Demystifying Citation Metrics

Michael Ladisch
Pacific Libraries
<table>
<thead>
<tr>
<th>Citation</th>
<th>Journal Name</th>
<th>Journal Impact Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NATURE REVIEWS MOLECULAR CELL BIOLOGY</td>
<td>44.25</td>
</tr>
<tr>
<td>2</td>
<td>CELL</td>
<td>30.410</td>
</tr>
<tr>
<td>3</td>
<td>NATURE MEDICINE</td>
<td>29.886</td>
</tr>
<tr>
<td>4</td>
<td>CANCER CELL</td>
<td>27.407</td>
</tr>
<tr>
<td>5</td>
<td>Cell Stem Cell</td>
<td>23.394</td>
</tr>
<tr>
<td>6</td>
<td>NATURE CELL BIOLOGY</td>
<td>23.394</td>
</tr>
<tr>
<td>7</td>
<td>Cell Metabolism</td>
<td>18.164</td>
</tr>
</tbody>
</table>
Outline

• Use and Misuse of Bibliometrics
• Databases for Citation Analysis
  • Web of Science
  • Scopus
  • Google Scholar
• Journal Ranking
  • Journal Citation Reports
  • ScImago Journal Rank
• Alt-metrics
• Your Resume
Not everything that can be counted counts, and not everything that counts can be counted.

William Bruce Cameron (1963) “Informal Sociology: A Casual Introduction to Sociological Thinking”
Bibliometrics

... is a set of methods to quantitatively analyze academic literature.

**Metrics are one indicator used for**
- Evaluation of research by individual researcher / group / institution
- Awarding research grants
- Recruitment / Promotion
- Discovering relevant publications
- Finding relevant journals

**Be aware**
- Measuring “Impact” not “Quality”
- Works better in some disciplines than in others
- Metrics are not the “whole picture”, no replacement for peer review
Bibliometrics

**Primary metrics:**
- Number of publications
- Number of citations received
- Collaborations
- Weighted Impact

**Secondary metrics:**
- Journal Impact Factor
- H-Index

**Types of metrics:**
- Journal metrics
- Author metrics
- Article metrics
- Alt-metrics
Many reasons for citing

• Acknowledge published or unpublished sources
• Highlight other sources
• Criticize other sources (negative citations)
• Self-citations
• “Strategic citations”
  • Citation networks
  • Publications in same journal/by same publisher
Bibliometrics

Citation = Citation?

Number of Authors / Contribution to publication

- Single author vs. multiple authors
- Position in author listing
### Bibliometrics

**Citation = Citation?**

<table>
<thead>
<tr>
<th>Document types</th>
<th>Location in publication</th>
<th>Number of occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book</td>
<td>Introduction</td>
<td></td>
</tr>
<tr>
<td>Book chapter</td>
<td>Background</td>
<td></td>
</tr>
<tr>
<td>Review</td>
<td>Methods</td>
<td>Editorial</td>
</tr>
<tr>
<td>Article</td>
<td>Results</td>
<td>Book review</td>
</tr>
<tr>
<td>Conference paper</td>
<td>Discussion</td>
<td>Note</td>
</tr>
<tr>
<td></td>
<td>Conclusion</td>
<td>Letter to editor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Correspondence</td>
</tr>
</tbody>
</table>
Bibliometrics

Citation = Citation?

Publication Year

Bibliometrics

Citation = Citation?

Discipline

![Graph showing H-index and Hi-norm for different disciplines](http://www.harzing.com/data_metrics_comparison.htm#indivh)
The Controversy

“The Leiden Manifesto for research metrics
Use these ten principles to guide research evaluation, urge Diana Hicks, Paul Wouters and colleagues.

Data are increasingly used to govern science. Research evaluations that were once bespoke and performed by peers are now routine and reliant on metrics. The problem is that evaluation is now led by the data rather than by judgment. Metrics have proliferated: usually well intentioned, not always well informed, often ill applied. We risk damaging the system with the very tools designed to improve it: an evaluation is increasingly implemented by organisations without knowledge of, or advice on, good practice and interpretation.

Before 2006, there was the Science Citation Index on CD-ROM from the Institute for Scientific Information (ISI), used by experts for specialist analysis. In 2002, Thomson Scientific launched its Web of Science platform, making the Web of Science database widely accessible. Computing citation indices were created: Thomson's Impact Factor (released in 2006) and Google Scholar (beta version released in 2004). Web-based tools to easily compute institutional research productivity and impact were introduced, such as Scopus (launched for the STM of Scopus and SciVal using Scopus) as well as software to analyse individual citation profiles using Google Scholar (PloS or PLoS to Publisher, released in 2007).

In 2007, Jorge Hirsch, a physicist at the University of California, San Diego, proposed the h-index, popularising citations counting for individual researchers. Interest in the journal impact factor grew rapidly after 1995 (see Impact factor obsession).

Lastly, metrics related to social usage...

Quantitative evaluation should support qualitative, expert assessment.”

http://www.nature.com/news/bibliometrics-the-leiden-manifesto-for-research-metrics-1.17351
The Controversy

San Francisco

DORA

Declaration on Research Assessment

http://www.ascb.org/dora/
H Index

my H-INDEX is bigger than yours
How many $h$ of a researcher’s publications have at least $h$ citations each.
Pro Contra

The h index is ...

- Considering productivity and impact
- Comprehensible
- Easy to compute

- Not taking subject differences in account
- Disadvantaging early career researchers
- Distinguishing between single and multi-author articles
The Tools

- Scopus (Elsevier)
- Web of Sciences (Clarivate)
- Google Scholar
- Publisher Databases
The Tools

Web of Science Vs. Scopus Coverage

Source: JISC  [http://adat.crl.edu](http://adat.crl.edu)
### Analyze author output

Vierra, Craig A.  
University of the Pacific, California, Department of Biological Sciences, Stockton, United States  
Author ID: 6602322840

#### h-index (13)

<table>
<thead>
<tr>
<th>Documents</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>44</td>
</tr>
<tr>
<td>4</td>
<td>43</td>
</tr>
<tr>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>9</td>
<td>23</td>
</tr>
<tr>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
</tr>
</tbody>
</table>

#### Title
- Molecular mechanisms of spider silk
- E2A expression, nuclear localization...
- Molecular and mechanical properties...
- Pyramid spidrin 1, a novel memb...
- Egg case protein-1: A new class of...
- Araneid egg case silk: A fibrin wi...
- Acidic spidroin, a constituent of...
- Spider egg case core fibers: Trimer...
- Analysis of aqueous glue coating p...
- Synthetic spider silk fibers spun from...
- Conserved C-terminal domain of s...
- The Pan basic helix-loop-helix pro...
- Spider glue proteins have distinct a...
- Characterization of a novel class II...
- The genomic structure and promot...
- Isolation and characterization of th...

### This author’s h-index is 13

The h-index is based upon the number of documents and number of citations.

Note: Scopus is in progress of updating pre-1996 cited references going back to 1970. The h-index might increase over time.

Scopus Metrics

Citation Count: 50

Field-Weighted Citation Impact: 2.93

Citation Benchmarking:
- 86th percentile
- Compared to Polymers and Plastics articles of same age and document type

Cited by

50 Citations

Date range: 2013 to 2017

Benchmarking

Measures of activity relative to specific research domains, based on cited by in Scopus

Compared to Polymers and Plastics articles of the same age and document type

All Citations: 86th percentile

http://www.scopus.com/
Web of Science

Results: 24
(in your subscription)

View the articles authored by: Vierra, C

For: AUTHOR: Vierra, C ...More

Refine Results

Search within results for...

Search

Sort by: Publication Date -- newest to oldest

Select Page   S  5K   Save to EndNote online   Add to Marked List

1. Comprehensive Proteomic Analysis of Spider Dragline Silk from Black Widows: A Recipe to Build Synthetic Silk Fibers

By: Larracas, Camille; Hekman, Ryan; Dyrness, Simmone; et al.
INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES
Volume: 17 Issue: 9 Article Number: 1537
Published: SEP 2019

Create Citation Report

Times Cited: 0
(from Web of Science Core Collection)

Usage Count

View Abstract
# Google Scholar Citations

## Marcos Gridi-Papp

**University of the Pacific**  
animal comunication, auditory physiology, vocal physiology, amphibia, bioacoustics  
Verified email at pacific.edu - Homepage

<table>
<thead>
<tr>
<th>Title</th>
<th>Cited by</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>SoundRuler: acoustic analysis for research and teaching</td>
<td>98 *</td>
<td>2007</td>
</tr>
<tr>
<td>M Gridi-Papp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal communication: complex call production in the túngara frog</td>
<td>70</td>
<td>2006</td>
</tr>
<tr>
<td>M Gridi-Papp, AS Rand, MJ Ryan</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature 441 (7089), 38-38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure ultrasonic communication in an endemic Bornean frog</td>
<td>38</td>
<td>2009</td>
</tr>
<tr>
<td>VS Arch, TU Grafe, M Gridi-Papp, PM Narins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLoS One 4 (4), e5413</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active control of ultrasonic hearing in frogs</td>
<td>26</td>
<td>2008</td>
</tr>
<tr>
<td>M Gridi-Papp, AS Feng, JX Shen, ZL Yu, JJ Rosowski, PM Narins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proceedings of the National Academy of Sciences 105 (31), 11014-11019</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential fruit consumption of two Melastomataceae by birds in Serra da Mantiqueira, southeastern Brazil</td>
<td>18</td>
<td>2004</td>
</tr>
<tr>
<td>CO Gridi-Papp, M Gridi-Papp, WR Silva Ararajuba, 5-10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Citation indices

- **Citations**: 317  
  - All: 317  
  - Since 2012: 201
- **h-index**: 8  
  - Since 2012: 6
- **i10-index**: 6  
  - Since 2012: 6

---

[Google Scholar](http://scholar.google.com)
Journal Metrics
- 55 Subject categories
- Uses Web of Science dataset
- Calculates 2 years period

<table>
<thead>
<tr>
<th>Full Journal Title</th>
<th>Total Cites</th>
<th>Citation Impact Factor</th>
<th>Eigenfactor Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics of Life Reviews</td>
<td>1,327</td>
<td>13.840</td>
<td>0.00318</td>
</tr>
<tr>
<td>BIOLOGICAL REVIEWS</td>
<td>9,669</td>
<td>11.615</td>
<td>0.01730</td>
</tr>
<tr>
<td>PLOS BIOLOGY</td>
<td>26,893</td>
<td>9.797</td>
<td>0.06750</td>
</tr>
<tr>
<td>eLife</td>
<td>15,730</td>
<td>7.725</td>
<td>0.13038</td>
</tr>
<tr>
<td>BMC BIOLOGY</td>
<td>4,588</td>
<td>6.779</td>
<td>0.01612</td>
</tr>
<tr>
<td>PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES</td>
<td>36,908</td>
<td>5.846</td>
<td>0.06960</td>
</tr>
<tr>
<td>FASEB JOURNAL</td>
<td>42,242</td>
<td>5.498</td>
<td>0.05766</td>
</tr>
</tbody>
</table>
## Key Indicators

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Cites/5 Year Impact Factor/Journal Impact Factor</th>
<th>5 Year Impact Factor Without Self Cites/Immediacy Index/Citable Items/Journal Citedness/Cited Half-Life</th>
<th>Citing Half-Life</th>
<th>Eigenfactor Score/Article Influence Score</th>
<th>% Articiles in Citable Items/Normalized Eigenfactor/Average JIF Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>26,593/9.797/9.624/10.208/2.035/229/7.5/7.5</td>
<td>0.0750/5.190/99.56/7.73479/95.977</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>25,871/8.668/8.525/10.731/2.437/183/7.1/7.3</td>
<td>0.07536/5.619/100.00/9.04562/95.581</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>24,324/11.771/11.660/12.807/1.706/201/5.9/7.0</td>
<td>0.11217/7.064/100.00/12.3699/97.558</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>22,608/12.690/12.596/13.447/2.151/152/5.2/6.7</td>
<td>0.13390/7.451/100.00/Not A.../98.061</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>20,579/11.452/11.315/13.630/2.461/180/4.6/6.4</td>
<td>0.14559/7.635/100.00/Not A.../98.066</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>18,454/12.472/12.326/14.376/2.706/214/4.1/5.7</td>
<td>0.15993/8.211/100.00/Not A.../98.223</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>15,699/12.916/12.777/14.798/2.692/195/3.5/6.0</td>
<td>0.17622/8.540/100.00/Not A.../98.346</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>12,186/12.683/12.600/14.662/2.184/212/3.1/5.7</td>
<td>0.15465/8.744/100.00/Not A.../98.289</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>9,223/13.501/13.271/14.991/2.855/228/2.6/5.7</td>
<td>0.12475/9.413/100.00/Not A.../98.412</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
SCImago Journal & Country Rank

- 27 Subject areas and 313 Subject categories
- Uses Scopus dataset
- Calculates 3 years period

http://www.scimagojr.com
# SCImago Journal & Country Rank

<table>
<thead>
<tr>
<th>Title</th>
<th>Type</th>
<th>H Index</th>
<th>Total Docs. (2016)</th>
<th>Total Docs. (3years)</th>
<th>Total Refs.</th>
<th>Total Cites</th>
<th>Citable Docs. (3years)</th>
<th>Cites / Doc.</th>
<th>Ref. / Doc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanisms of Disease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studies in Mycology</td>
<td>journal</td>
<td>6.468</td>
<td>72</td>
<td>16</td>
<td>45</td>
<td>1847</td>
<td>645</td>
<td>41</td>
<td>15.00</td>
</tr>
<tr>
<td>Plant Cell</td>
<td>journal</td>
<td>5.516</td>
<td>289</td>
<td>216</td>
<td>1075</td>
<td>12092</td>
<td>8190</td>
<td>932</td>
<td>8.21</td>
</tr>
<tr>
<td>Annual Review of Phytopathology</td>
<td>book</td>
<td>5.160</td>
<td>131</td>
<td>25</td>
<td>80</td>
<td>3530</td>
<td>975</td>
<td>80</td>
<td>11.42</td>
</tr>
</tbody>
</table>
Plant Cell
Scopus coverage years: from 1989 to Present
Publisher: American Society of Plant Biologists
ISSN: 1040-4651  E-ISSN: 1532-298X
Subject area: Agricultural and Biological Sciences: Plant Science

CiteScore
CiteScore 2016
7.66

CiteScore rank
In category: Plant Science
Percentile: 98th
Rank: #5/379

CiteScore content
Citation Count 2016
8,241 Citations
Documents 2013 - 2015*
1,076 Documents

* CiteScore includes all available document types
Altmetrics
Altmetrics

"Altmetrics are measures of scholarly impact mined from activity in online tools and environments."

Jason Priem, author of “Altmetrics: a manifesto”

Benefits:
• A more nuanced understanding of impact, showing us which scholarly products are read, discussed, saved and recommended as well as cited.
• Often more timely data, showing evidence of impact in days instead of years.
• A window on the impact of web-native scholarly products like datasets, software, blog posts, videos and more.
• Indications of impacts on diverse audiences including scholars but also practitioners, clinicians, educators and the general public.

New perspectives of impact

**ACADEMIC IMPACT**
- Journal Impact Factor
- Citation counts
- H-index
- Number of publications

**SOCIETAL IMPACT**
- Download counts
- Page views
- Mentions in news reports
- References in policy
- Mentions in social media
- Mentions in blogs
- Reference manager readers
- ... etc.

Traditional bibliometrics
Alternative metrics “altmetrics”

Can be slow to accrue
Altmetrics

Potentially “measured”

- Viewed (publisher websites, Dryad)
- Downloaded (publisher websites, Slideshare, Dryad)
- Shared (Facebook, Twitter)
- Reused/adapted (Github)
- Bookmarked (Mendeley, CiteULike, Delicious)
- Purchased (Library catalogues, Sales numbers)
- Commented upon (Twitter, Mendeley, blogs, publisher websites, Wikipedia, Faculty 1000)

Source: S. Konkiel, Univ. of Indiana
Altmetrics

Caveats

- Lack of standard
- Use of online tools may differ by individual researcher, discipline, over time
- Popularity (attention) does not always equal quality of research or researcher
- Was the spike in hits a one-time, short-attention event?
- Data sources come and go (think MySpace, Connotea)
- Open to manipulation and gaming
Altmetrics – Altmetric.com

STATISTICS FROM ALTMETRIC.COM

- Picked up by 2 news outlets
- Blogged by 6
- Tweeted by 7
- Referenced in 3 Wikipedia entries
- 1829 readers on Mendeley
- 5 readers on CiteULike

See more details

https://www.altmetric.com/

Tools for researchers

It’s quick and easy to start exploring the Altmetric data for your publications – here’s an overview of the tools we provide for individual researchers:

Altmetric Bookmarklet
This free browser plug-in lets you instantly see the Altmetric data for any publication with a DOI. Click on the donut to view the full details page for each output.

Altmetric badges
The Altmetric badges enable you to showcase the online attention surrounding your research, and it’s free to embed them in your individual profile or publications page in just a few simple steps.

Altmetric API
The Altmetric API is free to use for research purposes! You can use it to query our entire database (which currently contains attention data for over 4 million research outputs).
The timing and spatiotemporal patterning of Neanderthal disappearance.

Citation data: Nature, ISSN: 1476-4687, Vol: 512, Issue: 7514, Page: 306-9
Publication Year: 2014

https://plumanalytics.com/
Your Resume

To include in your CV

- Books
- Book chapters
- Journal articles
- Conference papers
- Working papers
- Patents
- Government publications

Count and mention

- Number of citations
- Impact factor of journal
- Your h-Index
- Downloads/views from Repository
- Reviews of book or book chapter
Your Resume

Include also

- Datasets / Open Source Software (download statistics)
- Awards (best paper award etc.)
- Reviewing invitations (journals, conferences)
- Editorial board membership
- Interviews, public appearances
- Scholarly articles in newspapers/magazines
- Links to professional blogs and professional accounts in social media (Twitter, Facebook, ResearchGate, Academia.edu, LinkedIn, etc.)
Your Resume

Add Summary for Publications

**Publications**

**Summary:** Since 2004 I have published 21 peer-reviewed journal articles (18 as first/corresponding author) and 3 book chapters. I have an h-index of 6 as calculated using Web of Science or 7 as calculated using Google Scholar. The following lists ISI Impact Factors and citations according to Google Scholar.

**Peer-Reviewed Journal Articles (published or accepted for publication):**


Your Resume

Downloads

Internet downloads

- 75,000 page downloads from my home page in 2009.
- Over 10,000 hits on INFFER web pages in 2009
- Most downloaded paper in Australian Journal of Experimental Agriculture since 2000 – effectively the all time most downloaded paper out of 1300 published in that time (have been no. 1 since May 2008 to present): Pannell, Marshall, Barr, Curtis, Vanclay and Wilkinson (2006).
- 17th most downloaded paper of all time in Australian Journal of Experimental Agriculture: Ridley and Pannell (2005).
Thank you!

Feel free to attend other Scholarly Communication Talks
For schedule see: http://scholarlycommons.pacific.edu/plw/

And check out the workshops provided by:
Office of Sponsored Programs
Institutional Review Board
Graduate School
Center for Teaching and Learning

Contact:
Michael Ladisch
Phone: 209.932.3188
Email: mladisch@pacific.edu
Twitter: MichaelLibrCA
ORCID: http://orcid.org/0000-0002-0124-5582