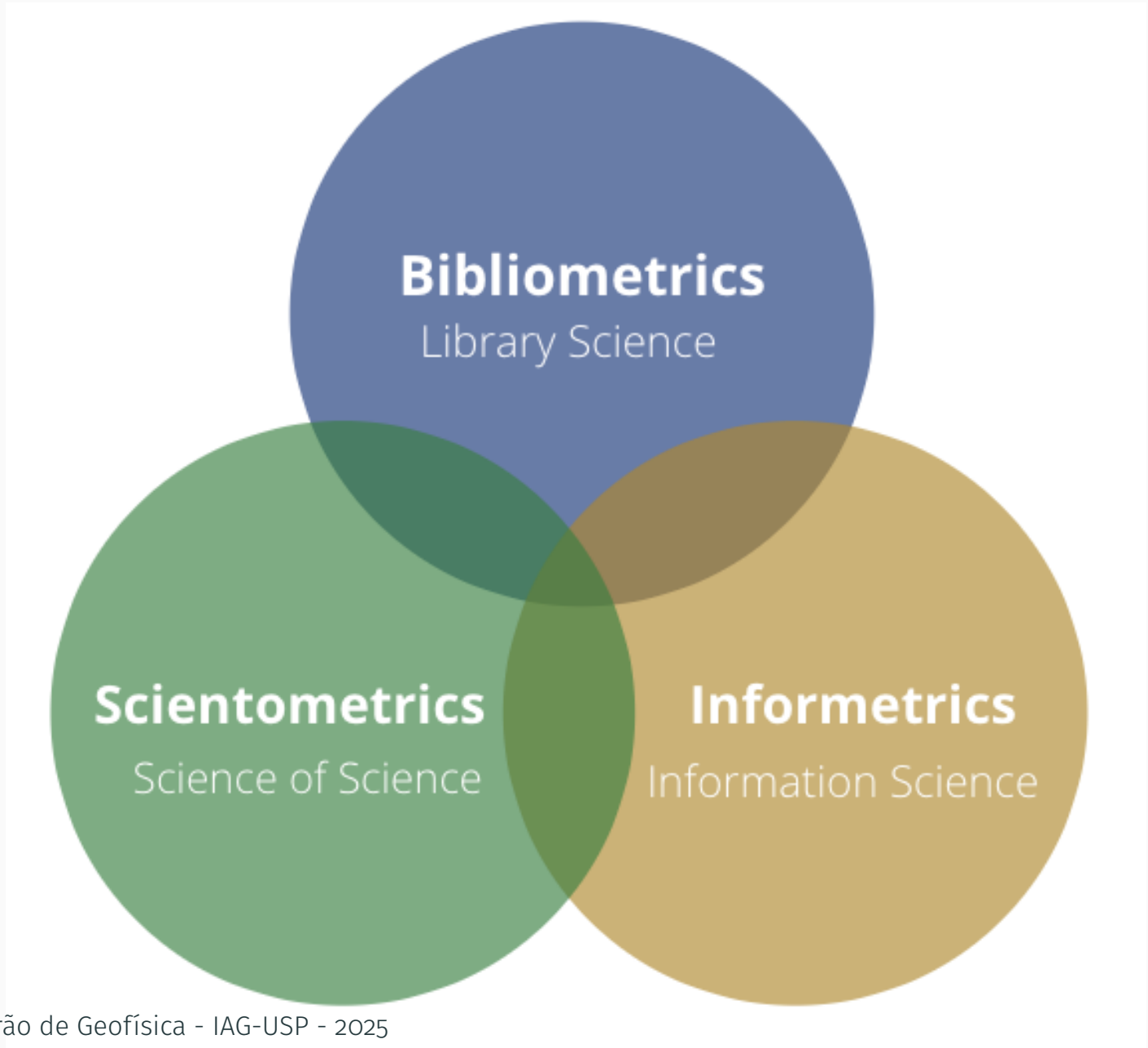
Identificadores Persistentes

- DOI - Digital Object Identifier - https://www.doi.org/
- Vários outros (Handle, ARK, OURL, URN)
- ORCID, ROR
- Digital Preservation Coalition - https://www.dpconline.org/handbook/technical-solutions-and-tools/persistent-identifiers

Bases de Dados

- Web of Science – https://www.webofscience.com/wos/
- Science Direct – https://www.sciencedirect.com
- Google Scholar – https://scholar.google.com
- SciELO – https://www.scielo.br/
- PubMed – https://pubmed.ncbi.nlm.nih.gov/

Bibliometria, Cientometria, Informetria



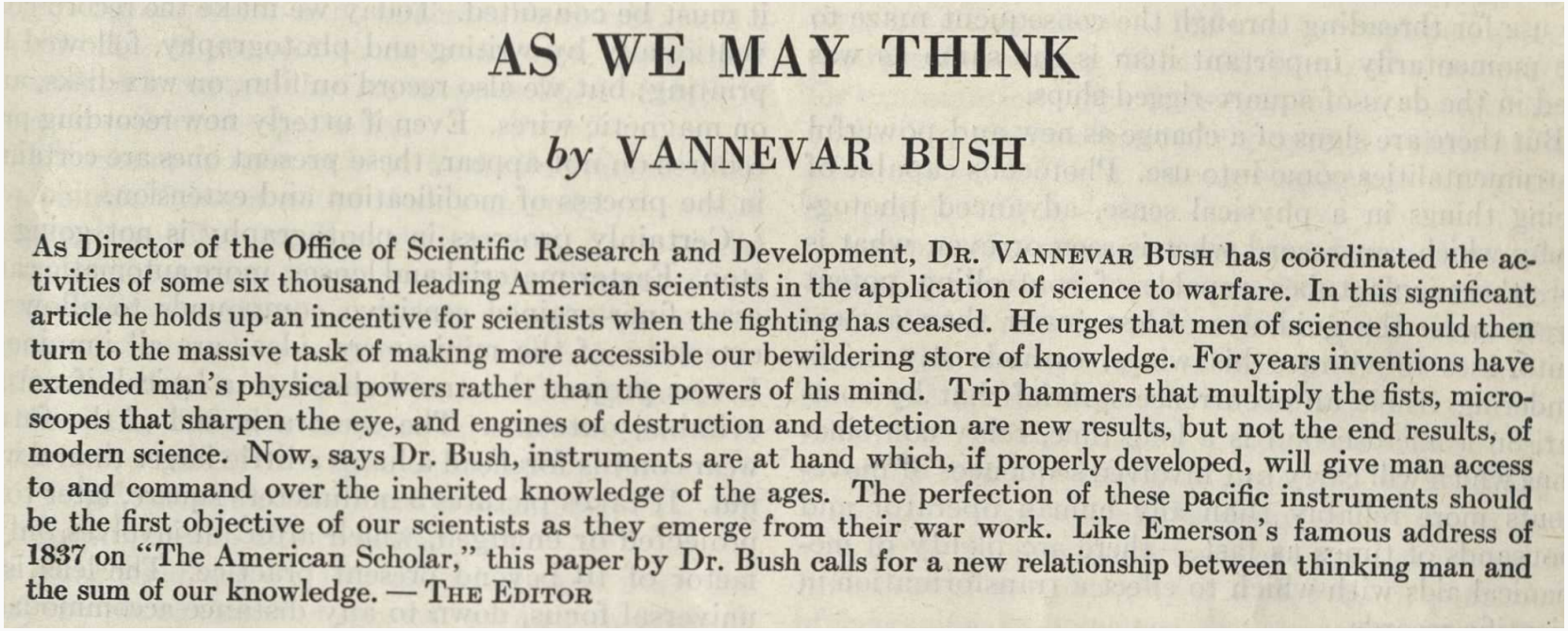
Fator de impacto / Impact factor (IF)

- Eugene Garfield (1925–2017)
- Químico
- Mestrado em Library Science
- Doutorado em Linguística

Eugene Garfield

- Depois da graduação - biblioteca de medicina Univ. Johns Hopkins
- Produzir um índice de artigos dos periódicos de medicina
- Buscava como encontrar artigos relevantes para um determinado tópico (produção crescente)
- Influenciado por “As we may think (1945)”
- Publica em 1955 “Citation indexes for science”
- Ideia criticada pela complexidade e custo

As we may think



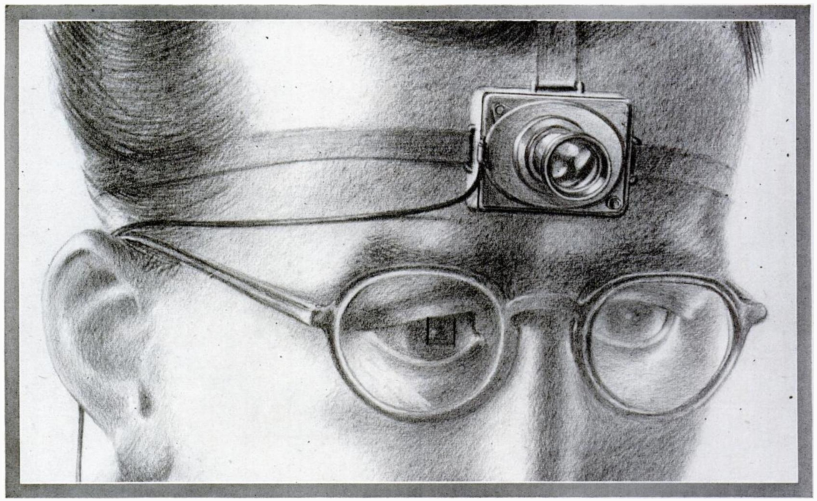
AS WE MAY THINK

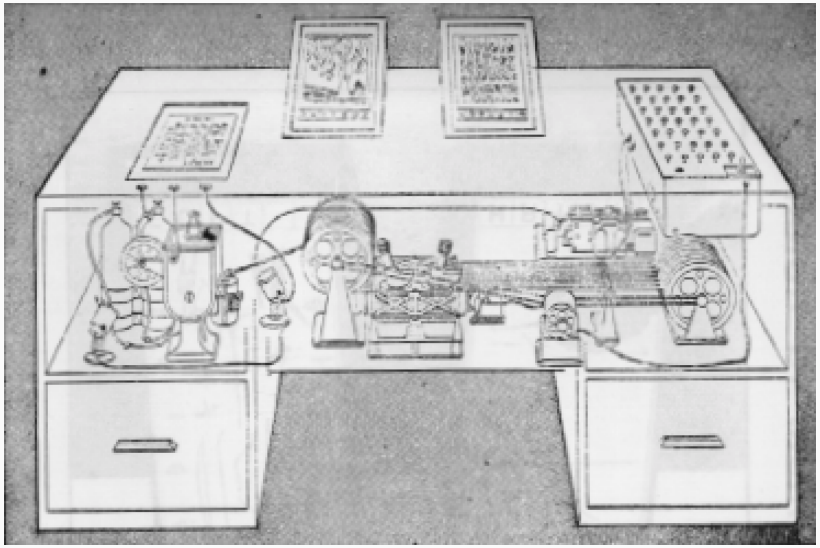
by VANNEVAR BUSH

As Director of the Office of Scientific Research and Development, Dr. Vannevar Bush has coördinated the activities of some six thousand leading American scientists in the application of science to warfare. In this significant article he holds up an incentive for scientists when the fighting has ceased. He urges that men of science should then turn to the massive task of making more accessible our bewildering store of knowledge. For years inventions have extended man's physical powers rather than the powers of his mind. Trip hammers that multiply the fists, microscopes that sharpen the eye, and engines of destruction and detection are new results, but not the end results, of modern science. Now, says Dr. Bush, instruments are at hand which, if properly developed, will give man access to and command over the inherited knowledge of the ages. The perfection of these pacific instruments should be the first objective of our scientists as they emerge from their war work. Like Emerson's famous address of 1837 on "The American Scholar," this paper by Dr. Bush calls for a new relationship between thinking man and the sum of our knowledge. — The Editor

https://cdn.theatlantic.com/media/archives/1945/07/176-1/132407932.pdf

As we may think





https://commons.wikimedia.org/w/index.php?curid=64881877

Citation indexes for science

Citation Indexes for Science

A New Dimension in Documentation through Association of Ideas

Eugene Garfield

"The uncritical citation of disputed data by a writer, whether it be deliberate or not, is a serious matter. Of course, knowingly propagandizing unsubstantiated claims is particularly abhorrent, but just as many naive students may be swayed by unfounded assertions presented by a writer who is unaware of the criticisms. Buried in scholarly journals, critical notes are increasingly likely to be overlooked with the passage of time, while the studies to which they pertain,

approach to subject control of the literature of science. By virtue of its different construction, it tends to bring together material that would never be collated by the usual subject indexing. It is best described as an association-of-ideas index, and it gives the reader as much leeway as he requires. Suggestiveness through association-of-ideas is offered by conventional subject indexes but only within the limits of a particular subject heading.

If one considers the book as the macro

case. Classified indexes are also dependent upon a subject analysis of individual articles and, at best, offer us better consistency of indexing rather than greater specificity or multiplicity in the subject approach. Similarly, terminology is important, but even an ideal standardization of terminology and nomenclature will not solve the problem of subject analysis.

What seems to be needed, then, in addition to better and more comprehensive indexes, alphabetical and classified, are new types of bibliographic tools that can help to span the gap between the subject approach of those who create documents —that is, authors—and the subject approach of the scientist who seeks information.

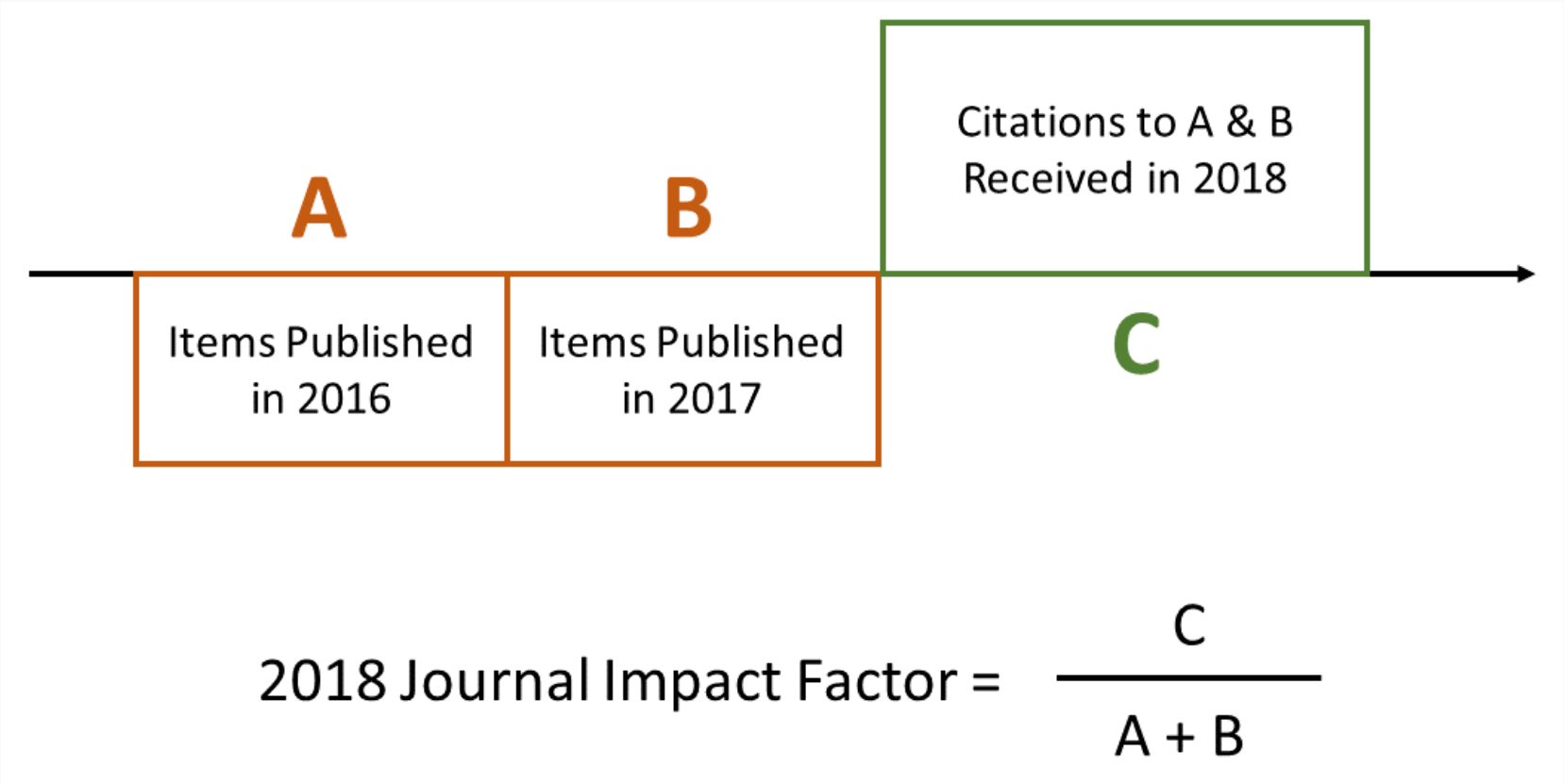
Since 1873 the legal profession has been provided with an invaluable research tool known as *Shepard's Citations,* published by Shepard's Citations, Inc., Colorado Springs, Colo. (*2*). A citation index is published for court cases in the 48 states as well as for cases in Federal courts. Briefly, the Shepard citation system is a listing of individual American

Science (1955), v122:3159, pp.108-111 DOI: https://doi.org/10.1126/science.122.3159.108

Eugene Garfield

- Fundou o Institute for Scientific Information (ISI) em 1956
- ISI foi parte da divisão de ciências da Thomson Reuters (ISI Web of Science) - agora Clarivate Analytics
- Anos 1950/1960 - Produz índices de artigos para companhias privadas
- 1964 - primeiro Science Citation Index (SCI) - artigos publicados em mais de 2200 periódicos
- Publica em 1972 “Citation analysis as a tool in journal evaluation”
- Lista de periódicos ordenada pelo número médio de citações por artigo - o Fator de Impacto

Fator de impacto



$$\text{2018 Journal Impact Factor} = \frac{C}{A + B}$$

Citation analysis as a tool in journal evaluation

Citation Analysis as a Tool in Journal Evaluation

Journals can be ranked by frequency and impact of citations for science policy studies.

Eugene Garfield

As a communications system, the network of journals that play a paramount role in the exchange of scientific and technical information is little understood. Periodically since 1927, when Gross and Gross published their study (*1*) of references in 1 year's issues of the *Journal of the American Chemical Society*, pieces of the network have been illuminated by the work of Bradford (*2*), Allen (*3*), Gross and Woodford (*4*), Hooker (*5*), Henkle (*6*), Fussler (*7*), Brown (*8*), and others (*9*). Nevertheless, there is still no map of the journal network as a whole. To date, studies of the network and of the interrelation of its components have been limited in the number of journals, the areas of scientific study, and the periods of time their authors were able to consider. Such shortcomings have not been due to any lack of purpose, insight, or energy on the part of investigators, but to the practical difficulty of compiling and manipulating manually the enormous amount of necessary data.

A solution to this problem of data is available in the data base used to produce the *Science Citation Index* (SCI) (*10*). The coverage of the SCI is international and multidisciplinary; it has grown from 600 journals in 1964 to 2400 journals in 1972, and now includes the world's most important sci-

The author is president of the Institute for Scientific Information, Philadelphia, Pennsylvania 19106

Science (1972), v178:4060, pp.471-479 DOI: https://doi.org/10.1126/science.178.4060.471

Citation analysis as a tool in journal evaluation

Item No. (1)	Cited Journal (2)	Times Cited Last Quarter 1969 (3)	1969 Citations to 1967 and 1968 Articles (4)	Articles Published in 1967 and 1968 (5)	Impact Factor (6)
0001	ACCOUNTS CHEM RES	247	820	28	29.285
0002	ADV PROTEIN CHEM	373	184	8	23.000
0003	PHARMACOL REV	725	448	20	22.400
0004	BACTERIOL REV	646	804	39	20.615
0005	ANNU REV BIOCHEM	468	932	53	17.584
0006	PHYSIOL REV	1022	572	33	17.333
0007	SOLID STATE PHYS	384	228	14	16.285
0008	ADV ENZYMOL	291	192	20	9.600
0009	INT REV CYTOL	230	144	16	9.000
0010	J MOL BIOL	4982	7340	833	8.811
0011	REC PROG HORMONE RES	417	232	27	8.592
0012	P NAT ACAD SCI USA	8260	11548	1348	8.566
0013	J EXP MED	3871	2700	325	8.307
0014	Q REV	488	452	55	8.218
0015	CHEM REV	1003	408	50	8.160
0016	ANNU REV PL PHYSIOL	314	296	42	7.047
0017	J CRYST GROWTH	232	820	125	6.560
0018	ANNU REV MICROBIOL	254	288	44	6.545
0019	J BIOL CHEM	17112	10768	1777	6.059
0020	METHODS BIOCHEM ANAL	285	80	14	5.714
0021	BIOCHEMISTRY	4076	6344	1114	5.694
0022	J AM CHEM SOC	26323	22156	3946	5.614
0023	SOV PHYS USP	586	612	109	5.614
0024	COLD SPR HARB SYMP	1091	1060	194	5.463
0025	BIOL REV	358	176	34	5.176
0026	J VIROL	560	1860	360	5.166
0027	MEDICINE	410	240	48	5.000
0028	J CELL SCI	552	600	122	4.918
0029	PHYS REV LETT	6581	11380	2317	4.911
0030	ASTROPHYS J	4271	5440	1167	4.661
0031	AM J MED	2191	1784	395	4.516
0032	SOV PHYS JETP	4295	3400	754	4.509
0033	VIROLOGY	2376	2620	584	4.486
0034	J NEUROPHYSIOL	1015	692	156	4.435
0035	PSYCHOL REV	593	368	83	4.433
0036	REV MOD PHYS	1364	816	189	4.317
0037	BIOCHEM BIOPHYS RES	3417	5108	1190	4.292
0038	MON NOT ROY ASTR SOC	868	1008	238	4.235
0039	CIRC RES	1750	1820	432	4.212
0040	J IMMUNOL	2627	2992	726	4.121
0041	Q J MED	437	284	70	4.057
0042	J NAT CANCER I	1668	1672	417	4.009
0043	EUR J BIOCHEM	1635	1992	501	3.976
0044	MOL PHARMACOL	300	564	144	3.916
0045	DEVELOP BIOL	435	552	142	3.887
0046	J CLIN ENDOCR METAB	1903	1888	488	3.868
0047	CHEM ENG LONDON	268	392	104	3.769
0048	J LIPID RES	929	876	235	3.727
0049	ADV PHYS	318	284	77	3.688
0050	PSYCHOL B	610	564	154	3.662
0051	IMMUNOLOGY	801	1208	335	3.605
0052	PHYS REV	20674	22710	5767	3.584

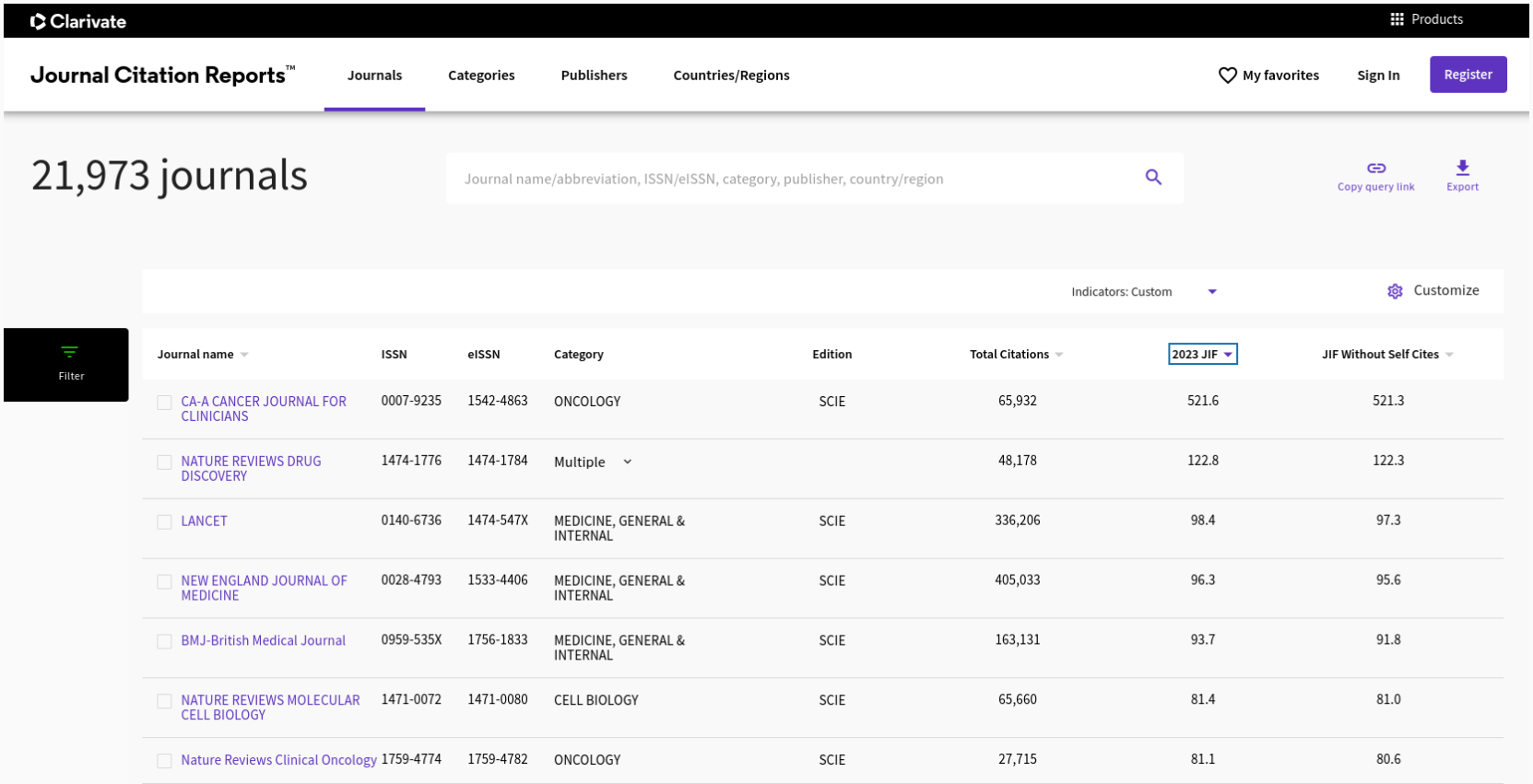
Item No. (1)	Cited Journal (2)	Times Cited Last Quarter 1969 (3)	1969 Citations to 967 and 1968 Articles (4)	Articles Published in 1967 and 1968 (5)	Impact Factor (6)
0077	SCIENCE	9752	11880	3968	2.993
0078	GENET RES	371	464	155	2.993
0079	J GEN PHYSIOL	1507	1208	407	2.968
0080	ANGEW CHEM	2728	3660	1251	2.925
0081	ENDOCRINOLOGY	2548	2276	783	2.906
0082	CANCER RES	2349	2344	814	2.879
0083	EXP PARASITOL	437	492	171	2.877
0084	NUCL PHYS	4034	6716	2345	2.863
0085	TETRAHEDRON LETT	3937	8252	2902	2.843
0086	PLANTA	707	1172	414	2.830
0087	HELV CHIM ACTA	2249	1524	539	2.827
0088	J COMP NEUROL	969	376	133	2.827
0089	BIOPOLYMERS	452	656	235	2.791
0090	CHROMOSOMA	458	440	159	2.767
0091	Z ZELLF MIKR ANAT	1286	1800	653	2.756
0092	CLIN SCI	680	552	205	2.692
0093	BRIT J PHARMACOL	1348	1348	507	2.658
0094	SURFACE SCI	399	844	321	2.629
0095	AM J HUM GENET	405	332	128	2.593
0096	PLANET SPACE SCI	508	892	348	2.563
0097	DISCUSS FARADAY SOC	702	292	114	2.561
0098	J NEUROCHEM	801	900	357	2.521
0099	SOV J NUCL PHYS	742	1588	630	2.520
0100	MUTAT RES	274	532	213	2.497
0101	J CATAL	431	764	308	2.480
0102	ACTA PHYSIOL SCAND	1816	1024	413	2.479
0103	CHEM PHYS LETT	294	996	402	2.477
0104	GEOCHIM COSMOCH ACTA	814	744	301	2.471
0105	P IEEE	1610	1856	756	2.455
0106	STEROIDS	473	680	277	2.454
0107	TETRAHEDRON	2071	3220	1313	2.452
0108	J PHYSIOL LOND	4966	3036	1248	2.432
0109	INT J CANCER	275	452	189	2.391
0110	PSYCHOPHARMACOLOGIA	277	388	163	2.380
0111	NEW ENGL J MED	4512	5252	2226	2.359
0112	PHYS LETT	3943	7160	3034	2.359
0113	EARTH PLANET SC LETT	269	672	286	2.349
0114	NATURE LONDON	15325	15956	6811	2.342
0115	J PHYS CHEM	4703	4516	1939	2.329
0116	J ORG CHEM	5401	5756	2475	2.325
0117	J EXP ANALYSIS BEHAV	509	424	184	2.304
0118	J HISTOCHEM CYTOCHEM	1229	828	362	2.287
0119	J APPL PHYSIOL	1836	1460	643	2.270
0120	AM J ANAT	637	256	113	2.265
0121	EXP CELL RES	1958	1464	653	2.241
0122	BLOOD	1614	1256	566	2.219
0123	J FLUID MECH	998	1036	472	2.194
0124	HISTOCHEMIE	323	668	305	2.190
0125	AM J CARDIOL	1238	1600	737	2.170
0126	REC TRAV CHIM	1010	728	337	2.160
0127	PHIL MAG	1943	1180	547	2.157

Science (1972), v178:4060, pp.471-479 DOI: https://doi.org/10.1126/science.178.4060.471

Fator de Impacto (1972)

- 1º geral - Accounts of Chemical Research - IF = 29.285
- 1º física (29º geral) - Physical Review Letters - IF = 4.911
- Ideia do Garfield
  - Ajudar os cientistas a decidir quais periódicos ler
  - Ajudar bibliotecários a decidir quais periódicos assinar
  - Destacar as pesquisas de vanguarda para agências de financiamento e “policymakers”

Fator de Impacto (2025)



Journal name	ISSN	eISSN	Category	Edition	Total Citations	2023 JIF	JIF Without Self Cites
CA-A CANCER JOURNAL FOR CLINICIANS	0007-9235	1542-4863	ONCOLOGY	SCIE	65,932	521.6	521.3
NATURE REVIEWS DRUG DISCOVERY	1474-1776	1474-1784	Multiple		48,178	122.8	122.3
LANCET	0140-6736	1474-547X	MEDICINE, GENERAL & INTERNAL	SCIE	336,206	98.4	97.3
NEW ENGLAND JOURNAL OF MEDICINE	0028-4793	1533-4406	MEDICINE, GENERAL & INTERNAL	SCIE	405,033	96.3	95.6
BMJ-British Medical Journal	0959-535X	1756-1833	MEDICINE, GENERAL & INTERNAL	SCIE	163,131	93.7	91.8
NATURE REVIEWS MOLECULAR CELL BIOLOGY	1471-0072	1471-0080	CELL BIOLOGY	SCIE	65,660	81.4	81.0
Nature Reviews Clinical Oncology	1759-4774	1759-4782	ONCOLOGY	SCIE	27,715	81.1	80.6

https://jcr.clarivate.com/jcr/browse-journals

Produtos Clarivate

- Banco de dados: Web of Science Core Collection
- Índices:
  - Science Citation Index Expanded
  - Social Sciences Citation Index
  - Arts & Humanities Citation Index
  - Emerging Sources Citation Index

https://webofscience.help.clarivate.com/pt-br/Content/home.htm

Críticas ao Fator de Impacto

- Críticas iniciais
  - Artigos podem ser citados por serem ruins (críticas)?
  - Auto-citação
- Críticas constantes
  - Abrangência do banco de dados
  - O que é uma publicação “citável”?
  - Falta de transparência

Document Types Included in the Impact Factor Calculation

The Impact Factor is calculated by dividing the number of citations in the Journal Citation Reports year (the numerator) by the total number of citable items published in the two previous years (the denominator).

https://support.clarivate.com/ScientificandAcademicResearch/s/article/Journal-Citation-Reports-Document-Types-Included-in-the-Impact-Factor-Calculation?language=en_US

Goodhart's law

"When a measure becomes a target, it ceases to be a good measure"

https://en.wikipedia.org/wiki/Goodhart's_law

Outras Métricas

- CiteScore - Elsevier
- SCImago Journal Rank (SJR)
- Source Normalized Impact per Paper (SNIP)
- Eigenfactor
- índice-h

CiteScore 2023 methodology

CiteScore 2023 counts the citations received in 2020-2023 to articles, reviews, conference papers, book chapters and data papers published in 2020-2023, and divides this by the number of publications published in 2020-2023.

https://service.elsevier.com/app/answers/detail/a_id/14880/supporthub/scopus/

CiteScore 2023

CiteScore 2023 methodology

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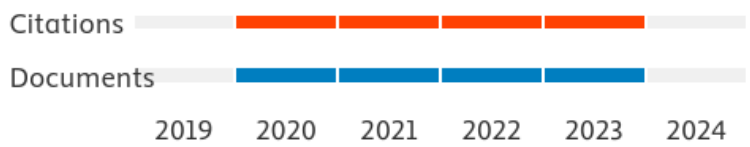


Want to learn more? Visit Citescore FAQ

CiteScoreTracker 2024 uses the same methodology with citations based on the latest 2024 data.

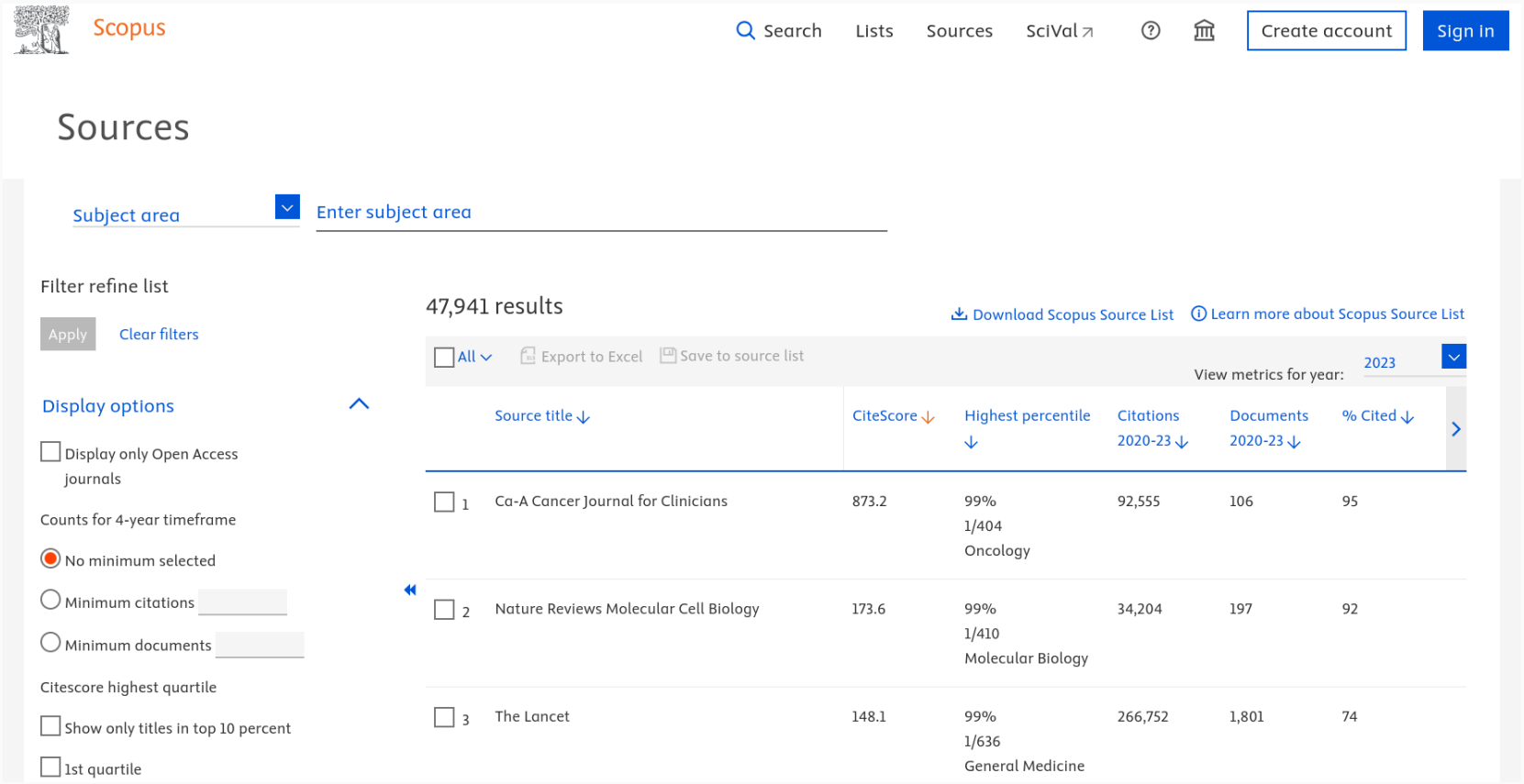
Frequency

4-year publication window

Publication types

The CiteScore calculation (numerator and denominator) consists of the following publication types: articles, reviews, conference papers, data papers and book chapters.

CiteScore 2023



CiteScore x Fator de Impacto

- Mais periódicos indexados (∼48.000 x ∼22.000)
- Base de dados: Scopus
- Janela de tempo maior
- Acesso gratuito
- Ambos são de empresas privadas com interesses próprios...
- https://www.scopus.com/

SCImago Journal Rank (SJR)

- Número de citações recebidas por um periódico, ponderadas pela importância dos periódicos que fazem essas citações.
- Atribui maior peso às citações provenientes de periódicos mais influentes
- Base de dados: Scopus
- Acesso gratuito
- https://www.scimagojr.com/files/SJR2.pdf
- https://www.scimagojr.com/journalrank.php

Source Normalized Impact per Paper (SNIP)

- Leva em conta as diferenças entre áreas do conhecimento
- Base de dados: Scopus
- Disponível nas métricas do Scopus

Eigenfactor

- Classificação das periódicos similar à de paginas web (tipo Page Rank)
- Leva em conta as diferenças entre áreas do conhecimento
- Janela de 5 anos
- Acesso gratuito
- Base de dados: Web of Science

Índice-h (não é Fator-H)

- Métrica para **autores** (mas tem sido utilizada para periódicos)
- Proposto em 2005 por Jorge Hisrch (Un. Califórnia
- Número **h** tal que o autor tenha pelo menos **h** artigos com **h** citações cada
- Ex.: você tem 50 artigos e 15 deles foram citados ao menos 15 vezes, seu índice-h é 15
- Varia com a base da dados utilizada
- Favorece pessoas mais velhas (o índice só pode crescer)
- Não varia linearmente

Altmetrics

- *Alternative Metrics*
- Menções em diversas plataformas, incluindo redes sociais, blogs, notícias, etc
- Podem medir popularidade e disseminação da pesquisa, mas não qualidade ou rigor científico

Altmetrics

International Journal of Antimicrobial Agents
Volume 56, Issue 1, July 2020, 105949

RETRACTED: Hydroxychloroquine and azithromycin as a treatment of COVID-19: results of an open-label non-randomized clinical trial

Philippe Gautret [a b $], Jean-Christophe Lagier [a c $], Philippe Parola [a b], Van Thuan Hoang [a b d], Line Meddeb [a], Morgane Mailhe [a], Barbara Doudier [a], Johan Courjon [e f g], Valérie Giordanengo [h], Vera Esteves Vieira [a], Hervé Tissot Dupont [a c], Stéphane Honoré [i j], Philippe Colson [a c], Eric Chabrière [a c], Bernard La Scola [a c], Jean-Marc Rolain [a c], Philippe Brouqui [a c], Didier Raoult [a c]

Show more

+ Add to Mendeley Share Cite

https://doi.org/10.1016/j.ijantimicag.2020.105949

Recommended articles

No articles found.

Article Metrics

Citations

Citation Indexes
Clinical Citations
Patent Family Citations
Policy Citations

Captures

Readers

Mentions

Blog Mentions
News Mentions
References

Social Media

Shares, Likes & Comments

Qualis - CAPES

- Classificação de periódicos para avaliação de programas de pós-graduação
- Critérios: fator de impacto, indexação em bases de dados, número de citações e *critérios específicos de cada área* (subjetividade...)
- Estratos
  - A1 e A2
  - B1, B2, B3, B4 e B5
  - C
- Antes de 2019 - Classificação por área
- Depois de 2019 - Qualis Referência (área c/ class. maior)
- Depois de 2025 - SEM QUALIS! (e sem informações por enquanto)

https://sucupira-legado.capes.gov.br/sucupira/public/consultas/coleta/veiculoPublicacaoQualis/listaConsultaGeralPeriodicos.jsf

Métricas enganosas

- International Journal Impact Factor (IJIF) - http://www.internationaljournalimpactfactor.com/
- Scientific Indexing Services - https://www.sindexs.org/
- CiteFactor - https://www.citefactor.org/