

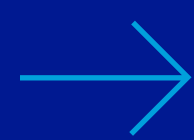
# Progress Report 2021

— A year in review





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# 2021

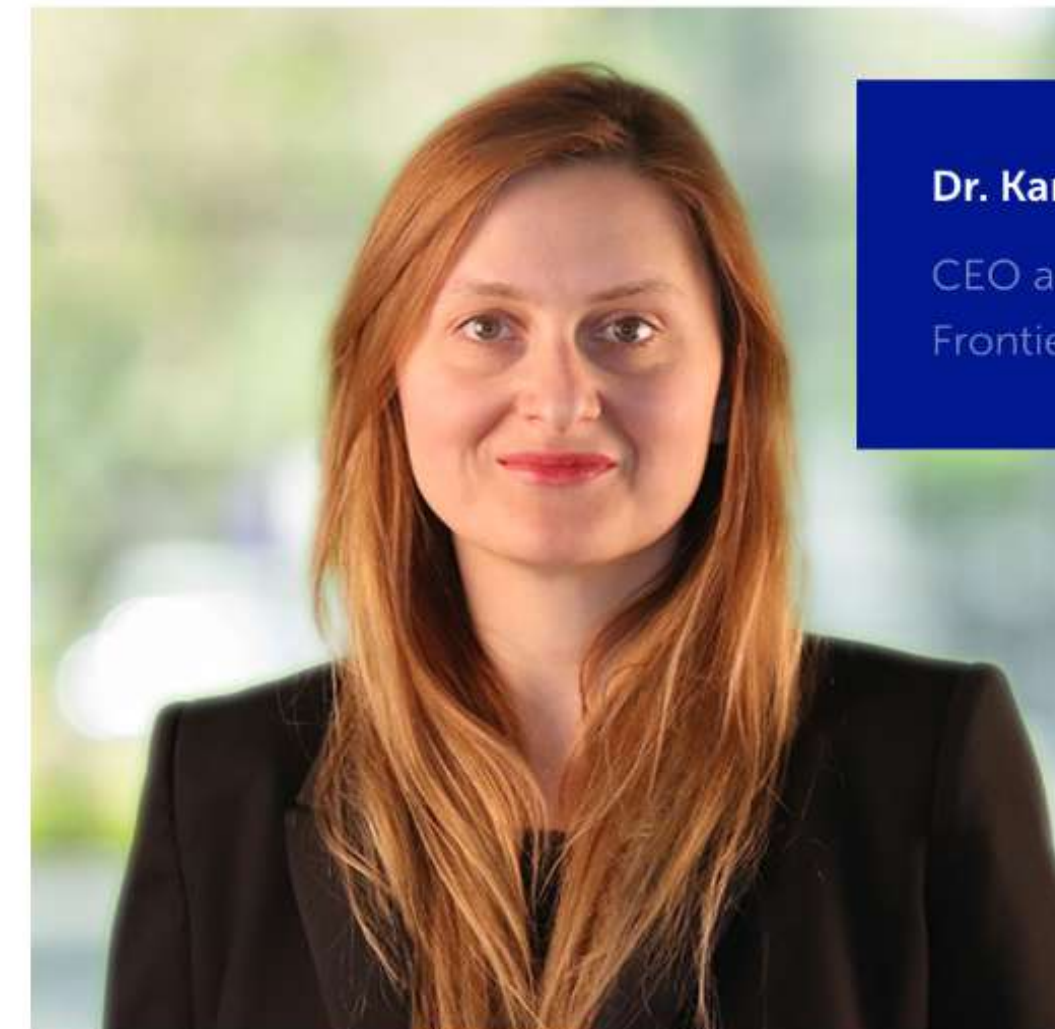
## A game-changing year in science

The coronavirus pandemic, our response, and our recovery will come to define this period in our history. But what will 2021 be remembered for? As well as the pandemic, the prevailing memory of last year will also be the fact that science, and more specifically open science, delivered solutions for one of the biggest challenges we have faced.

2021 demonstrated, above all else, that while COVID-19 remained a significant challenge, it was also a year of immense global collaboration, cooperation, and achievement.

Today, less than two years after the World Health Organization declared COVID-19 a global pandemic, more than **nine billion vaccine** doses for COVID-19 have been administered. Nearly 60% of the world's population has received at least one dose of a vaccine and around 30 million vaccines are now administered daily. That is extraordinary progress against an unprecedented challenge.

While we have not yet conquered the pandemic, scientists and the research community have risen to the challenge. Treatments and vaccines have been delivered at a speed faster than any other time in history – and that is something to be proud of and to be remembered.



**Dr. Kamila Markram**  
CEO and co-founder,  
Frontiers

### Open science is saving lives

In January 2020, when most people weren't aware of COVID-19, Chinese scientists had already openly shared the genetic sequence of coronavirus, instantly triggering a race for vaccines worldwide. Two months later, in March 2020, when it was clear this was a global emergency, the US White House, together with a coalition of partner organizations, launched the COVID-19 Open Research Dataset (CORD-19). This collated all coronavirus-related research and mandated it must be open and free to access, even those articles published in subscription journals. At the time, there were 30'000 coronavirus research articles. Today, there are well over 400'000 – most open access.

Since Frontiers was founded in 2007, we have stood for open science; free, immediate, and unrestricted access to all publicly funded research for all of society. From academics to physicians, policymakers, journalists, students, you, and I.

Our mission remains unchanged. Throughout 2021, thanks to the enormous efforts of everyone who is part of our wonderful community of editorial board members, staff, and those who support us, we reached several new and important milestones in our history.

In the continued context of COVID, the **Frontiers Forum** opened its virtual doors in a series of webinars on science-led solutions to the grand challenges of our time with 24 incredible speakers, including former US Vice President, Al Gore. More than 21,000 of the world's leading minds from 159 countries joined the discussions, which have been viewed online by more than six million people.

### Continued growth and achievement

2021 was also an exceptional year for **Frontiers for Young Minds**, our journal for young people aged eight to 15. In a first, **five Nobel Laureates** published a scientific article collection, connecting young minds with some of today's most distinguished scientists. This outstanding journal has published 800 articles and includes English, Hebrew, and Arabic. Taken together, these articles have been viewed and downloaded more than 14 million times.

Last year, we also welcomed new growth throughout our operations. Frontiers now has more than 1,200 employees in 14 locations across Europe, North America, and Asia. We will continue to grow into 2022 and bring the best talent on board to help us achieve our mission of making science open to enable healthy lives on a healthy planet.

Our **Institutional Partnerships** have too gone from strength to strength. In 2021, 64 new institutional partners joined Frontiers, including the University of Oslo, the University of Oklahoma, Durham University, and University of Colorado Boulder. Our number of Institutional Partners is now 555 and we have transparent National Open Access publishing deals in place in Austria, Luxembourg, Norway, Sweden, UK and Qatar, and partnerships with six other consortia.

### Other key highlights from 2021

We are the third most cited publisher, with our average article citation count increasing from 3.9 in 2020 to 4.8 in 2021.

- Last year, we published more than 85,000 quality research articles in our portfolio of journals. To date, we have now published 273,000+ research papers that are freely available and helping to inform vital research worldwide.
- There were more than 518 million article views and downloads of our published articles last year. In total, there have now been over 1.5 billion views and downloads of our papers, all of which are entirely free to access.
- Frontiers' community grew to 169,000 editors and one million authors from leading institutions around the world last year. An additional 58,000 new editors joined our editorial boards in 2021.
- 27 new journals were launched in 2021. Frontiers is now home to 139 community-run journals across 1,165 academic disciplines.

Together, the scientific community achieved so much last year. Now we must build on that momentum. We must build on the spirit of collaboration across other areas; cancer, cardiovascular disease, and the defining issue of our time, climate change. Science is central to this, and open science can make it happen at the speed we need it to. At Frontiers, we remain committed to enabling this change in everyone way we can.

A sincere thank you to our authors, editors, reviewers, and staff for everything you have contributed and for believing in open science. It is your contributions that will help enable a way forward for people and planet.

I am proud to work alongside you and look forward to continuing to do so as we face the future together.

Kamila Markram, PhD

CEO and co-founder, Frontiers

January 2022



# Awards

## Special Jury Prize at the 2021 Vaud International Business Awards

The Swiss award recognizes Frontiers' role in creating jobs and successfully contributing to the reputation and prosperity of the Canton Vaud.

[– Read more](#)



## Best Culture of Learning at the 2021 LinkedIn Talent Awards

We have been recognized as the best middle-sized company in Switzerland for investing in the learning and development of our employees by connecting them to relevant and applicable skills training programs.

[– Read more](#)



[See all awards](#)



# Journals

Frontiers publishes **139** open access journals, including **6** society journals. Our portfolio aligns with the UN's Sustainable Development Goals and ranges from Artificial Intelligence to Digital Humanities, and Climate to Psychology.

**139**

total journals

**1,165**

total academic disciplines

## Journal launches

We launched **27** new journals in 2021, many of which support the UN's Sustainable Development Goals with research addressing the biggest global challenges of our time.



## 2021 journal highlights



### Frontiers in Virology

Field Chief Editor: **Akio Adachi**  
Kansai Medical University, Japan

An exciting new multidisciplinary journal exploring all biological and molecular aspects of viruses to direct the future of research.

— See journal



### Frontiers in Network Physiology

Field Chief Editor: **Plamen Ch. Ivanov**  
Boston University, United States

The first journal in this new field, focusing on the basic mechanisms through which systems and organs interact and integrate to generate a variety of physiologic states.

— See journal



### Frontiers in Health Services

Field Chief Editor: **Jose M Valderas**  
The Institute of Health Research, Medical School, College of Medicine and Health, University of Exeter, United Kingdom

A multidisciplinary journal exploring health services, from policy to implementation, from cost allocation to health information systems. It aims to help health systems be more efficient and to improve experiences and outcomes for patients.

— See journal



### Frontiers in Drug Discovery

Field Chief Editor: **Bruno Viloutreix**  
Institut National de la Santé et de la Recherche Médicale (INSERM), France

A multidisciplinary journal focusing on drug discovery and the development lifecycle, from the identification of drug entities, to the design and development of new candidate medications and therapies.

— See journal



### Frontiers in Epidemiology

Field Chief Editor: **Tobias Kurth**  
Charité – Universitätsmedizin Berlin, Germany

An innovative journal for scientific exchange across the breadth of epidemiological research. It explores the use of data for investigating and predicting health outcomes, and assessing the health impact of climate change or social inequality.

— See journal



### Frontiers in Thermal Engineering

Field Chief Editor: **Xianguo Li**  
University of Waterloo, Canada

Advancing our understanding of thermal engineering from fundamental and basic research to applied and industry focused engineering and technology development.

— See journal



### Frontiers in Manufacturing Technology

Field Chief Editor: **Dimitris Kiritsis**  
Swiss Federal Institute of Technology Lausanne, Switzerland

An innovative journal exploring all aspects of manufacturing technologies - additive processes, precision engineering, material forming, software technologies and lifecycle engineering - and their application to address key global challenges.

— See journal



### Frontiers in Food Science and Technology

Field Chief Editor: **Giovanna Ferrari**  
University of Salerno, Italy

Exploring food science and technology, coupling innovation with an eye on sustainability. It explores new thinking in global food and food production systems, in line with the UN 2030 Agenda sustainable development goals.

— See journal



### Frontiers in Insect Science

Field Chief Editor: **Guy Smagghe**  
Ghent University, Belgium

Advancing entomology, with research on the biology, physiology and neurobiology of insects. It explores commercial and industrial applications of insect research to global challenges such as climate change and nutrition.

— See journal

## 2021 journal launches

Frontiers in Drug Delivery

Frontiers in Drug Discovery

Frontiers in Drug Safety and Regulation

Frontiers in Molecular Medicine

Frontiers in Network Physiology

Frontiers in Systems Biology

Frontiers in Aging Neuroscience

Frontiers in Molecular Neuroscience

Frontiers in Neuroimaging

Frontiers in Epidemiology

Frontiers in Health Services

Frontiers in Nephrology

Frontiers in Nuclear Medicine

Frontiers in Ophthalmology

Frontiers in Radiology

Frontiers in Urology

Frontiers in Gastroenterology

Frontiers in Insect Science

Frontiers in Virology

Frontiers in Analytical Science

Frontiers in Biomaterials Science

Frontiers in Electronic Materials

Frontiers in Food Science and Technology

Frontiers in Manufacturing Technology

Frontiers in Signal Processing

Frontiers in Soft Matter

Frontiers in Thermal Engineering

[See all journals](#)



# Authors and editors

We work with leading authors and editors. Our journals are community-driven by active researchers and enable them to drive progress and shape their fields.

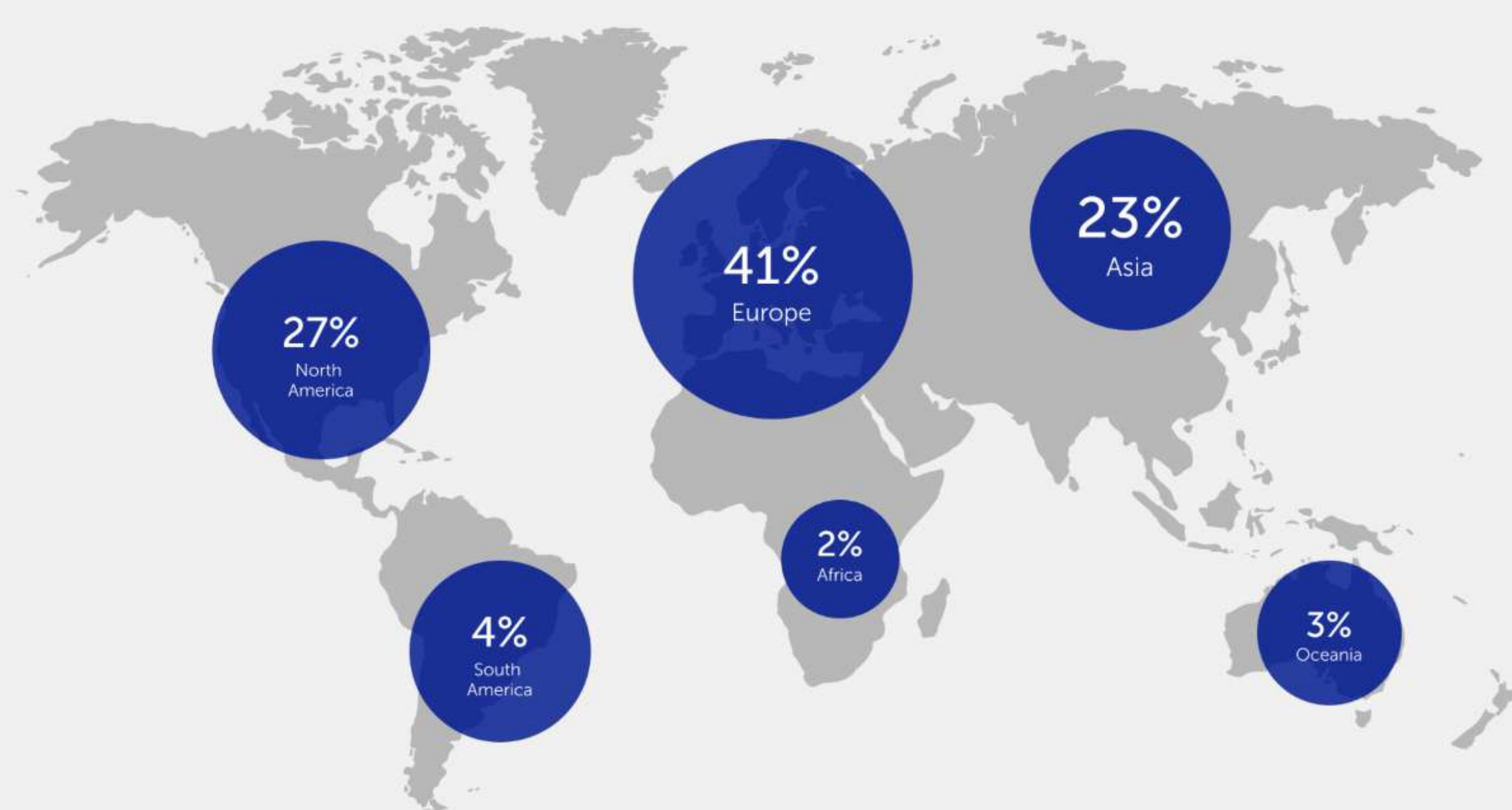
In 2021, the Frontiers community grew to more than **1 million** authors and **169,000** Review, Associate and Chief Editors.

## Top institutional affiliations

Institutions	Editors	Authors
<b>Total</b>	<b>169,614</b>	<b>1,053,652</b>
University of California System	2,022	10,607
Centre National de la Recherche Scientifique (CNRS)	1,493	8,040
Chinese Academy of Sciences (CAS)	1,401	8,351
Harvard University	1,245	5,047
University of Texas System	1,206	4,598
State University System of Florida	916	4,005
Institut National de la Santé et de la Recherche Médicale (INSERM)	857	5,502
Spanish National Research Council (CSIC)	843	3,482
National Institutes of Health (NIH)	834	3,511
National Research Council (CNR)	796	2,226
University of London	747	3,346
University of São Paulo	691	3,606
Sapienza University of Rome	684	2,331
University of North Carolina System	676	2,543
University of Naples Federico II	636	2,014
University of Padua	608	2,053
Helmholtz Association of German Research Centres (HZ)	593	4,079
Zhejiang University	564	6,788
Shanghai Jiao Tong University	517	7,504
University of Bologna	498	1,475
University of Pittsburgh	477	1,766
Stanford University	466	2,041
University of Toronto	452	2,591
Johns Hopkins University	443	1,979
Cornell University	441	1,973

## Editors' geographical locations

Our editorial boards comprise more than **169,000** review, associate and chief editors from **202** countries.



## Research Topics

Finding answers to your biggest research questions, Research Topics are multidisciplinary article collections bringing together leading experts in their field. Designed for impact, these collections are highly cited and widely read by researchers across the world.

**4,657**  
Research Topics with ebooks

**744,514,002**  
total views and downloads

## 2021 collection highlights



### Nutritional immunology

How specific foods and nutrients affect COVID-19 severity and outcomes

29 articles | 731,000 views

— See collection



### Infectious disease

Uncovering the many ethical, legal, and social issues that have arisen during the pandemic

29 articles | 1,638,000 views

— See collection



### Sustainable agriculture

Demonstrating the potential of various microbes to enhance plant productivity and yield in cropping systems

49 articles | 163,000 views

— See collection

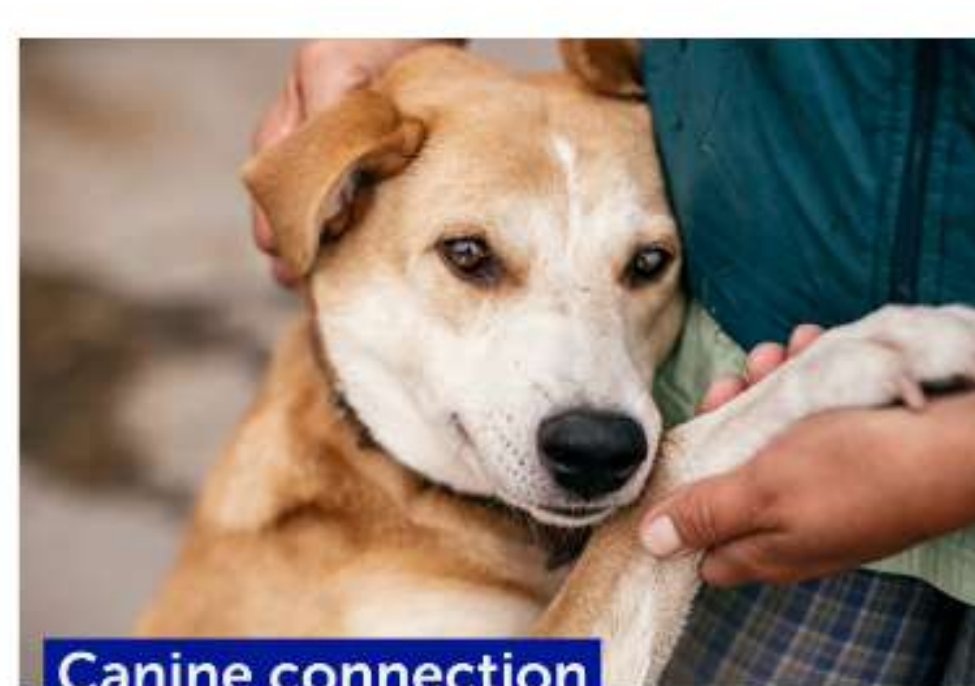


### Political misinformation

Understanding how to halt the spread of false news while increasing the circulation of information from credible sources during the pandemic

11 articles | 210,000 views

— See collection



### Canine connection

Exploring the human-dog bond and how interactions between the two benefits us medically, psychologically, and through service as working dogs

13 articles | 115,000 views

— See collection



### Mental health

Discovering insights from altered states of consciousness through psychedelic therapies

22 articles | 130,000 views

— See collection

[See all collections](#)

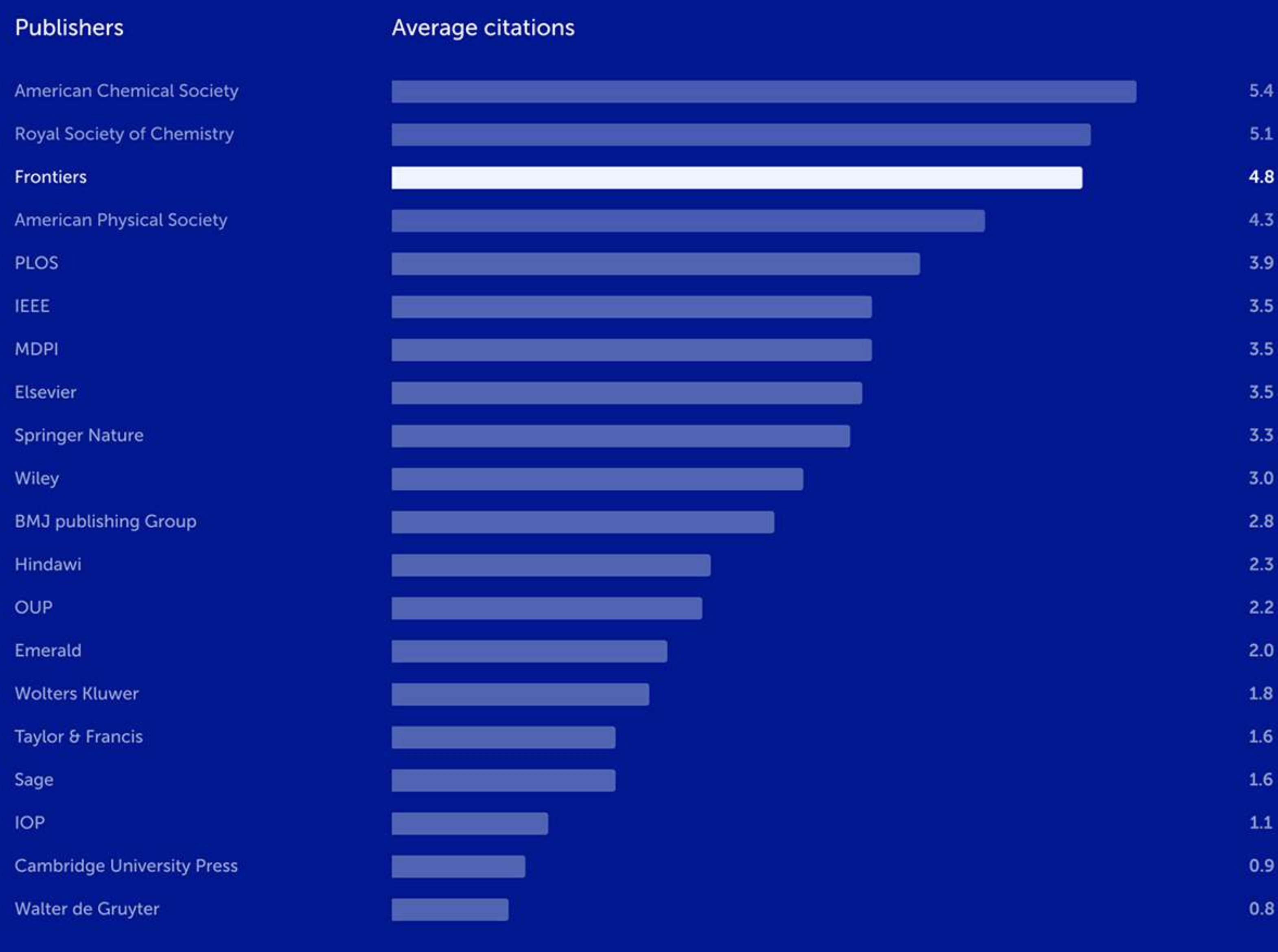


# Impact

Our impact metrics reflect the power of research that is open to all. We measure and communicate a range of metrics, including Impact Factor, CiteScore, overall citation rate, aggregate views and downloads, and news and social media mentions.

## 3rd most-cited publisher

In 2020, Frontiers was the 3rd most-cited publisher. Average citations increased from **3.9** in 2019 to **4.8** in 2020 for every article published with us.



## 1.5 billion views and downloads | 3 million citations

In 2021, Frontiers articles were viewed and downloaded **515 million** times, totalling **1.5 billion** overall. This is an increase of **64%** over the previous year. Article citations also increased by **46%**, totalling **3 million citations**.

**1.5 billion**

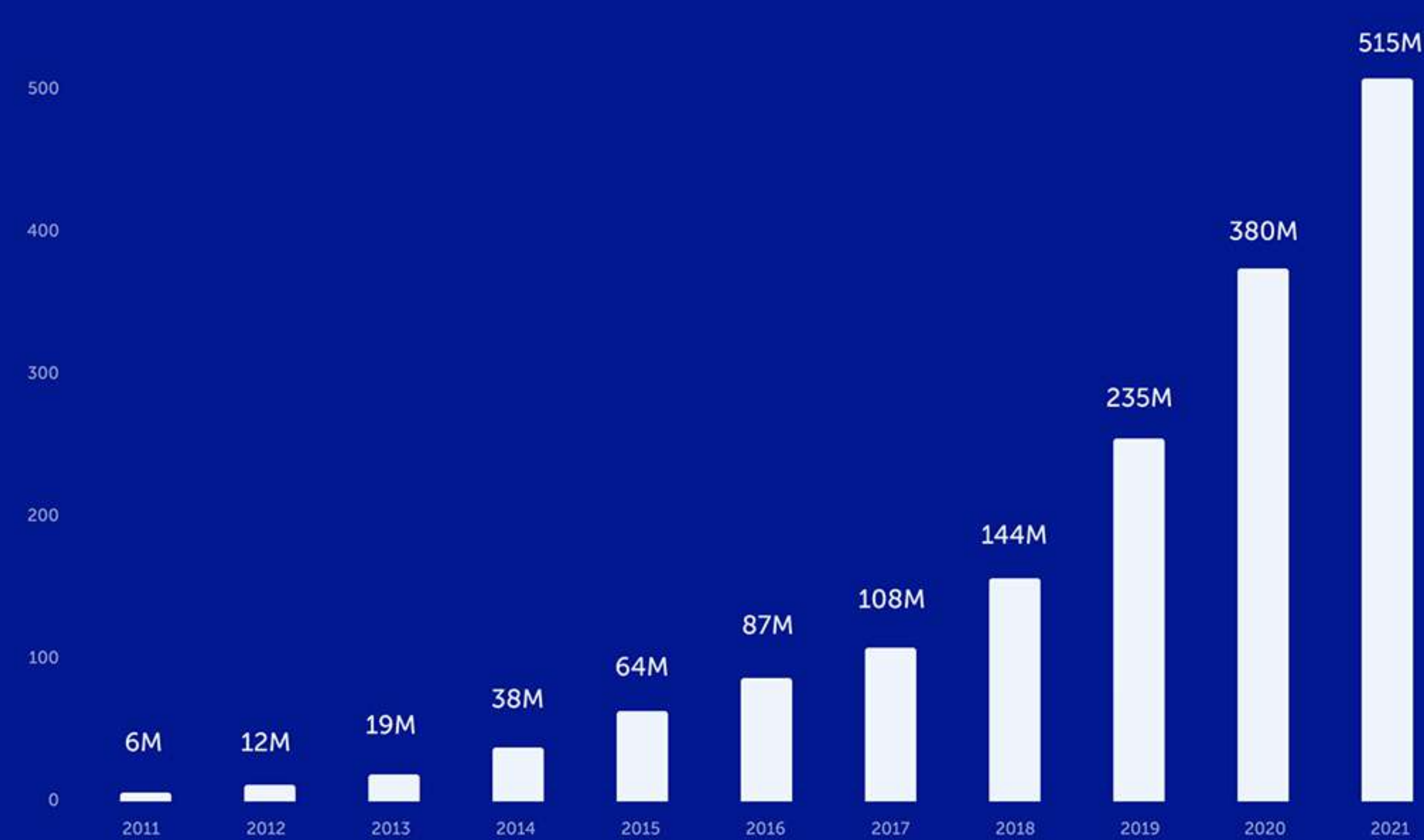
total views and downloads

**3 million**

total Scopus citations



## Article views and downloads (per year)





# Impact Factor and CiteScore

Following the 2021 release of the Web of Science Group's Journal Citation Report (JCR 2021) and Scopus' CiteScore, **46** of the journals published by Frontiers have a Journal Impact Factor and **57** journals have a CiteScore.

The Journal Impact Factor is the average number of citations received in the last year to articles published in the previous two years. It is measured each year by the Web of Science Group and reported in the Journal Citation Reports (JCR). The 2020 Journal Impact Factors, published in the 2021 Journal Citation Report, are based on citations in 2020 to articles published in 2018 and 2019.

The CiteScore journal impact metric measures the average citations received in a four-year time window to selected documents published in the same four years. The 2020 CiteScores are based on citations received in 2017-2020 to articles, reviews, conference papers, book chapters, and data papers published in 2017-2020, and divides this by the number of these documents published in 2017-2020. CiteScore covers all journal titles in Elsevier's Scopus database and is released once a year.

Frontiers in Astronomy and Space Sciences		5.2
Frontiers in Behavioral Neuroscience	3.558	4.7
Frontiers in Bioengineering and Biotechnology	5.890	2.8
Frontiers in Built Environment		2.6
Frontiers in Cardiovascular Medicine	6.050	7.8
Frontiers in Cell and Developmental Biology	6.684	2.7
Frontiers in Cellular and Infection Microbiology	5.293	6.5
Frontiers in Cellular Neuroscience	5.505	7.0
Frontiers in Chemistry	5.221	4.1
Frontiers in Computational Neuroscience	2.380	4.7
Frontiers in Earth Science	3.498	3.3
Frontiers in Ecology and Evolution	4.171	3.6
Frontiers in Education		1.3
Frontiers in Endocrinology	5.555	5.1
Frontiers in Energy Research	4.008	2.6
Frontiers in Environmental Science	4.581	4.4
Frontiers in Genetics	4.599	3.7
Frontiers in Human Neuroscience	3.169	5.1
Frontiers in Immunology	7.561	8.1
Frontiers in Integrative Neuroscience	2.763	3.6
Frontiers in Marine Science	4.912	5.0
Frontiers in Materials	3.515	2.7
Frontiers in Mechanical Engineering		3.0
Frontiers in Medicine	5.091	4.1
Frontiers in Microbiology	5.640	7.3
Frontiers in Molecular Biosciences	5.246	4.1
Frontiers in Molecular Neuroscience	5.639	8.4
Frontiers in Neural Circuits	3.492	5.7
Frontiers in Neuroanatomy	3.856	6.0
Frontiers in Neuroinformatics	4.081	6.2
Frontiers in Neurology	4.003	4.0
Frontiers in Neurorobotics	2.650	5.5
Frontiers in Neuroscience	4.677	5.4
Frontiers in Nutrition	6.576	5.0
Frontiers in Oncology	6.244	3.9
Frontiers in Pediatrics	3.418	3.1
Frontiers in Pharmacology	5.810	6.2
Frontiers in Physics	3.560	3.1
Frontiers in Physiology	4.566	5.6
Frontiers in Plant Science	5.753	8.2
Frontiers in Psychiatry	4.157	3.5
Frontiers in Psychology	2.990	3.5
Frontiers in Public Health	3.709	2.7
Frontiers in Robotics and AI		4.4
Frontiers in Sociology		1.2
Frontiers in Surgery	2.718	2.4
Frontiers in Sustainable Food Systems		2.4
Frontiers in Synaptic Neuroscience	4.506	4.5
Frontiers in Systems Neuroscience	3.289	4.8
Frontiers in Veterinary Science	3.412	2.6
International Journal of Public Health	3.38	4.2
Pathology and Oncology Research	3.201	4.1
Public Health Reviews		6.8
Spanish Journal of Soil Science		1.1

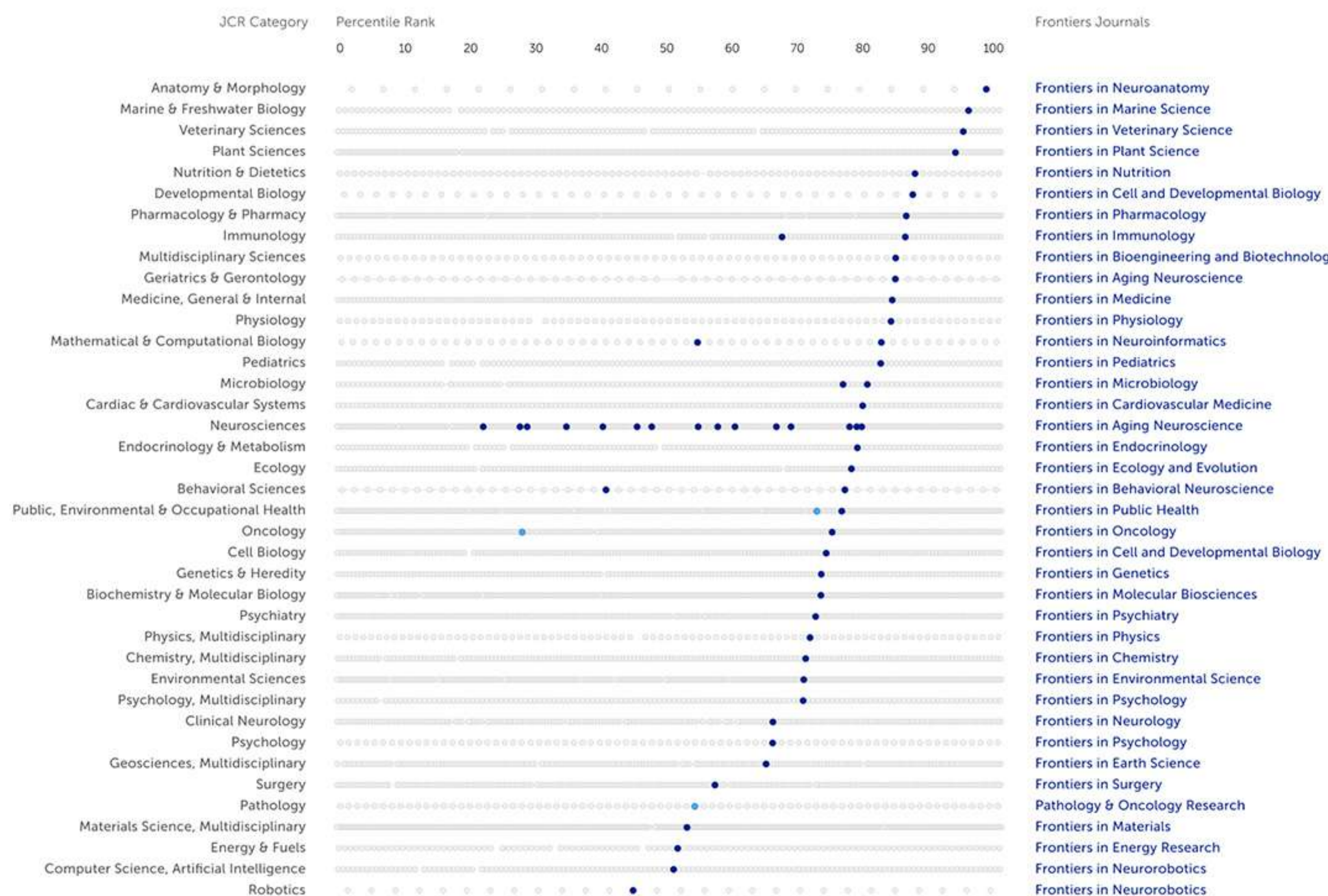
[See all journals](#)

## Impact Factors

Frontiers journals improved their Journal Impact Factor ranking in **30 out of 39 categories in the 2021 Journal Citation Report**. There are **4** Frontiers journals in the top 10% in at least one category, and **23** journals are in the top 25%.

### Percentile rank of Frontiers journals in their respective JCR category (2020)

The Journal Impact Factor is the average number of citations received in the last year to articles published in the previous two years. It is measured each year by the Web of Science Group and reported in the Journal Citation Reports (JCR). The 2020 Journal Impact Factors are based on citations in 2020 to articles published in 2018 and 2019. The graph below depicts the percentile rank of Frontiers journals (blue dots) in their respective JCR category.





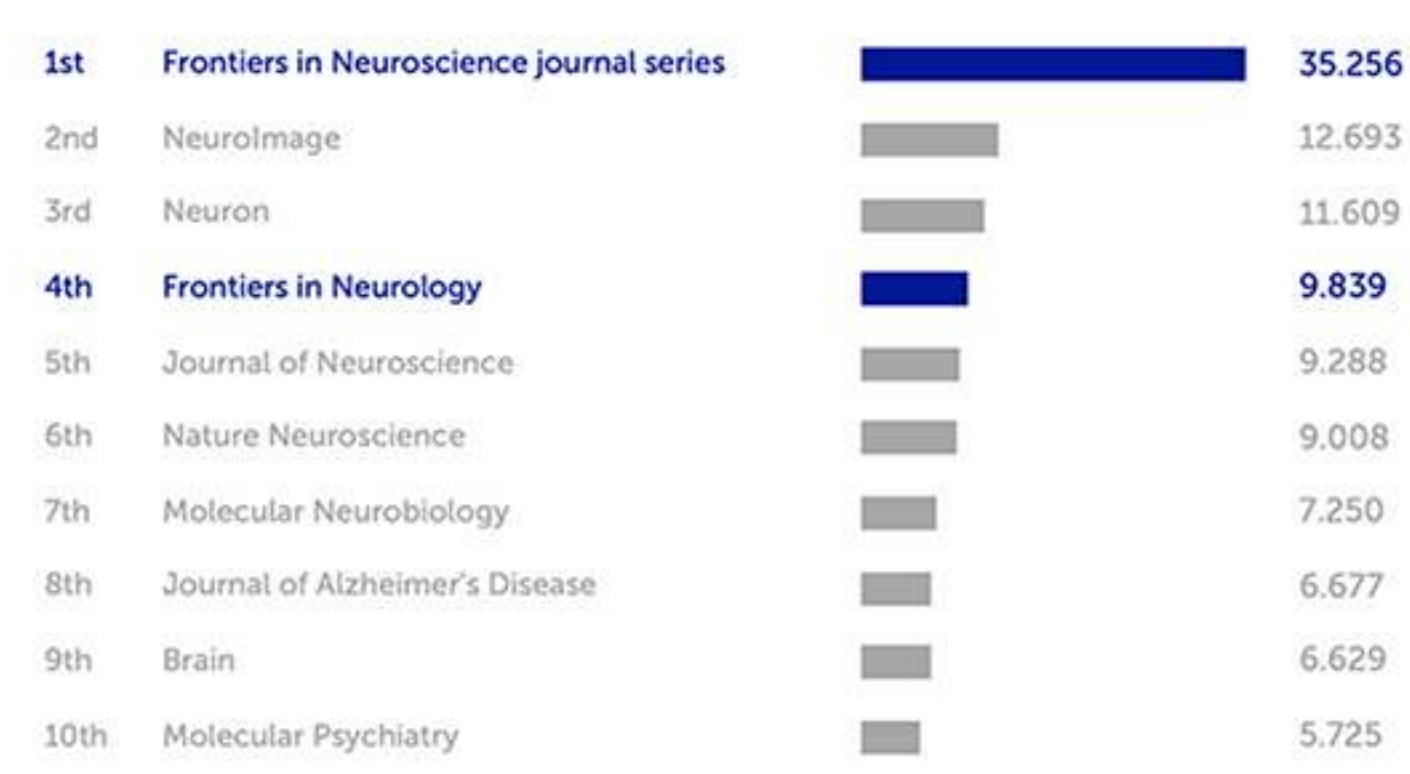
# Most cited journals

Many of our journals rank among the most influential in their fields, including the most cited in **neurosciences, immunology, microbiology, plant science, and psychology.**

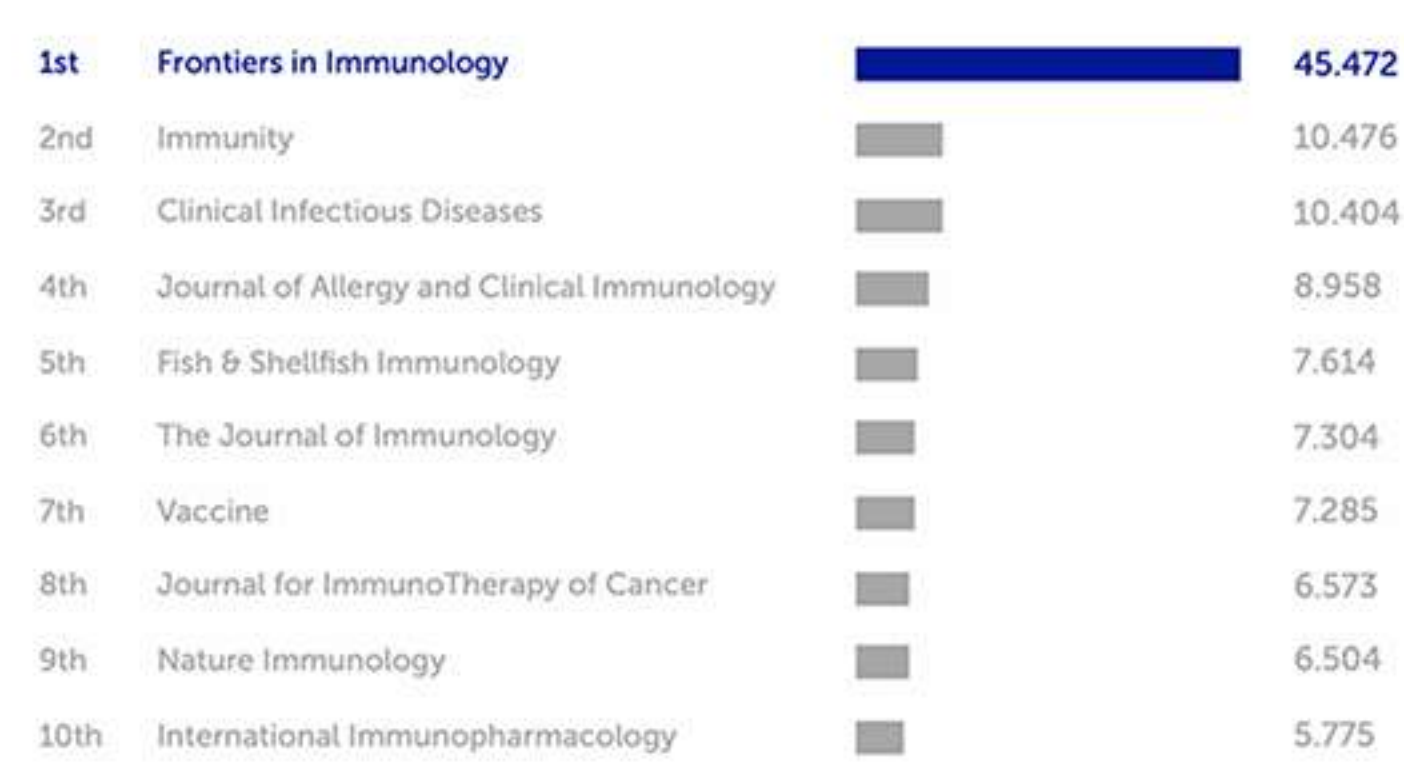
JCR CiteScore

Ranking of the top 10 most-cited journals in several JCR categories (released in 2021 by Web of Science Group). Bar plots show the total number of citations received in 2020 to articles published in 2018 and 2019, with Frontiers journals in blue.

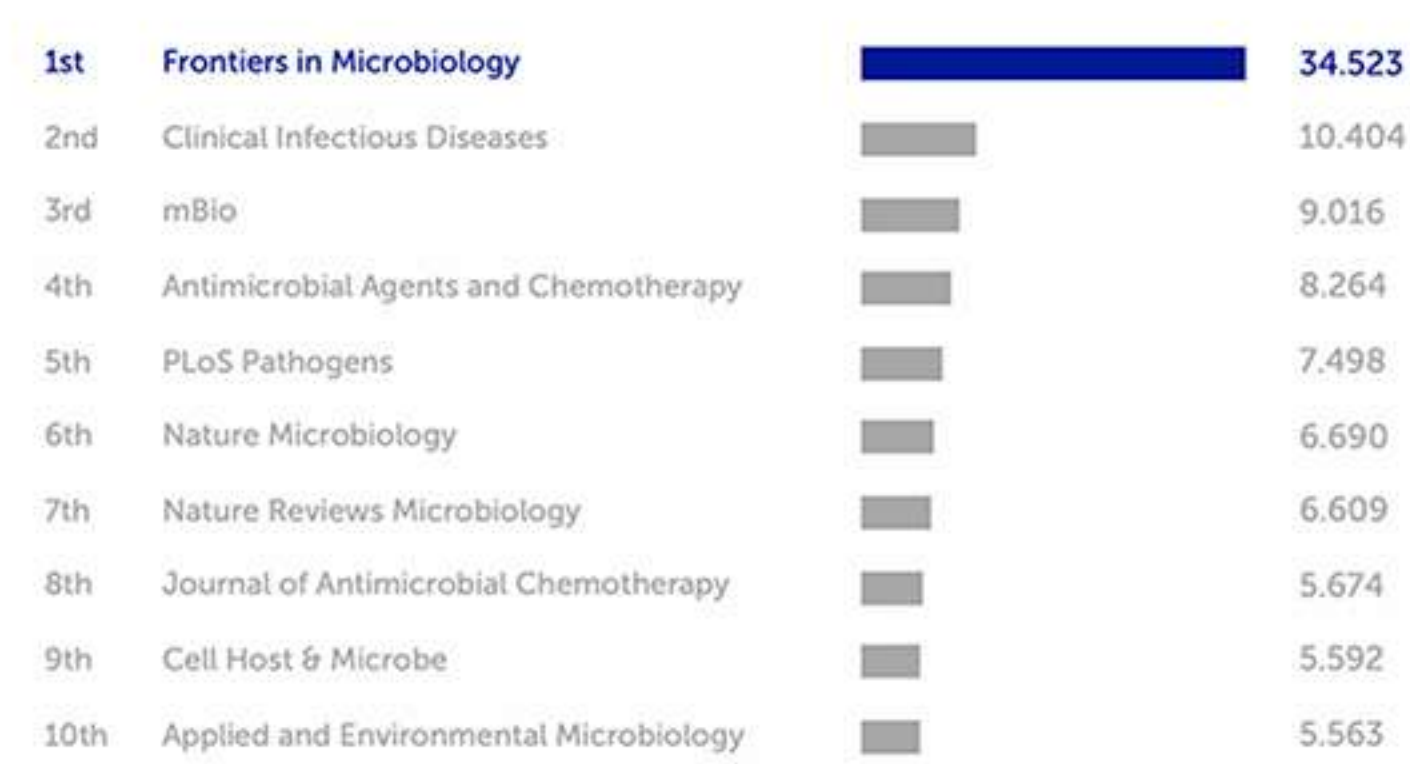
## Neurosciences\* (260 journals)



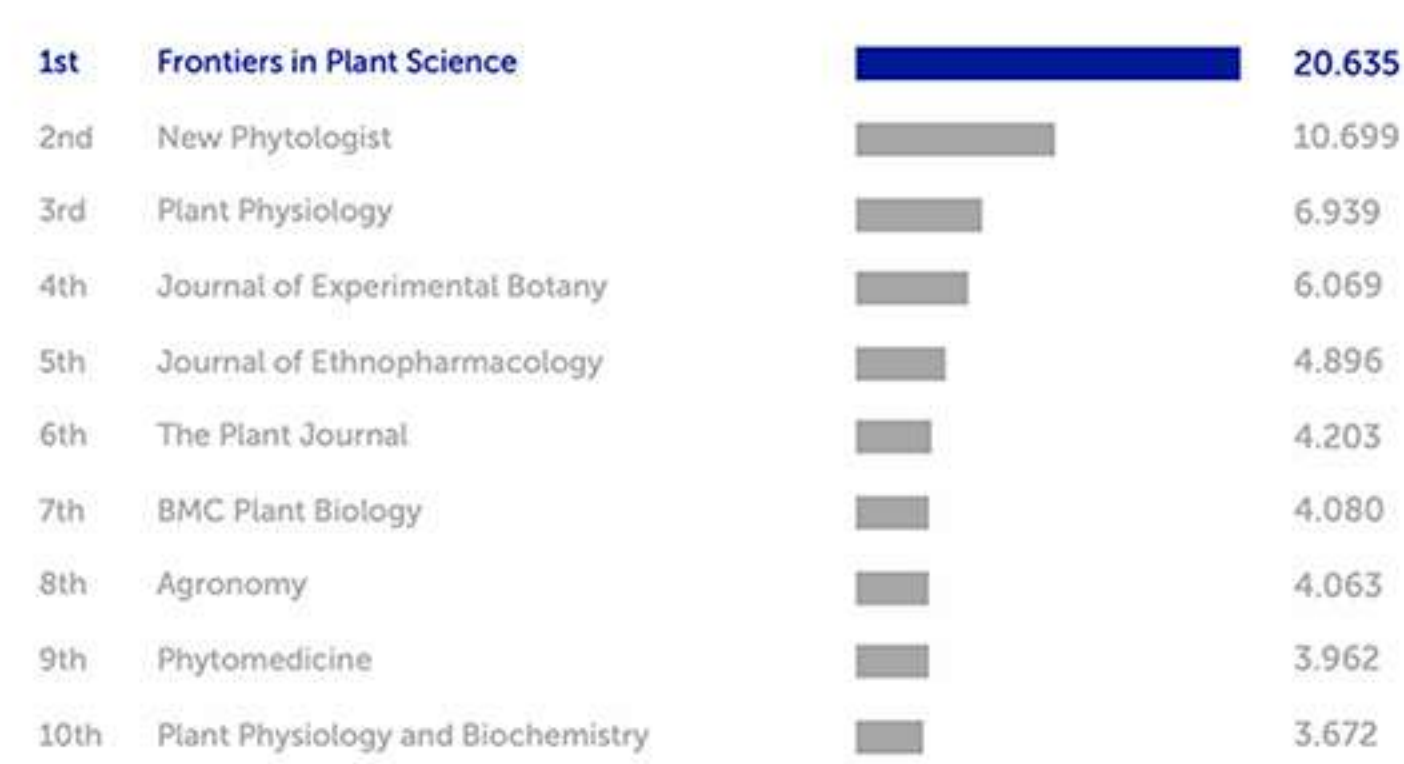
## Immunology (162 journals)



## Microbiology (136 journals)



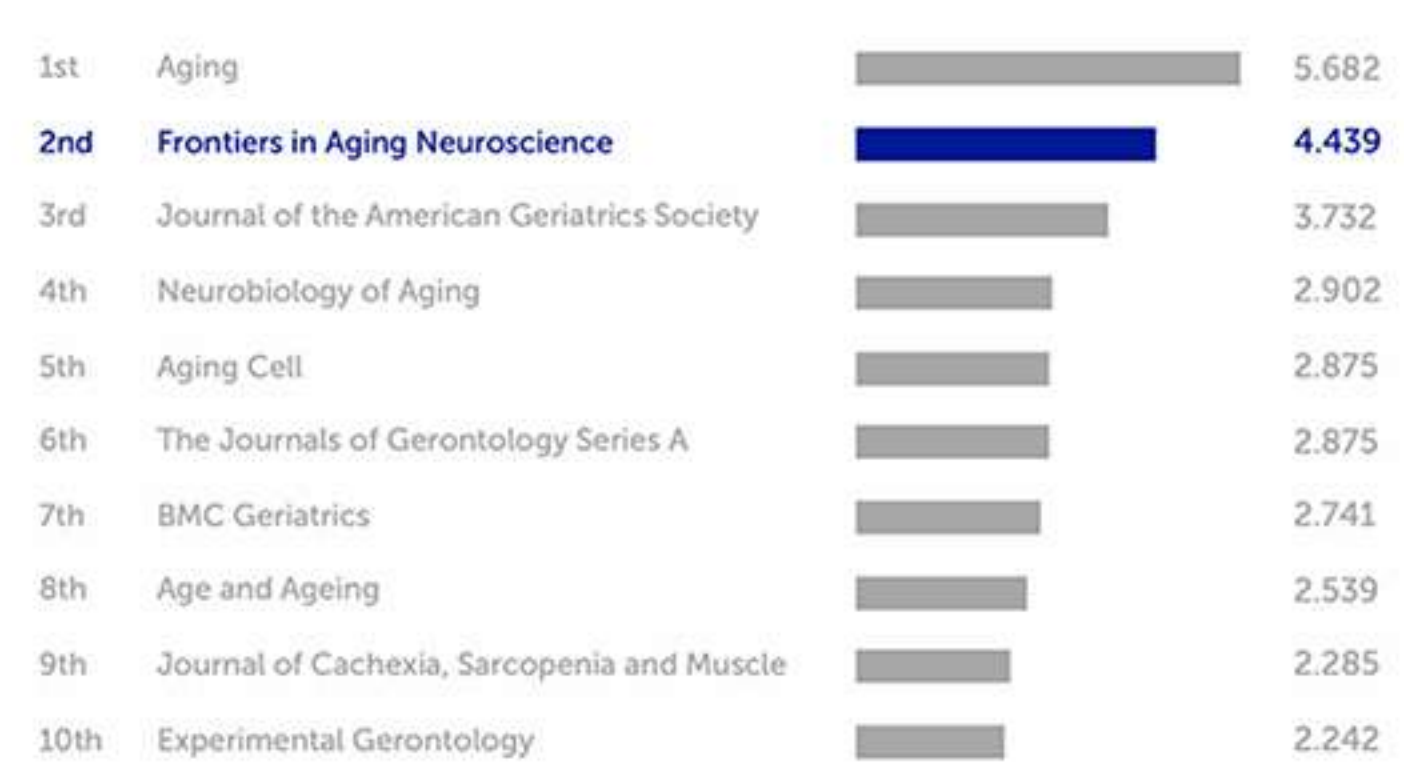
## Plant Sciences (235 journals)



## Psychology, Multidisciplinary (139 journals)



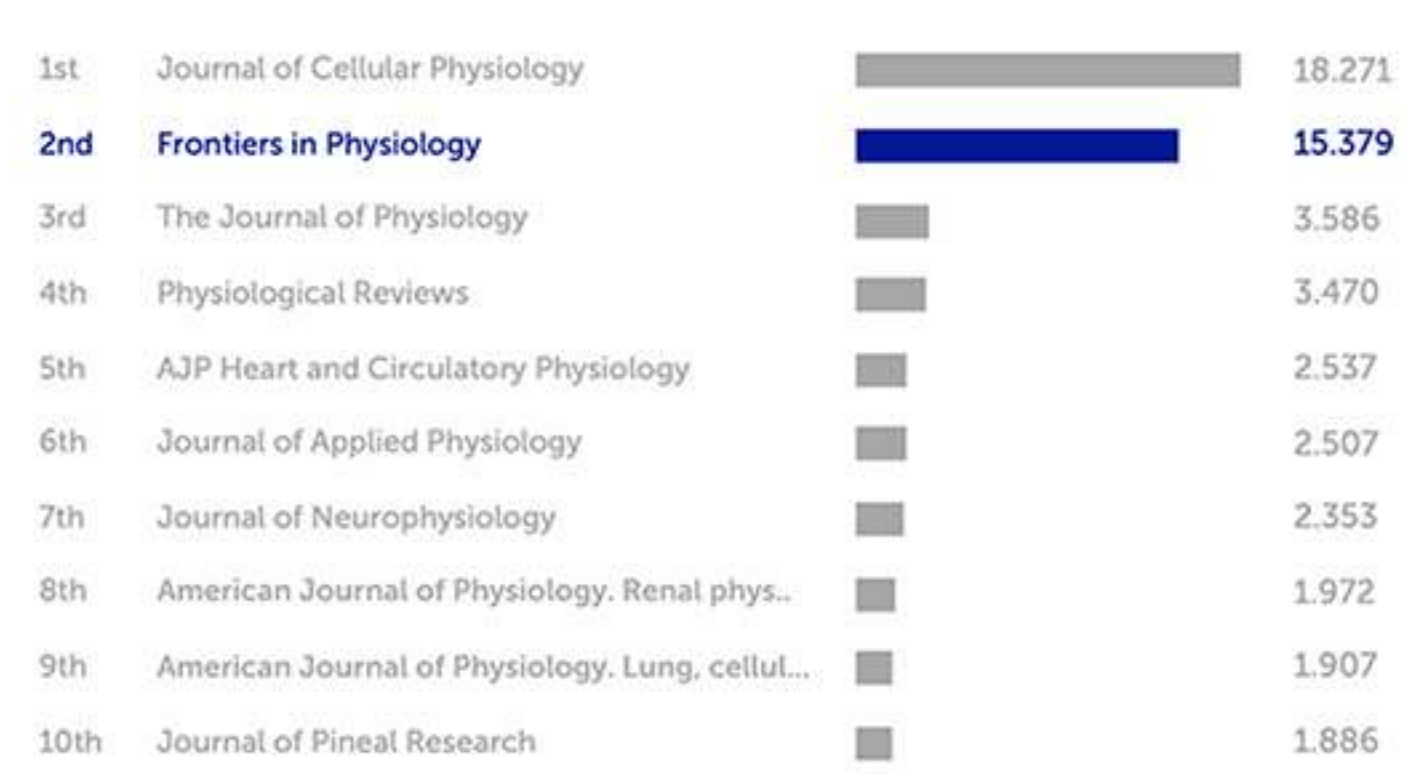
## Geriatrics & Gerontology (53 journals)



## Pharmacology & Pharmacy (275 journals)



## Physiology (81 journals)



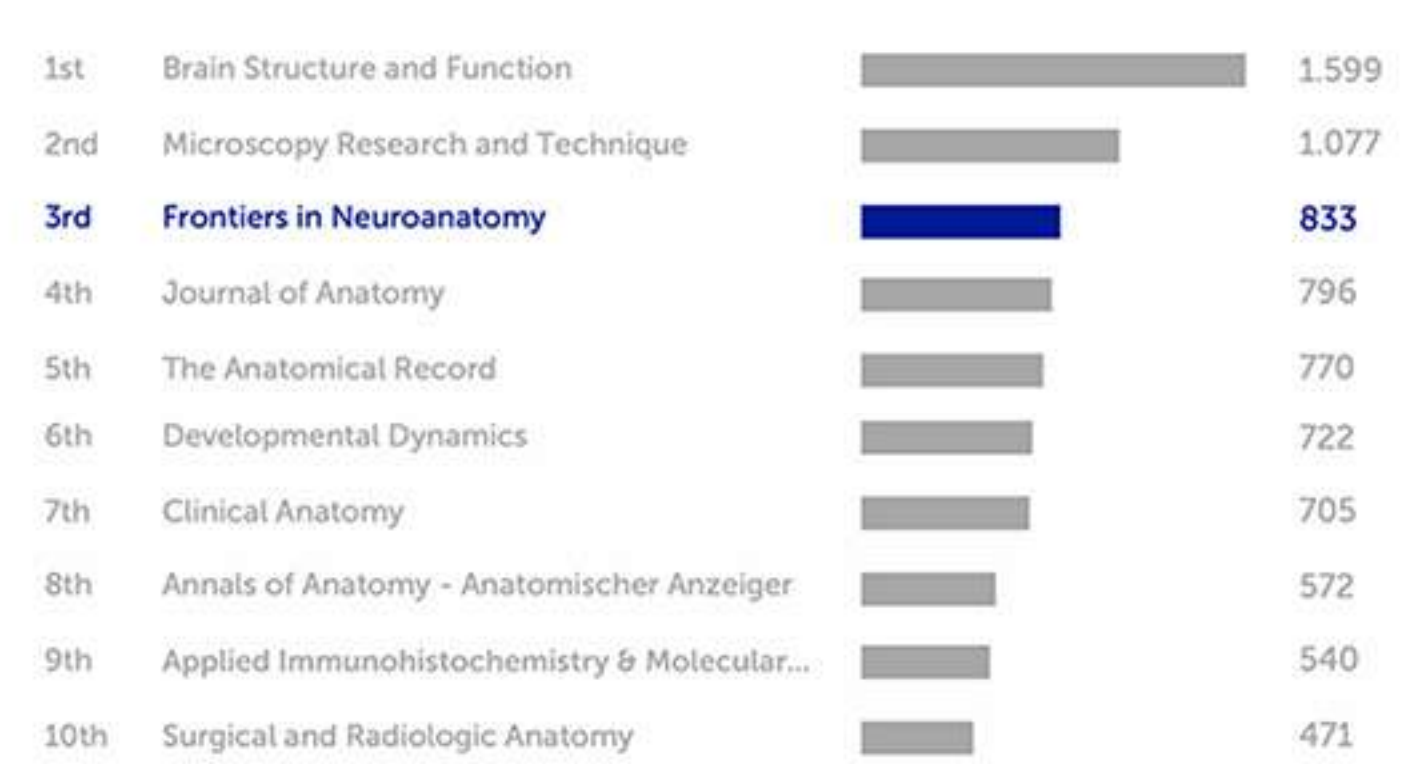
## Psychiatry (216 journals)



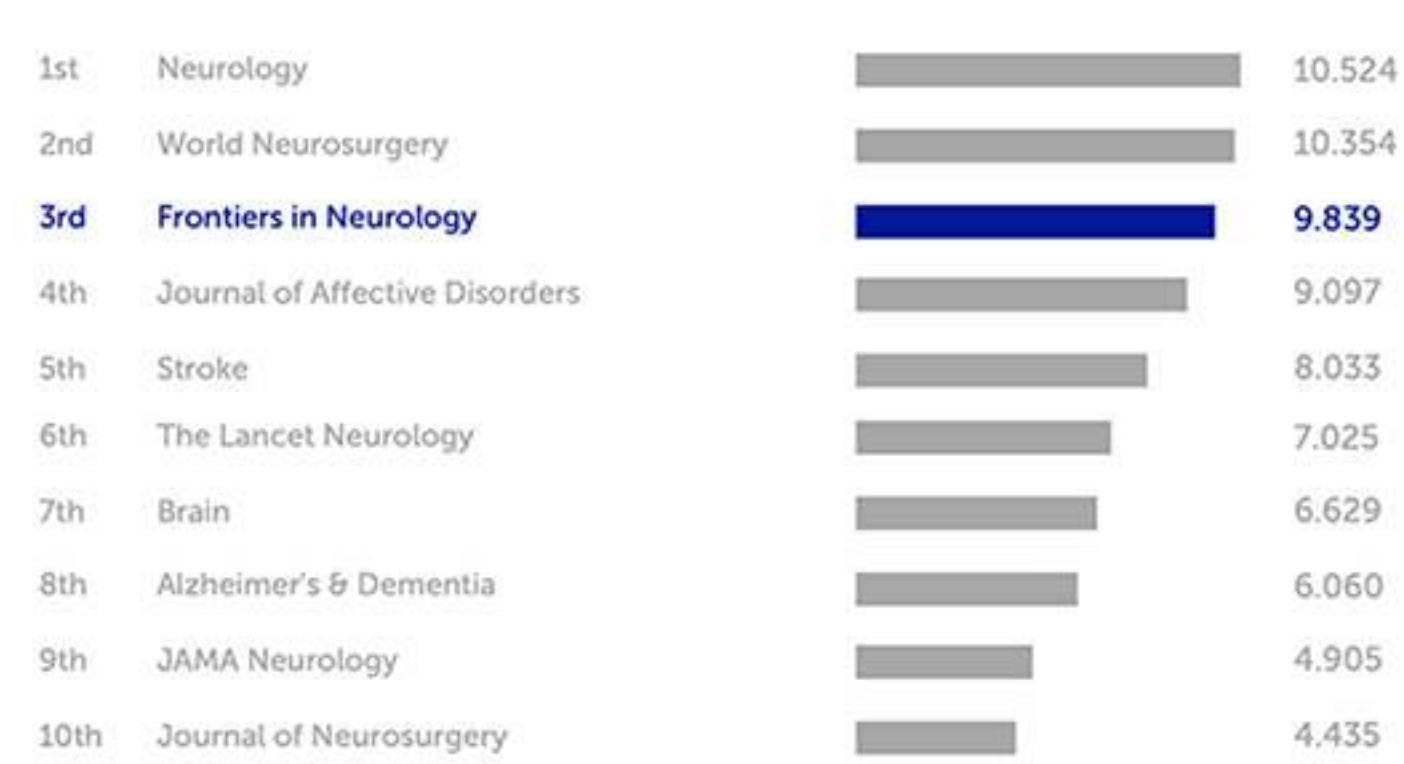
## Psychology (77 journals)



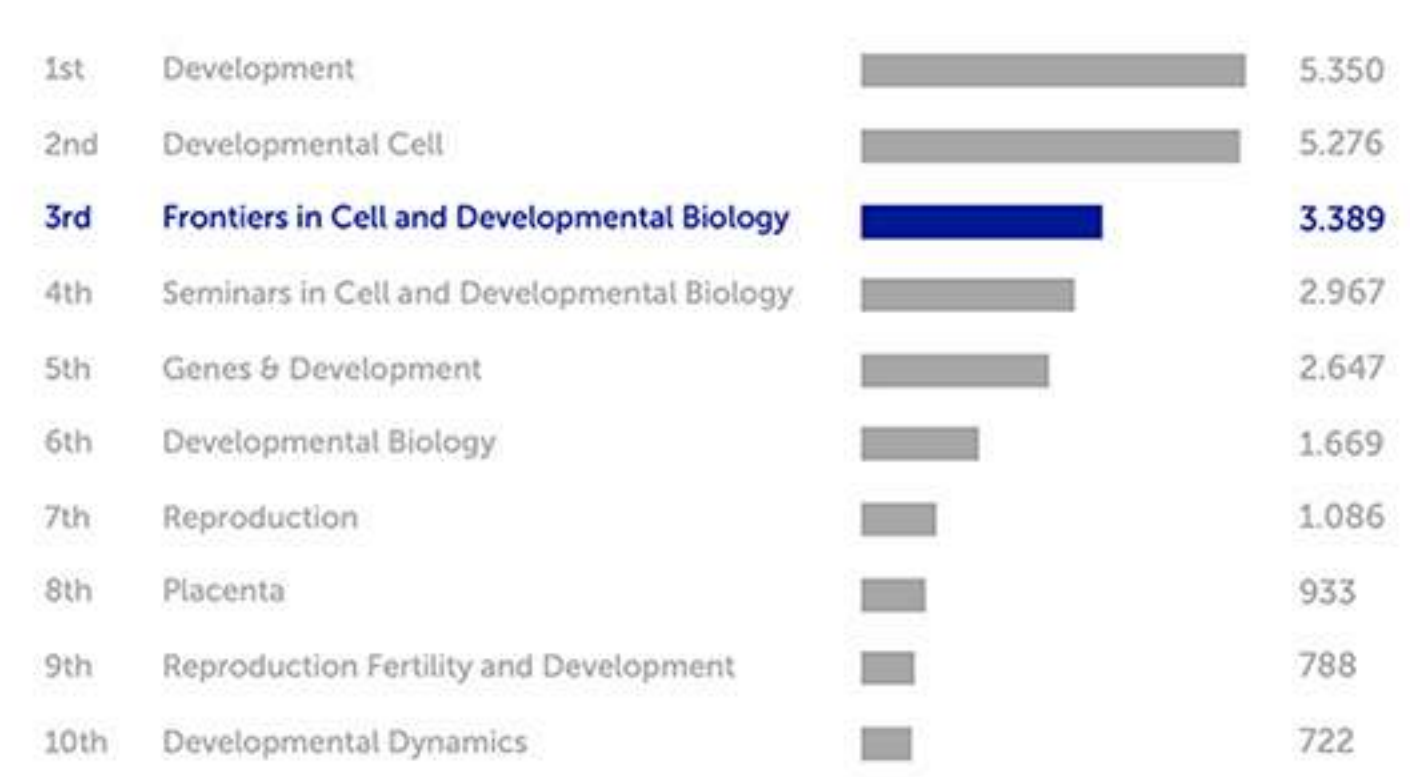
## Anatomy & Morphology (21 journals)



## Clinical Neurology (208 journals)



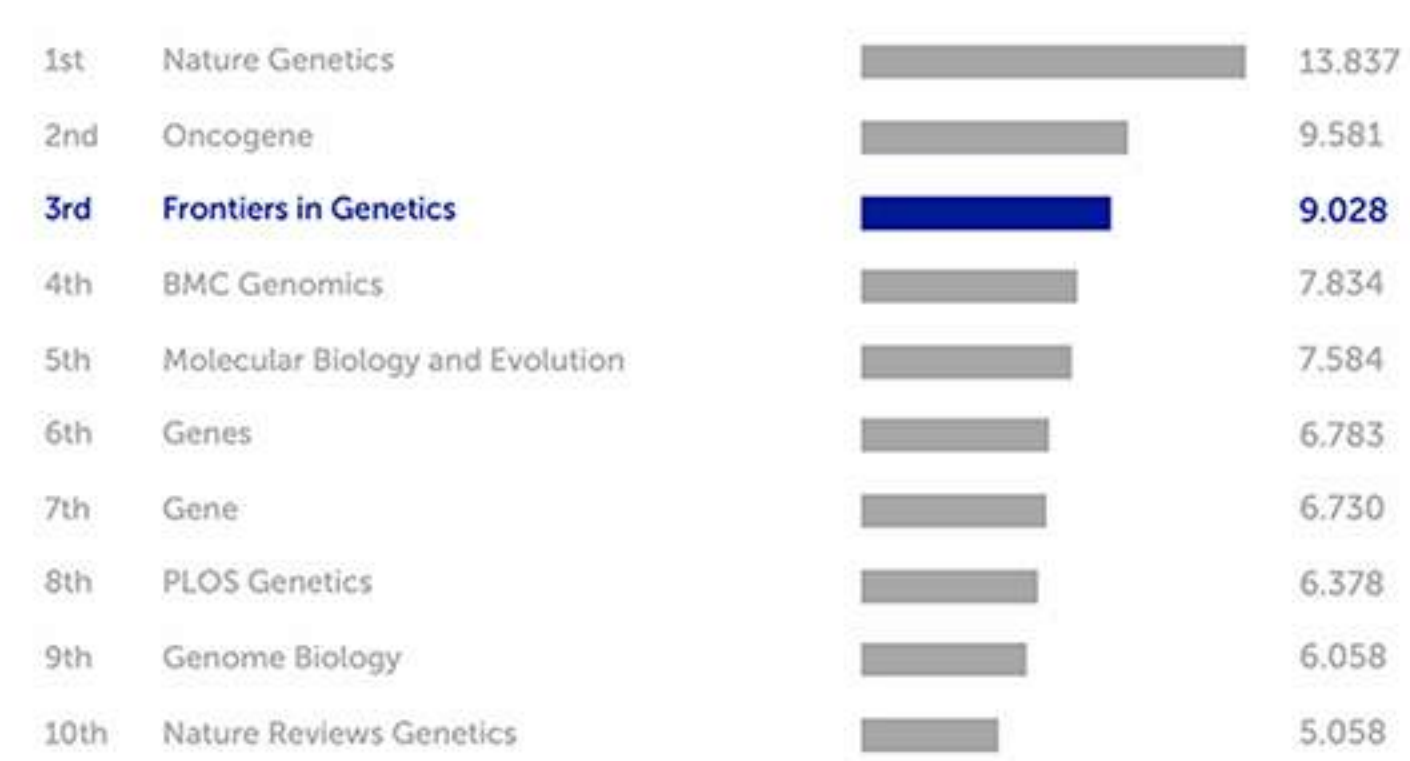
## Developmental Biology (41 journals)



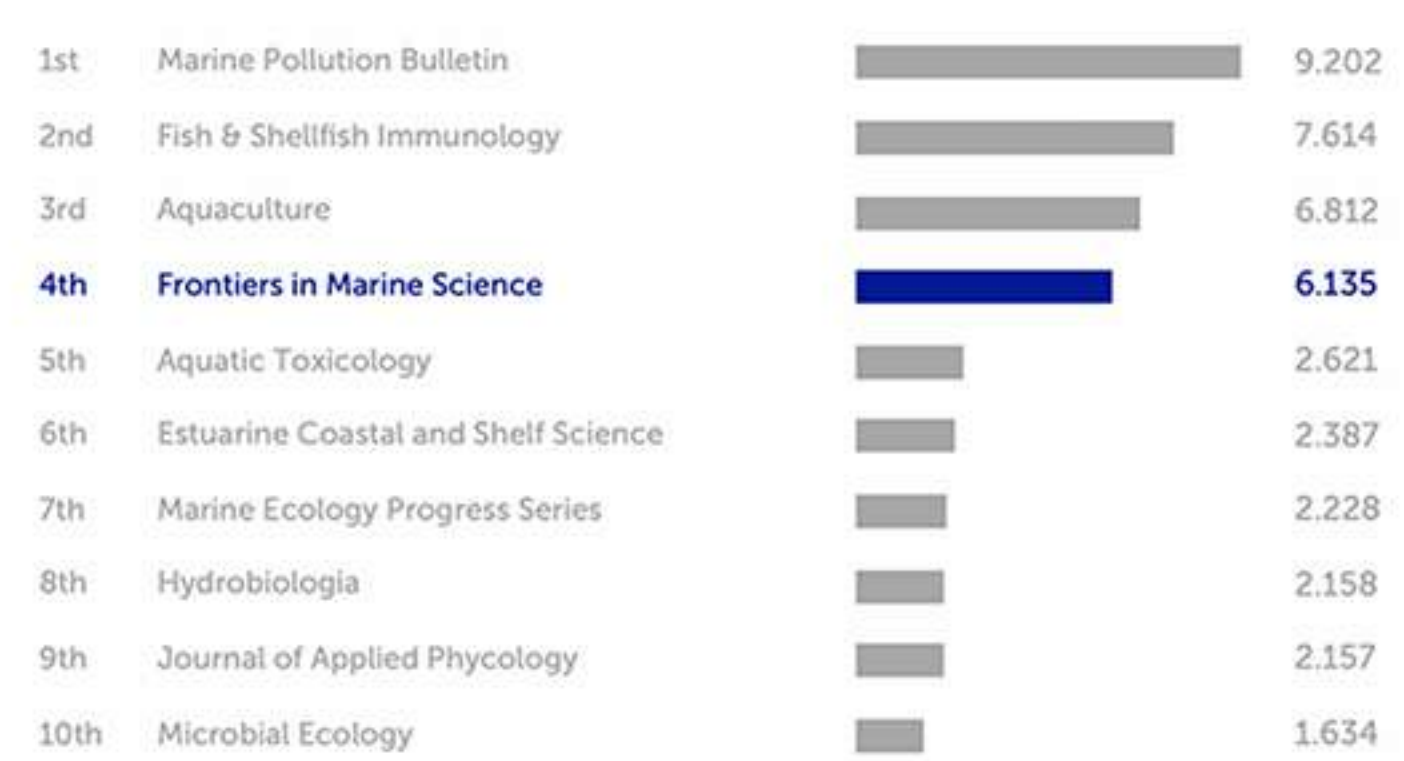
## Endocrinology & Metabolism (145 journals)



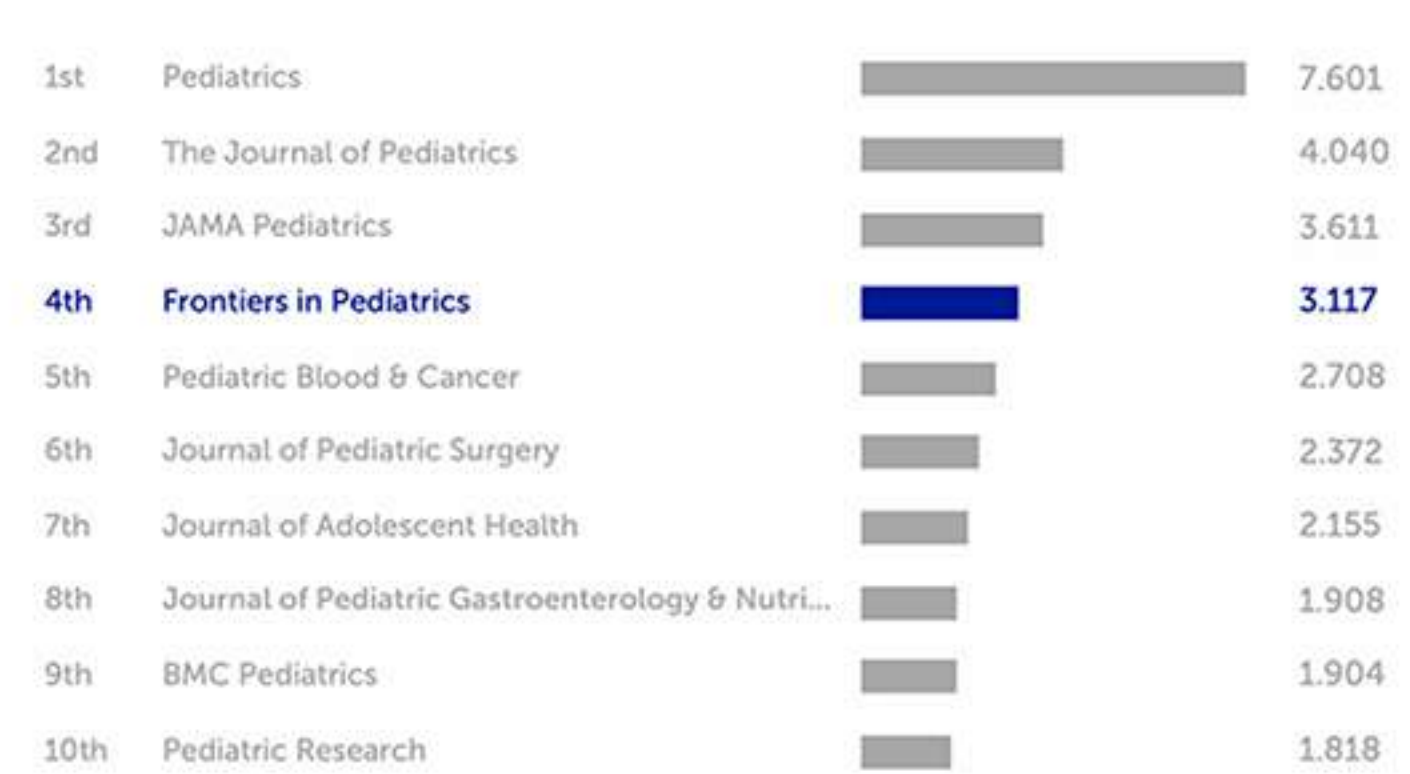
## Genetics & Heredity (175 journals)



## Marine & Freshwater Biology (109 journals)



## Pediatrics (129 journals)



## Veterinary Sciences (146 journals)



\*Neurosciences: The ranking is calculated from total citations for all journals in the Frontiers Neuroscience journal series, in the Neuroscience subject area (JCR 2021 update). The Frontiers Neuroscience journal series includes all Frontiers journals in the field of Neuroscience.



Ranking of the top 10 most-cited journals in several 2020 CiteScore categories (released in 2021 by Scopus, Elsevier). Bar plots show the total number of citations received in 2017–2020 to articles, reviews, conference papers, book chapters and data papers published in 2017–2020, with Frontiers journals in blue.

#### Neuroscience subject area\* (538 journals)

Rank	Journal	Citations
1st	Frontiers in Neuroscience journal series	86,550
2nd	eLife	67,120
3rd	Neurocomputing	49,511
4th	NeuroImage	39,378
5th	Cell Death and Disease	38,818
6th	Neuron	37,410
7th	Journal of Neuroscience	33,039
8th	PeerJ	28,662
9th	Current Biology	27,992
10th	Nature Neuroscience	26,752

#### Psychology (all) (203 journals)

Rank	Journal	Citations
1st	Frontiers in Psychology	38,421
2nd	Computers in Human Behavior	26,743
3rd	Personality and Individual Differences	11,074
4th	Appetite	10,556
5th	Behavior Research Methods	6,105
6th	Psychological Science	6,048
7th	Current Opinion in Psychology	5,966
8th	Psychological Bulletin	5,473
9th	Perspectives on Psychological Science	4,789
10th	Archives of Sexual Behavior	4,296

#### Pharmacology (medical) (246 journals)

Rank	Journal	Citations
1st	Frontiers in Pharmacology	36,808
2nd	Cochrane Database of Systematic Reviews	29,921
3rd	Antimicrobial Agents and Chemotherapy	29,258
4th	European Review for Medical and Pharmacology	20,491
5th	OncoTargets and Therapy	17,966
6th	Journal of Antimicrobial Chemotherapy	17,721
7th	American Journal of Transplantation	15,466
8th	Alimentary Pharmacology and Therapeutics	13,088
9th	Drug and Alcohol Dependence	11,955
10th	International Journal of Antimicrobial Agents	11,868

#### Microbiology (medical) (116 journals)

Rank	Journal	Citations
1st	Frontiers in Microbiology	86,248
2nd	Clinical Infectious Diseases	40,535
3rd	Journal of Antimicrobial Chemotherapy	17,721
4th	Nature Microbiology	17,246
5th	Emerging Infectious Diseases	16,135
6th	Microbiome	15,024
7th	Frontiers in Cellular and Infection Microbiology	14,207
8th	Journal of Clinical Microbiology	13,334
9th	International Journal of Antimicrobial Agents	11,868
10th	International Journal of Infectious Diseases	11,048

#### Plant Science (445 journals)

Rank	Journal	Citations
1st	Frontiers in Plant Science	63,927
2nd	New Phytologist	30,715
3rd	Journal of Experimental Botany	19,086
4th	Plant Journal	16,028
5th	Plant Physiology and Biochemistry	11,575
6th	Plant Biotechnology Journal	10,832
7th	Plant and Soil	10,282
8th	Plant, Cell and Environment	10,060
9th	BMC Plant Biology	9,384
10th	Nature Plants	9,123

#### Immunology (202 journals)

Rank	Journal	Citations
1st	Frontiers in Immunology	86,957
2nd	Blood	48,565
3rd	Cell Death and Disease	38,818
4th	Journal of Allergy and Clinical Immunology	30,382
5th	Journal of Virology	28,053
6th	Immunity	27,073
7th	PLoS Pathogens	26,562
8th	Journal of Immunology	25,631
9th	Annals of the Rheumatic Diseases	24,277
10th	Fish and Shellfish Immunology	19,797

#### Neuropsychology and Physiological Psychology (60 journals)

Rank	Journal	Citations
1st	Neuroscience and Biobehavioral Reviews	17,593
2nd	Frontiers in Human Neuroscience	10,661
3rd	Trends in Cognitive Sciences	7,098
4th	Cortex	6,730
5th	Frontiers in Behavioral Neuroscience	5,057
6th	Psychophysiology	4,315
7th	Biological Psychology	3,155
8th	Quarterly Journal of Experimental Psychology	3,108
9th	International Journal of Psychophysiology	2,774
10th	Journal of Memory and Language	2,137

#### Oceanography (128 journals)

Rank	Journal	Citations
1st	Marine Pollution Bulletin	28,120
2nd	Frontiers in Marine Science	13,820
3rd	Journal of Geophysical Research: Oceans	12,973
4th	Marine and Petroleum Geology	12,296
5th	Palaeogeography, Palaeoclimatology, and Palaeoecology	9,454
6th	Estuarine, Coastal and Shelf Science	7,198
7th	Limnology and Oceanography	6,300
8th	Ocean and Coastal Management	5,967
9th	Global and Planetary Change	5,543
10th	ICES Journal of Marine Science	5,290

#### Physiology (169 journals)

Rank	Journal	Citations
1st	Journal of Cellular Physiology	35,913
2nd	Frontiers in Physiology	33,519
3rd	New Phytologist	30,715
4th	Cellular Physiology and Biochemistry	28,590
5th	Cell Metabolism	26,036
6th	Circulation Research	21,674
7th	Journal of Experimental Botany	19,086
8th	Journal of Physiology	13,997
9th	Plant Physiology and Biochemistry	11,575
10th	Plant, Cell and Environment	10,060

#### Aging (35 journals)

Rank	Journal	Citations
1st	Oxidative Medicine and Cellular Longevity	22,686
2nd	Frontiers in Aging Neuroscience	11,659
3rd	Aging	10,959
4th	Neurobiology of Aging	9,713
5th	Journals of Gerontology – Series A Biological Sciences and Social Sciences	9,520
6th	Aging Cell	7,957
7th	Ageing Research Reviews	6,771
8th	Experimental Gerontology	6,501
9th	Age and Ageing	5,651
10th	Aging clinical and experimental research	4,537

#### Neuroscience (miscellaneous) (24 journals)

Rank	Journal	Citations
1st	DMM Disease Models and Mechanisms	4,740
2nd	Frontiers in Neuroanatomy	2,627
3rd	Brain Injury	2,491
4th	Frontiers in Neural Circuits	2,154
5th	Psychiatry Research - Neuroimaging	2,036
6th	Frontiers in Computational Neuroscience	1,976
7th	Frontiers in Neuroinformatics	1,867
8th	Journal of NeuroImmunopharmacology	1,573
9th	Frontiers in Systems Neuroscience	1,545
10th	Journal of Electromyography and Kinesiology	1,472

#### Neurology (clinical) (343 journals)

Rank	Journal	Citations
1st	World Neurosurgery	26,684
2nd	Stroke	21,695
3rd	Frontiers in Neurology	18,694
4th	Brain	18,668
5th	The Lancet Neurology	16,942
6th	JAMA Neurology	13,903
7th	Human Brain Mapping	12,888
8th	Epilepsia	12,256
9th	Journal of Neurosurgery	12,222
10th	Alzheimer's and Dementia	11,930

#### Genetics (clinical) (87 journals)

Rank	Journal	Citations
1st	PLoS Genetics	19,754
2nd	Genes	15,796
3rd	Frontiers in Genetics	13,743
4th	Genome Research	13,551
5th	Human Molecular Genetics	13,463
6th	Nature Reviews Genetics	12,296
7th	Genetics in Medicine	12,184
8th	American Journal of Human Genetics	11,284
9th	G3: Genes, Genomes, Genetics	7,088
10th	Genome Medicine	5,546

#### Endocrinology, Diabetes and Metabolism (219 journals)

Rank	Journal	Citations
1st	Diabetes Care	31,095
2nd	Journal of Clinical Endocrinology and Metabolism	20,063
3rd	Diabetologia	13,739
4th	Frontiers in Endocrinology	13,625
5th	The Lancet Diabetes and Endocrinology	13,245
6th	Diabetes, Obesity and Metabolism	13,183
7th	Diabetes	12,110
8th	Obesity Surgery	11,203
9th	Diabetes Research and Clinical Practice	10,748
10th	Nature Reviews Endocrinology	10,221

#### Histology (60 journals)

Rank	Journal	Citations
1st	Bone	9,130
2nd	Cell Systems	6,079
3rd	Brain Structure and Function	6,069
4th	Frontiers in Bioengineering and Biotechnology	5,831
5th	Histopathology	5,789
6th	Cell and Tissue Research	5,541
7th	Journal of Extracellular Vesicles	5,189
8th	Microscopy Research and Technique	2,684
9th	Bone Research	2,632
10th	Anatomical Record	2,599

#### Biochemistry, Genetics and Molecular Biology (miscellaneous) (46 journals)

Rank	Journal	Citations
1st	Advanced Science	34,841
2nd	Stem Cell Research and Therapy	12,183
3rd	ACS Synthetic Biology	9,073
4th	Frontiers in Molecular Biosciences	2,902
5th	Journal of Ginseng Research	2,766
6th	Fermentation	2,182
7th	Asian Pacific Journal of Tropical Biomedicine	1,925
8th	Life Science Alliance	1,368
9th	JIMD Reports	997
10th	Wiley Interdisciplinary Reviews: System Biology	946

\*Neurosciences: The ranking is calculated from total citations for all journals in the Frontiers Neuroscience journal series, in the Neuroscience subject area (CiteScore 2020 edition). The Frontiers Neuroscience journal series includes all Frontiers journals in the field of Neuroscience.



# Media mentions

Frontiers articles are regularly featured in numerous leading news outlets.

## In the news

Frontiers articles were featured **36,651** by international news outlets in 2021 including The New York Times, The Guardian and BBC World News. An increase of **49%** from 2020.

**101,592**  
total news mentions  
(Altmetric)

Most featured by:



## 2021 news and feature highlights

[See all news](#)



**Antarctic life**

A study published in *Frontiers in Marine Science* revealed the discovery of a colony of sponges and other animals attached to a boulder on the seafloor –challenging researchers' understanding about the existence of life in extreme environments.

*The Guardian*, 15 Feb 2021

[— Read feature](#)



**Pharaoh unwrapped**

For the first time since the 11th century BCE, scientists have unwrapped – virtually, using CT scans – the only royal mummy to remain unopened in modern times, pharaoh Amenhotep I. The findings were published in *Frontiers in Medicine*.

*BBC*, 28 Dec 2021

[— Read feature](#)



**Reducing plastic**

A study published in *Frontiers in Bioengineering and Biotechnology* revealed that bacteria found in cow stomachs can be used to digest polyesters used in textiles, packaging, and compostable bags.

*CNN*, 2 July 2021

[— Read feature](#)

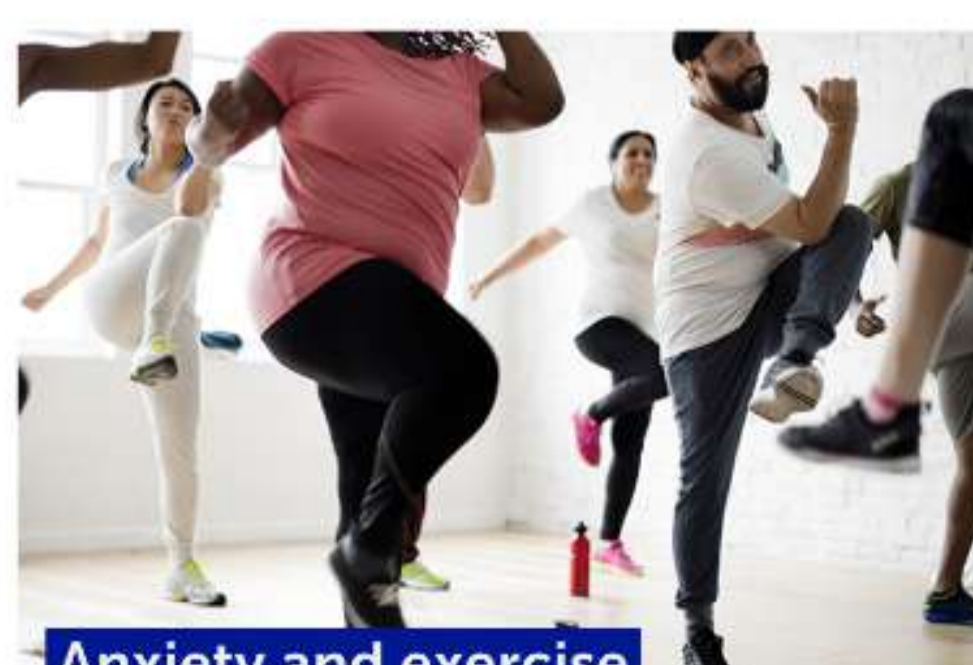


**Precious Earth**

Only between 2% and 3% of the Earth's terrestrial surface can be considered ecologically intact, according to a study published in *Frontiers in Forests and Global Change*. However, a focus of restoration of specific species in intact habitat could recover ecological integrity to about 20% of land.

*News Scientist*, 15 April 2021

[— Read feature](#)



**Anxiety and exercise**

The findings of a study published in *Frontiers in Psychiatry* found that those who engage in regular exercise may lower their risk of developing anxiety by almost 60%.

*Forbes*, 12 September 2021

[— Read feature](#)



**Tiny robots**

A study in *Frontiers in Robotics and AI* is the first to investigate how tiny robots might perform as drug delivery vehicles in neural tissue.

*WEF*, 5 September 2021

[— Read feature](#)



## On social media

In 2021, Frontiers articles were mentioned over **276,000** times across all social media channels, an increase of **65%** over the previous year.

# 955,954

total mentions on social media  
(Altmetric)

### Top channels



### 2021 social media highlights

[Follow Frontiers](#)



#### Climate change

Research published in *Frontiers in Allergy* suggests the climate crisis is causing the dreaded allergy season to start earlier and last longer.

**1,494 likes**

— See Instagram post



#### Women in Science

From our Women in Science series, we spoke to Ecologist Dr. Vidya Athreya, and discussed how India's patriarchal society has influenced her career, as well as the trials and tribulations of being a mother and a scientist.

**2,700 likes | 103 shares**

— See Facebook post



#### Coral Conservation

For the first time, interactions between coral and algal cells have been observed. Published in *Frontiers in Marine Science*, this research could be critical in helping to preserve our depleting coral reefs.

**213 likes | 80 shares**

— See Facebook post



#### Growing food in space

Findings published in *Frontiers in Microbiology* reveal the discovery of three novel strains of bacteria which could help grow food on Mars.

**180 likes | 58 retweets**

— See Twitter post

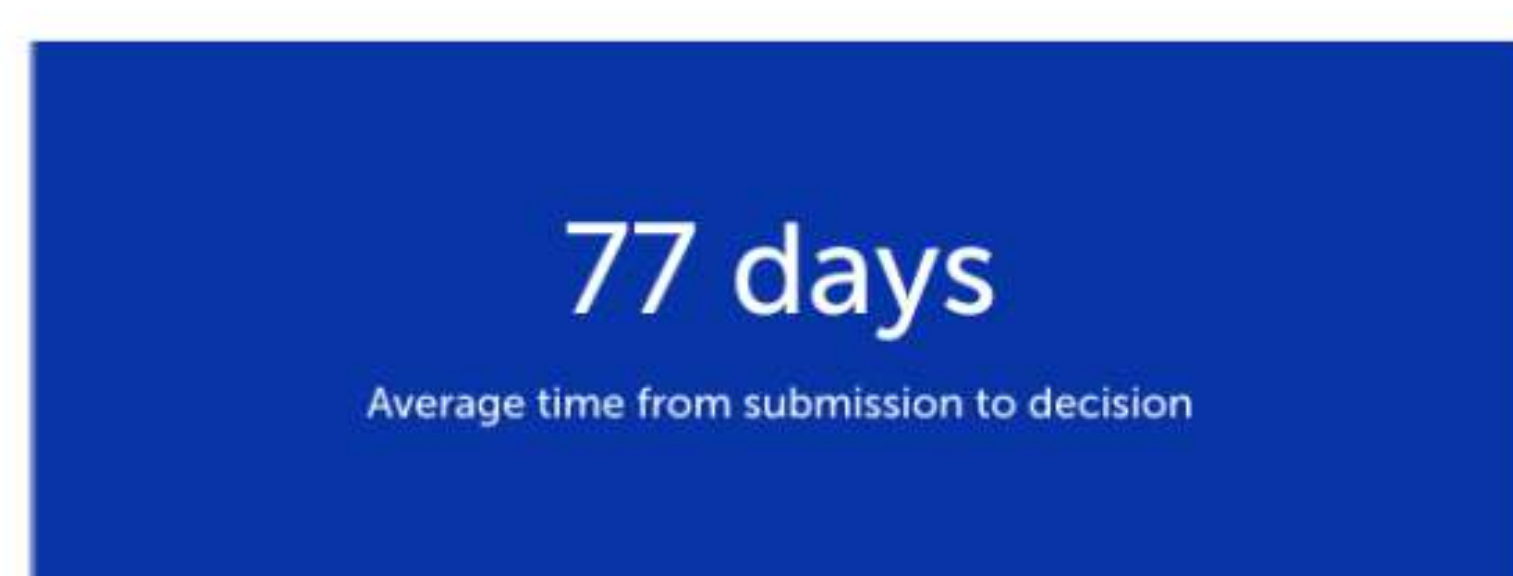


# Peer review

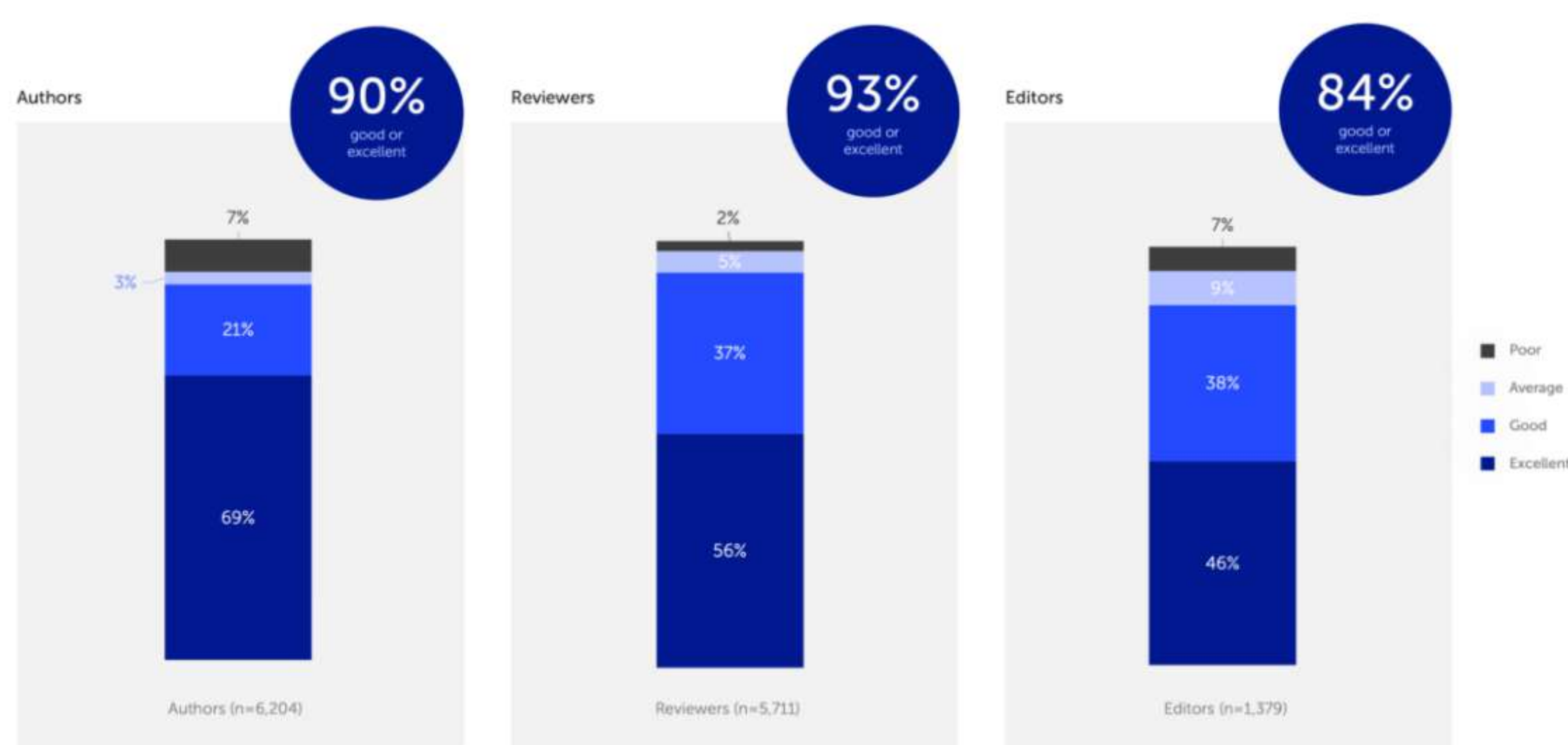
Only the best science can solve the world's biggest challenges. That's why every article we publish goes through our rigorous quality checks and peer review by experts.

## Collaborative review process

Our state-of-the-art collaborative peer review forum allows authors and reviewers to connect online so they can work together to improve the manuscript. Our dedication to process optimisation resulted in an average time from submission to decision of **77 days** in 2021, down from 80 days in 2020. **90%** of our authors, **93%** of our reviewers and **84%** of our handling editors rating the review process as **good or excellent**.

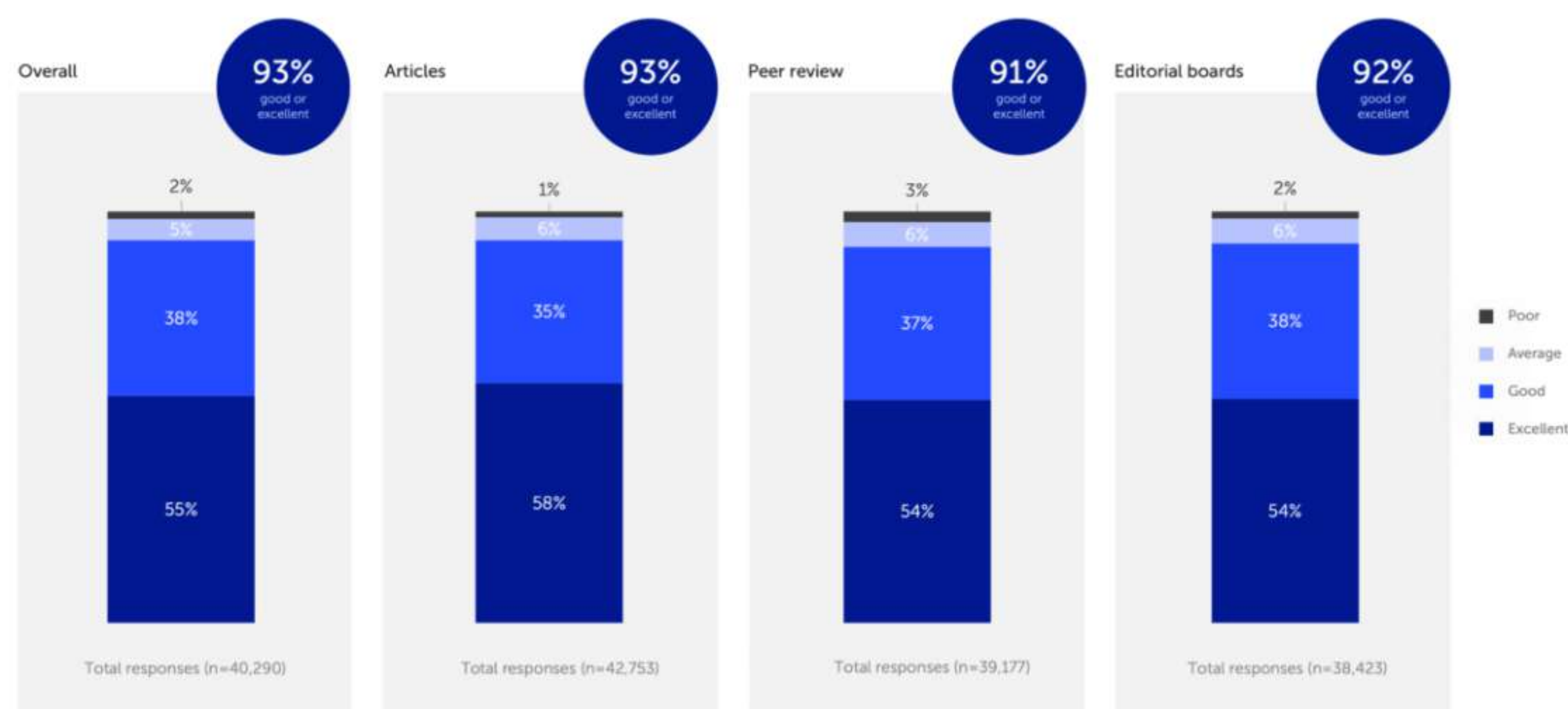


## How do you rate the Frontiers collaborative review process?



Survey results of 13,294 Frontiers' editors, authors, and reviewers show an exceptionally high satisfaction rate with our peer-review process. Data Source: Frontiers Surveys, Jan-Dec 2021.

## How do you rate the quality of Frontiers?

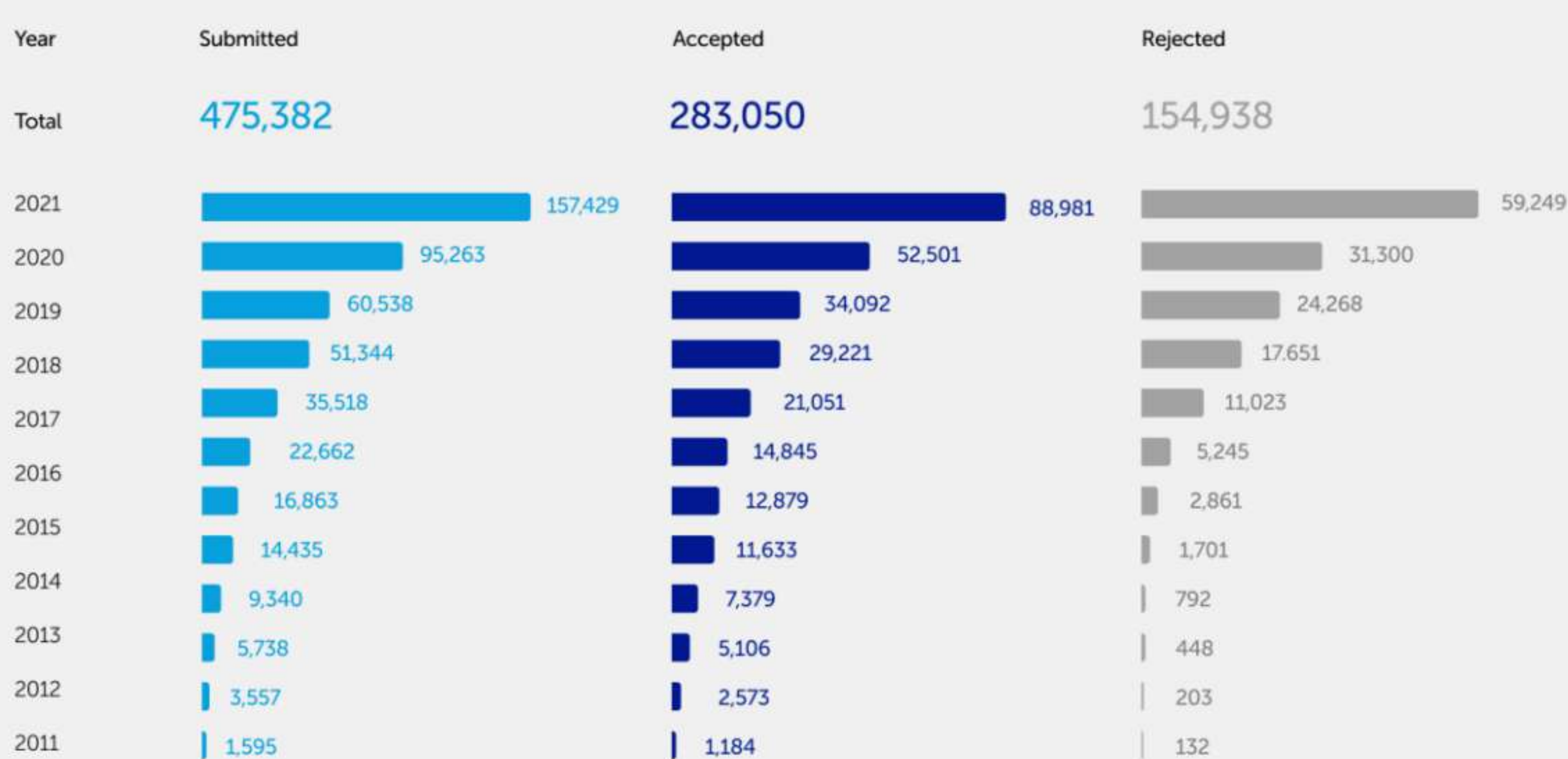


Survey results of Frontiers' website visitors show exceptionally high quality ratings for our products and services. Data Source: Frontiers Surveys, Jan-Dec 2021.

[Learn more](#)

## Submissions, acceptances, rejections

The Frontiers collaborative review objectively certifies quality, validity and rigor of research. It is performed by an external editorial board of researchers, assisted by our peer review team and powered by our custom-built open science platform, featuring our artificial intelligence review assistant (AIRA). The review mandate does not focus on potential impact, nor are artificial acceptance or rejection rates imposed. Within this framework, the rejection rate for 2021 was on average **40%** across all Frontiers journals, and as high as 79% in some journals.



[Learn more](#)



# Partnerships

We work with librarians, institutions, and funders around the world to support researchers who want to publish open access.

## Institutional agreements

Institutional agreements simplify the process for authors wishing to publish in our journals and contribute to the growing number of research articles that are openly available to all.

### Institutional partnerships

We work with research institutions, libraries, consortia, and funders to support their researchers publish open access. In 2021, **64** new institutional members joined us, including the University of Oslo, Durham University, the Italian Research Council (CNR) and the Taiwanese National Health Research Institutes (NHR).



### National agreements

We have **six** fully transparent national open access publishing agreements for research organizations and their researchers in Austria, Sweden, Qatar, the UK, Norway and most recently Luxembourg.



[See all members](#)



# Publishing partnerships

In 2021 Frontiers established seven new partnerships with societies and other organisations, including our first partnership in China with Zhejiang University to launch their new journal, *Aerospace Research Communications* in 2022.

Through our publishing partnerships, we have facilitated the transition of 1,063 articles to open access making them freely available to read for the first time, having formerly been published behind a paywall.

## Partner journals



British Journal of Biomedical Science

### Editor-in-Chief

- Anthony Rhodes, International Medical University and University of Malaya, Malaysia



Spanish Society of Soil Science

### Chief Editors

- Avelino Núñez-Delgado, University of Santiago de Compostela, Spain
- Irene Ortiz-Bernad, University of Granada, Granada, Spain



Journal of Abdominal Wall Surgery

### Chief Editor

- Manuel López-Cano Vall d'Hebron University Hospital, Spain



Advances in Drug and Alcohol Research

### Chief Editor

- Emmanuel Onaivi, William Paterson University, USA



Dystonia

### Chief Editors

- Aasef Shaikh, Case Western Reserve University, USA
- Roy Sillitoe, Baylor College of Medicine, USA



Transplant International

### Editor-in-Chief

- Thierry Berney, University of Geneva, Switzerland



Aerospace Research Communications

### Editors-in-Chief

Prof. Yao Zheng and Prof. Feng Liu

[Learn more](#)



# Technology

We build all our technology in-house. With the feedback of many scientists, we are continually developing and evolving. This has resulted in a fast, efficient, powerful and highly scalable open science platform, customized for the needs of our authors, editors, reviewers, and readers.

## Product releases

Our latest innovation, the **artificial intelligence review assistant (AIRA)**, is an industry-first and has the potential to revolutionize how manuscripts are evaluated. AIRA currently makes up to 20 recommendations in seconds, from assessing language quality and the integrity of figures to detecting plagiarism and potential conflicts of interest.

### 2021

#### Artificial intelligence review assistant (AIRA) updates

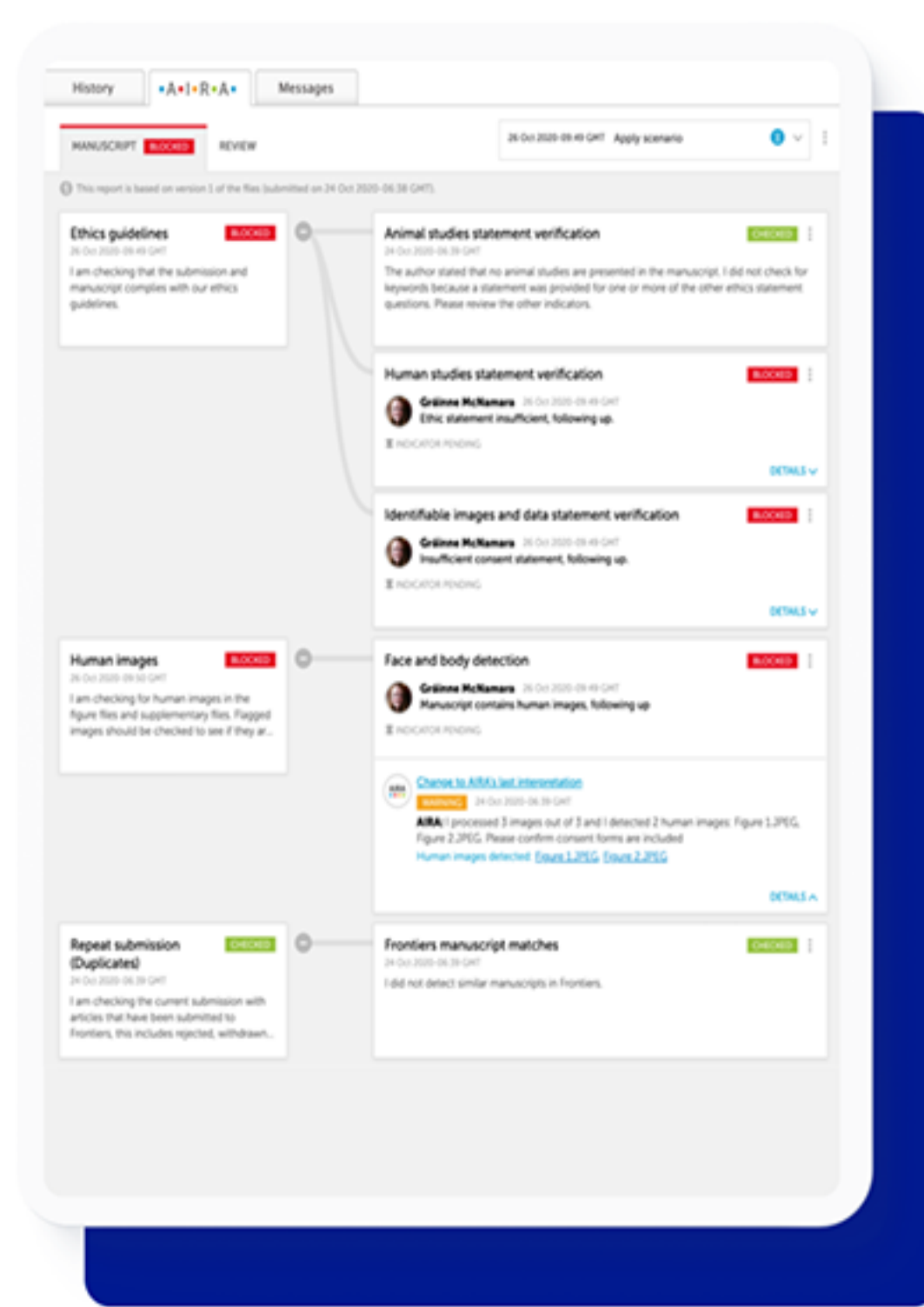
New checks to validate the quality of the paper before it enters peer review, including image manipulation and research checks, as well as an improved scope classifier to ensure the manuscript has been submitted to the correct section and journal

#### Review forum updates

Reviewer recommendations improved with an updated selection algorithm

#### Live chat

Latest support feature for our authors, editors and reviewers during the peer review for selected journals



### 2020

#### Artificial Intelligence Review Assistant (AIRA) updates

New checks added to detect image manipulation and to evaluate if a manuscript has been submitted to the appropriate section and journal

#### Publishing Partnerships Program

Frontiers' publishing platform and expertise made available to societies and institutions, enabling their transition to open access

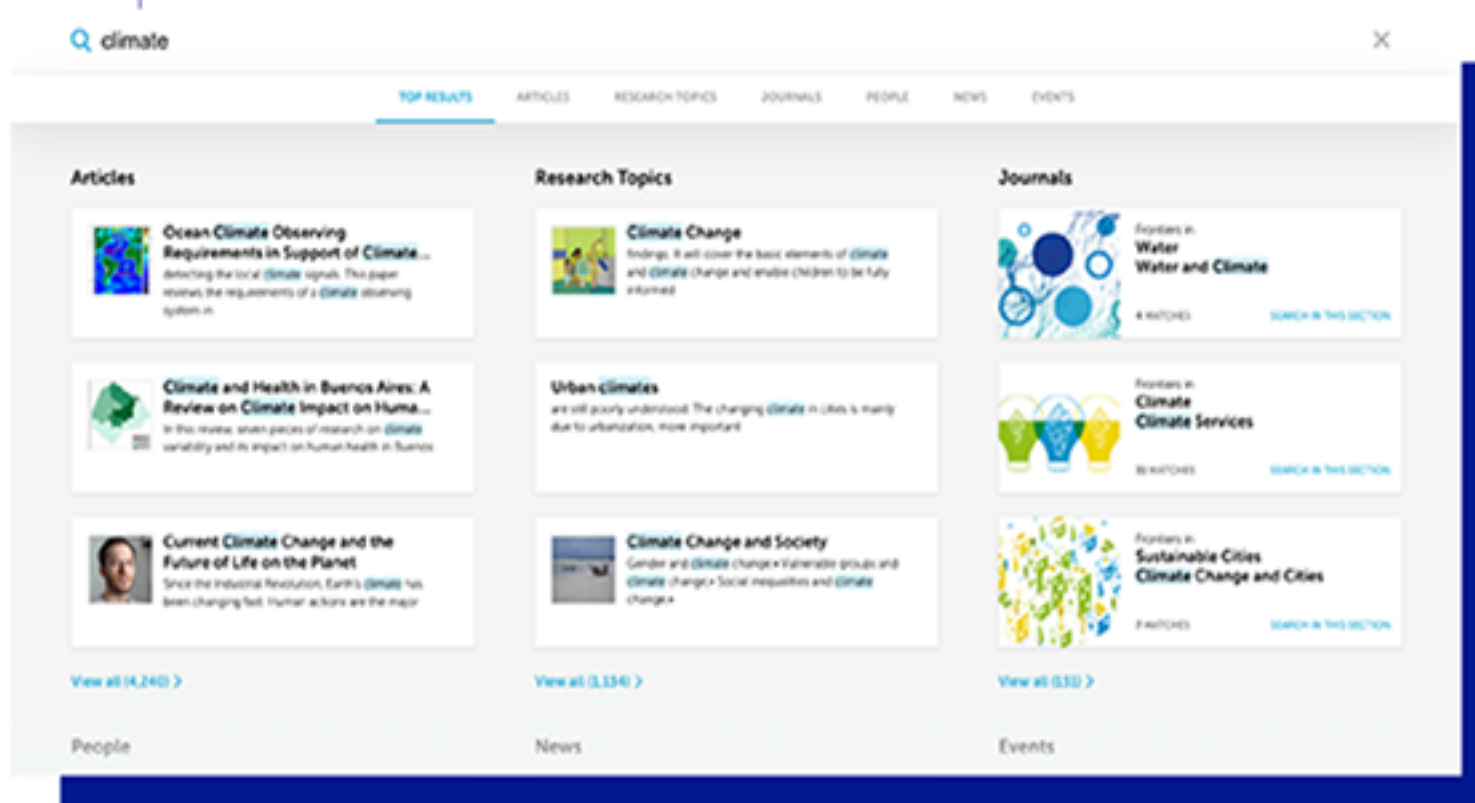
### 2019

#### Artificial Intelligence Review Assistant (AIRA) updates

Improved reviewer suggestions and new automated checks to help assess article quality

#### Website search

Search functionality rebuilt making it easier to find content – articles, collections, journals, and people – and helping to raise the visibility of research



### 2018

#### Artificial Intelligence Review Assistant (AIRA)

The next generation of peer review in which AI and machine learning enable more rigorous quality control and efficiency in the peer review

#### My Frontiers

A new editorial interface helping authors, editors, and reviewers to easily track the status of their manuscripts and assignments

#### New submission system

Streamlined submission system to ensure papers are submitted to the correct journals to prevent delays

### 2017

#### AI-powered reviewer recommendations

Improved suggestions for editors to find relevant experts to review manuscripts



## 2016

### Editorial contributions

Editorial roles showcased on Loop profiles, providing visibility and accreditation for editorial contributions

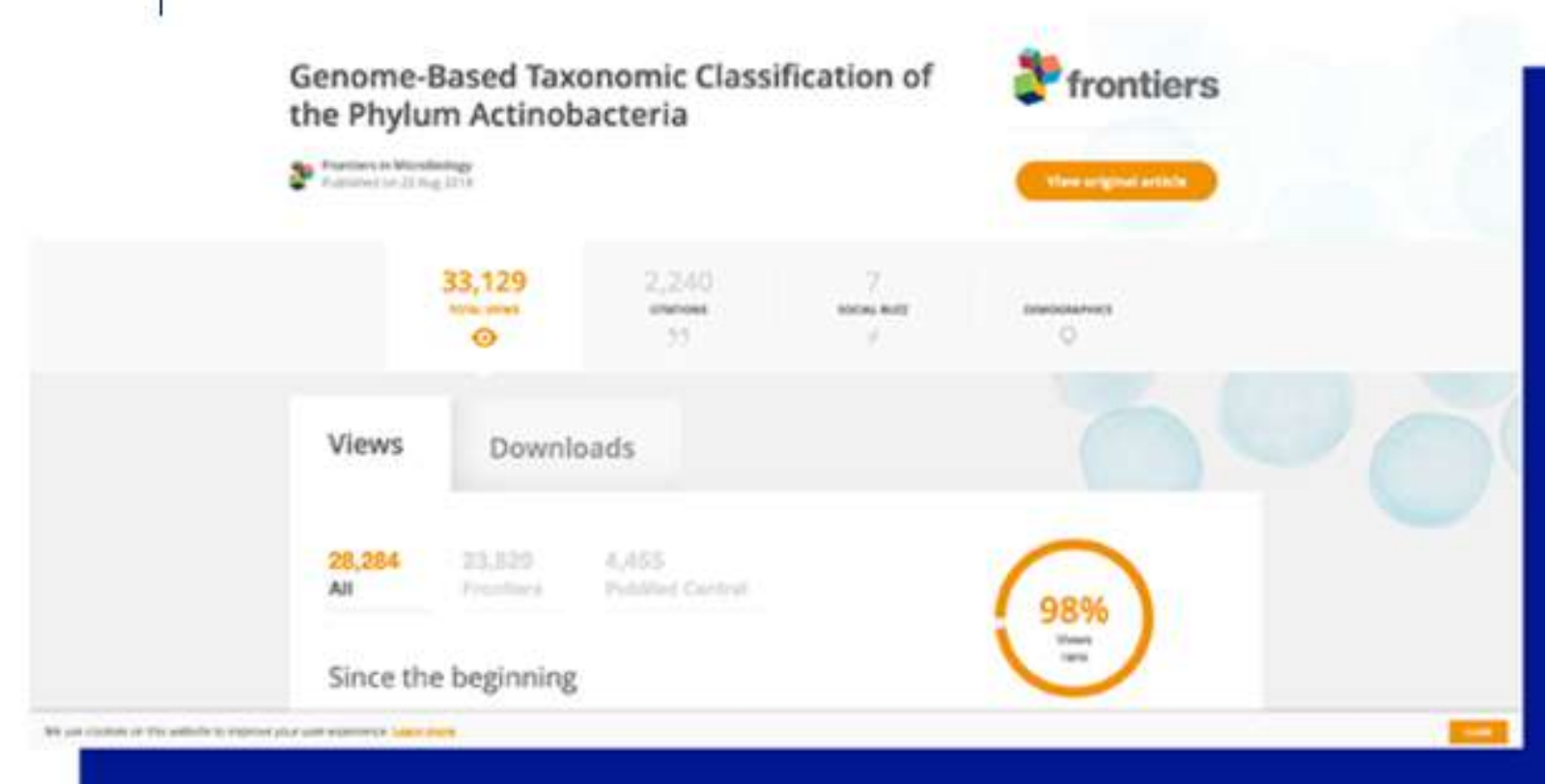
## 2015

### Loop research network (updates)

Network and profile pages redesigned to maximize author impact and integrated with ORCID and other partners

### Research Topic metrics

Views and downloads on articles aggregated at a collection level



## 2014

### Collaborative Review Forum (updates)

Improved online experience for reviewers and editors

### Article pages

Newly designed pages with improved look and performance

### Research Topic pages

Newly designed pages placing more focus on the researcher.

## 2013

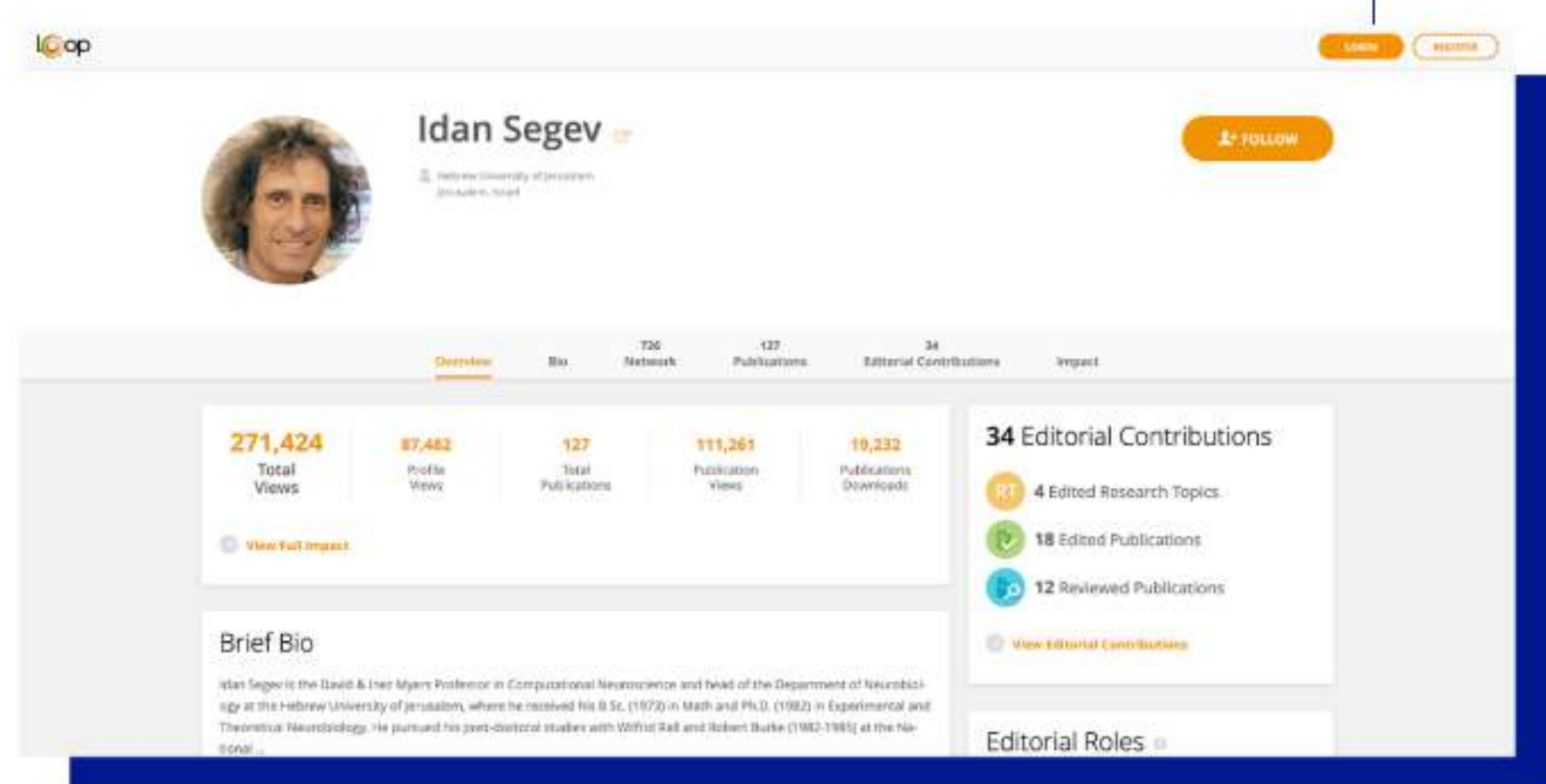
### Frontiers for Young Minds

Open access journal involving young people in the review process of real scientific papers and bringing the latest cutting-edge research into the classroom

## 2012

### Loop research network

The "social network" for researchers with academic profiles showcasing publications, achievements, and impact



## 2011

### Author-level metrics

Article views and downloads on all articles aggregated at author level.

## 2010

### Digital Editorial Office

A dedicated online cockpit for editors to manage their journals, enhancing efficiency, oversight, and quality control

### Profiles

Profiles showcasing published work and career achievements for all authors, editors, and reviewers

### Community Platform

Profiles enriched with multi-media tools, including events and videos

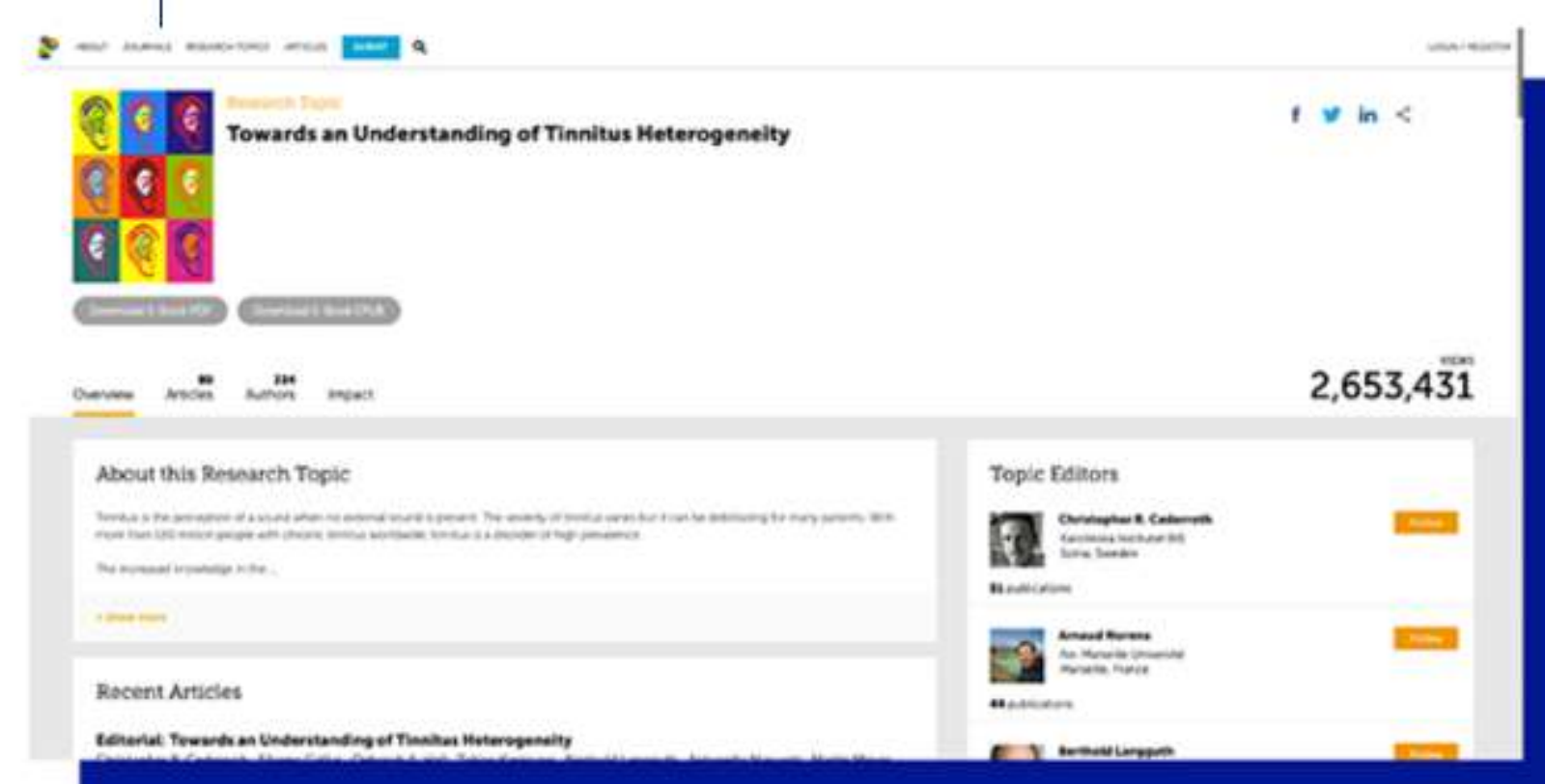
### Commenting functionality and post-publication review

Available on all published articles allowing other researchers to comment on the findings

## 2009

### Research Topics

Multidisciplinary article collections around an important or emerging area of research



## 2008

### Online publishing platform

IT platform to manage author registration, article submissions, review, publication and evaluation

### Collaborative Review Forum

Discussion forum connecting authors with reviewers in a direct online conversation

### Article-level and journal-level metrics

Pioneering new quantitative metrics based on article views and downloads



# Frontiers Forum

This year our Frontiers Forum was once again a virtual series of webinars around science-led solutions to the grand challenges of our time, viewed more than **6 million** times.

## 2021 speakers



**Al Gore**

### The case for climate optimism

Former US Vice President and Nobel Laureate **Al Gore** outlined encouraging progress on the sustainability revolution – from market shifts towards clean energy, to new science-based emissions targets, to incredible advances in science and technology.

– Watch the video



**Esther Duflo**

### Good economics for harder times

Nobel prize winner and best-selling author **Prof Esther Duflo** discussed her revolutionary, evidence-based approach to economics and the lessons it provides to challenges such as poverty alleviation, Covid-19, and climate change.

– Watch the video



**Harris Lewin**

### Genomics-led solutions for all life on Earth

**Prof Harris Lewin** showed how the moonshot Earth BioGenome Project he co-founded – which aims to sequence the genomes of 1.8 million species – will help efforts to slow extinction rates and mitigate climate change impacts, plus add billions to the bioeconomy.

– Watch the video



**Kongjian Yu**

### Healing the world's cities

Globally renowned 'landscape architect' **Prof Kongjian Yu** revealed how replacing concrete infrastructure with nature-based solutions is transforming city centers into beautiful spaces for people and biodiversity, while also cleansing water and better managing floods.

– Watch the video



**Axel Cleeremans**

### Solving consciousness

Renowned consciousness researcher **Prof Axel Cleeremans** took us on a journey through the leading theories attempting to explain how we know who we are, and introduced a new 'adversarial' research approach that may finally solve this great mystery of our minds.

– Watch the video



**David Christian**

### Preparing our children as guardians of the planet

**Prof David Christian** argued for an education revolution through teaching Big History – a wide-angle approach to history covering 4.5 billion years and multiple disciplines that illuminates the complex connections between people and the Earth's natural processes.

– Watch the video

<p><b>21K</b> attendees</p>	<p><b>159</b> countries</p>	<p><b>24</b> speakers &amp; panelists</p>	<p><b>6M</b> video views</p>
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"The Forum is a great opportunity to share and debate big ideas with thousands across the world."

**Harris Lewin**  
Distinguished Professor of Evolution and Ecology, University of California, Davis

"Thank you for including me in the list of panelists for the event. David's talk was instructive, inspirational and thought-provoking."

**Mamokgethi Phakeng**  
Vice Chancellor, University of Cape Town

"It was a terrific session - I was delighted to be part of it."

**Anil Seth**  
Science communicator and Professor of Cognitive and Computational Neuroscience, University of Sussex



[Explore all sessions](#)



# Outreach

Our outreach activities provide a more inclusive and collaborative way for scientists, educators, policymakers, and wider society to engage with scientific research.

## Science for kids

**Frontiers for Young Minds** is Frontiers' philanthropic outreach program involving young people aged 8-15 in the review process of real scientific papers and brings the latest, cutting-edge research into the classroom. The journal is available in English, Hebrew and Arabic and is generously supported by the Jacobs Foundation, the Patrick & Lina Drahi Foundation, and the King Abdullah University of Science Technology.



3,850

Young Minds

680

mentors

800

total articles

14,410,472

total article views and downloads

## 2021 The Nobel Collection

[See collection](#)



52 million

total social media views

The Nobel Collection covers science's role in addressing today's global challenges. The collection connects young minds with some of today's most distinguished scientists and provides access to engaging learning material covering groundbreaking research from the last twenty years.

*How do we find our way? Grid cells in the brain*

**May-Britt Moser**, awarded The Nobel Prize in Physiology or Medicine 2014

*Computer Simulations in Service of Biology*

**Michael Levitt**, awarded The Nobel Prize in Chemistry 2013

*Quasi-Crystal, Not Quasi-Scientist*

**Dan Shechtman**, awarded The Nobel Prize in Chemistry 2011

*The Transcription of Life: from DNA to RNA*

**Roger D. Kornberg**, awarded The Nobel Prize in Chemistry 2006

*Targeted Degradation of Proteins – the Ubiquitin System*

**Aaron Ciechanover**, The Nobel Prize in Chemistry 2004



"I'm honoured to contribute to the journal Frontiers for Young Minds. Children are born curious, with passion for questions and with light in their eyes. As a scientist, I feel privileged to be able to ask questions that I think are important. I hope the papers in this journal may help nurture and reinforce children's passion and curiosity for science – what a gift to humanity that would be!"

**May-Britt Moser**, Awarded The Nobel Prize in Physiology or Medicine 2014

## 2021 article highlights

[See all articles](#)



**Climate change**

Turning CO<sub>2</sub> into stone is a natural way to reduce CO<sub>2</sub> emissions and slow down climate change.

April 12, 2021 | 12,000 views

[Read article](#)



**Dark matter**

How scientists use science and observations from telescopes to predict the existence of dark matter.

May 4, 2021 | 17,000 views

[Read article](#)



## Policy Labs

Our Policy Labs initiative strengthens the connection between scientific research and informed policymaking. The Covid-19 pandemic and the climate emergency are two challenges among many that we must now address.

### Editor-in-Chief



**Jean Claude Burgelman**  
Editor-in-Chief of Frontiers Policy Labs

Jean Claude Burgelman, Professor of Open Science Policy at the *Free University of Brussels* and former Head of Unit for Open Science Policy at the *European Commission*, hosts in-depth conversations and analysis with experts in policy, business, and academia.

### Podcasts



#### Global systems

**Professor Ian Goldin**, Oxford University, discusses the impact of Covid-19 on global systems.

1 July 2021

- Listen



#### Open science

**Heather Joseph**, SPARC, discusses the role of open science in the Covid-19 pandemic.

2 August 2021

- Listen

### Video conversations



#### What role do foundations have?

**Dr Georg Schütte**, Volkswagen Foundation, explains the role of research in tackling global challenges.

19 April 2021

- Watch



#### Scientific response to the COVID-19 virus

**Prof. James Wilsdon**, Research on Research Institute, discusses the impact of COVID-19 on the speed and availability of science funding.

7 January 2021

- Watch



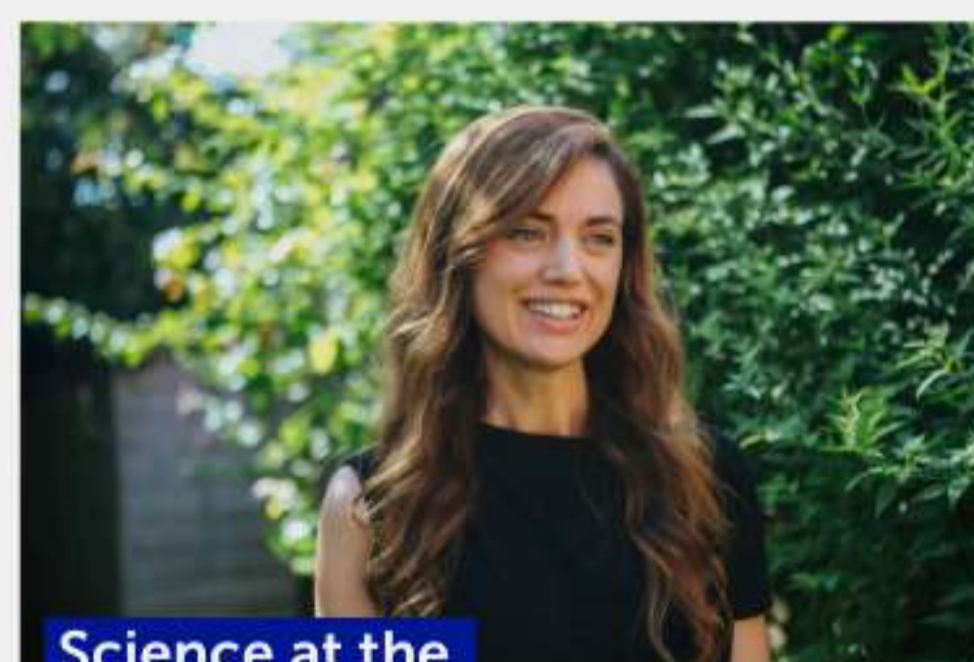
#### The role of social science

**Prof. Helga Novotny**, ERC, talks about the role of the social sciences in addressing the public policy challenges posed by COVID-19.

25 June 2021

- Watch

### Commentaries



#### Science at the table of policy

**Professor Ruth Morgan**, University College London, addresses why science needs to become a standard part of public policy.

6 August 2021

- Read



#### A new worldview on global challenges

**Professor Paolo Vinies**, Imperial College, shares his health and climate change insights on the G7 shared agenda.

2 August 2021

- Read

### Evidence



#### How to be prepared next time

**Luc Debruyne**, CEPI, provides his perspective on the global pandemic response and how to be prepared next time.

25 June 2021

- Read

Explore Policy Labs



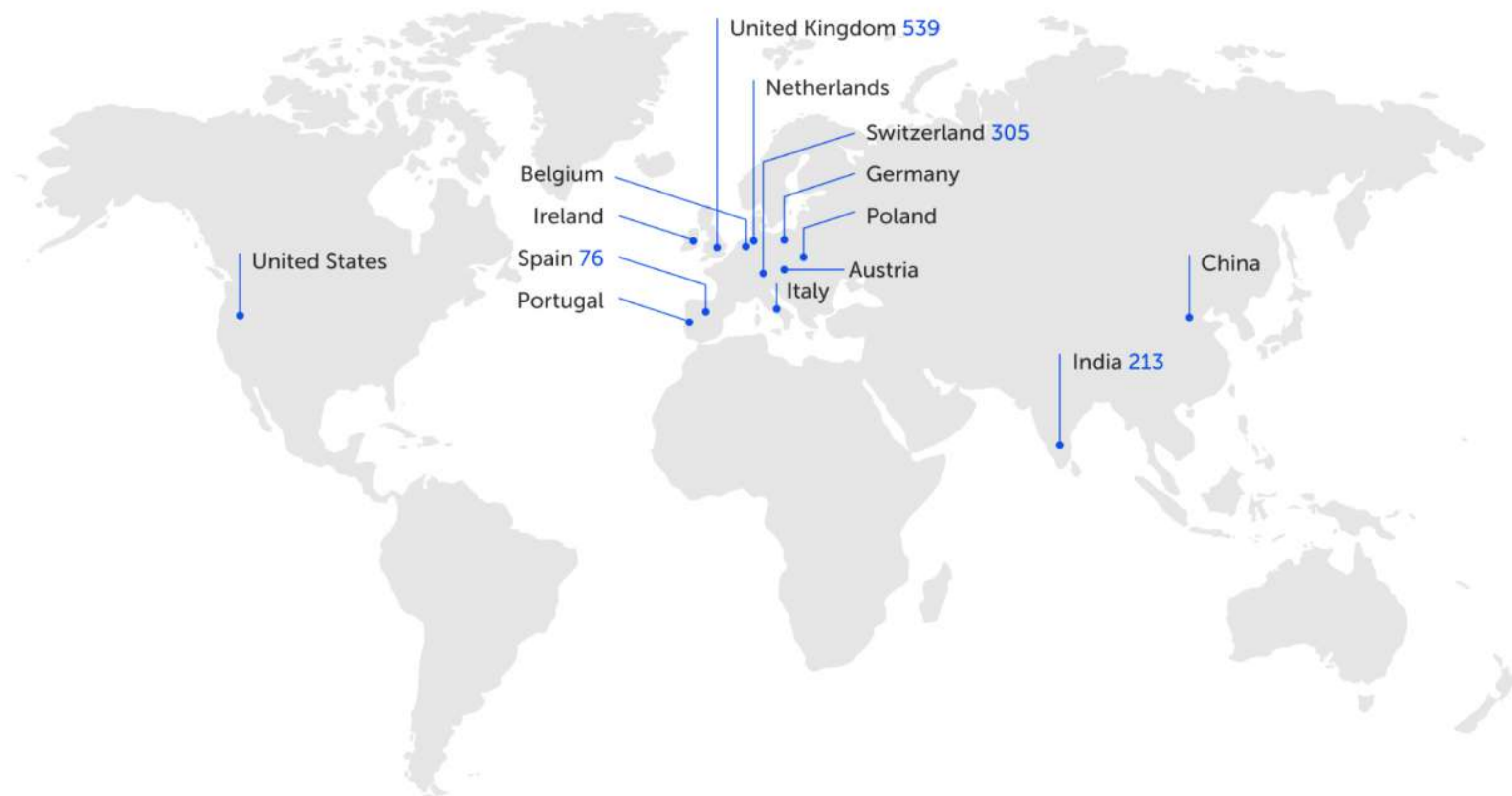
# People

Our employees, known as 'Frontons', are passionate contributors to our mission of making science open so everyone can live healthy lives on a healthy planet.

## Who we are

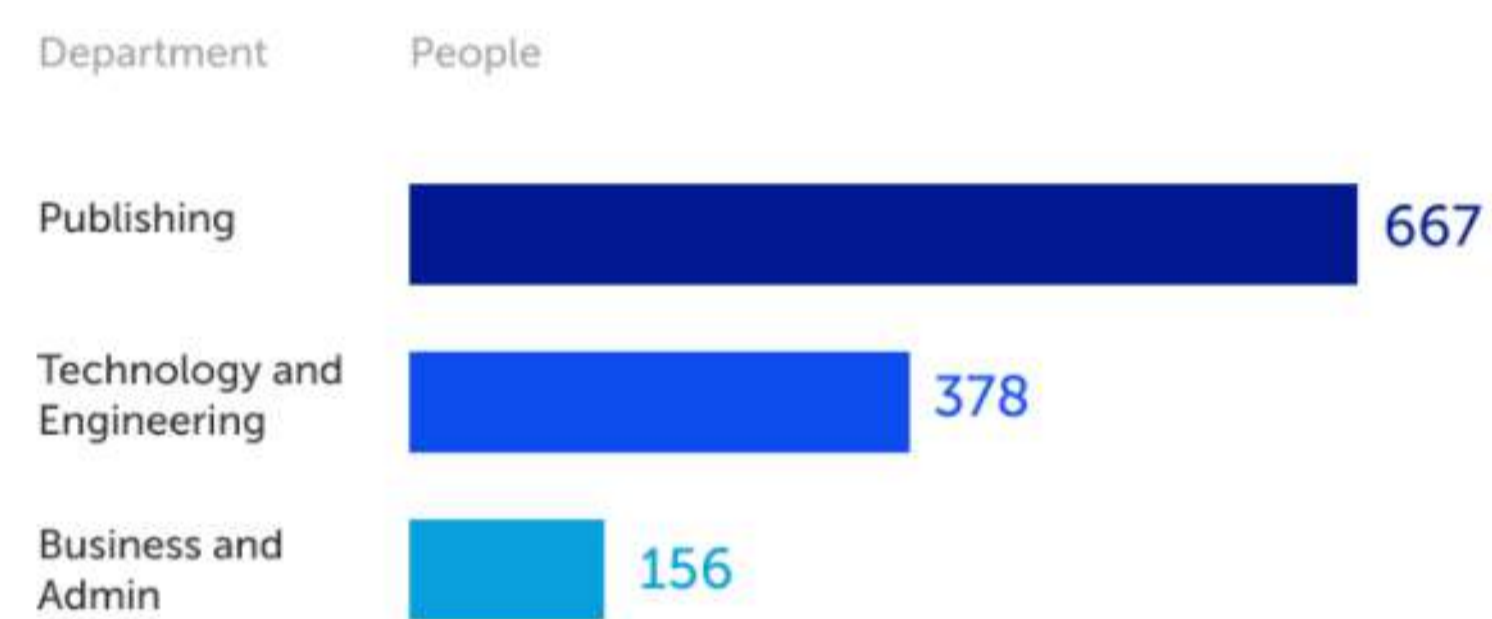
We employ **1,201** people across **14** countries. We live and breathe diversity, with employees of **62** different nationalities, of which **62%** are women and **55%** of the senior management positions are held by women. In 2021, we welcomed **498** new colleagues to the Frontiers family.

## Our people around the world



**498**  
New hires in 2021

## Our people by department



## How we work

With offices in 14 locations around the world, our employees are used to working with each other online – and throughout 2021 we were able to continue to support our editors, authors, and reviewers from our homes.

### 2021 workplace initiatives

In 2021 we introduced our 'remote-first' work philosophy and continued to actively support our colleagues with their professional development.



#### Remote working

In 2021 Frontiers introduced a 'remote-first' work philosophy. Offered to all staff by default, they can choose to either work remotely or from their nearest office. With 75% of staff opting to work from home, we are flexible and our employees have the freedom to choose the working environment and location that suits them best.



#### Supporting professional development

Learning and development is an integral part of the Frontiers culture and we are committed to connecting our staff to relevant training programs to support their professional growth. Frontons embraced these opportunities and Frontiers was recognised as the winner in the Best Culture of Learning category at the 2021 LinkedIn Talent Awards.



#### Frontiers' volunteers

We actively encourage and support our staff in giving back to society. From skills-based initiatives such as language translations, to supporting sustainable farming through software expertise, to volunteering at food banks and soup kitchens. In 2021 our Frontons dedicated more than 500 hours to volunteering.



#### Diversity, equity and inclusion

We are proud to have over 62 nationalities within our workforce. People from all backgrounds can join our mission and are ensured an equal opportunity for career advancement through our fair internal mobility processes.





🐦 @FrontiersIn  
f @Frontiersin  
📷 @frontiersin\_

— frontiersin.org