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The Peer-Review Problem: a sedimentological perspective

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Abstract:

Albert Einstein, one of the greatest physicists of all time, had a deep disdain for peer review. The peer-review process, introduced over a thousand years ago in Syria and fully formalized by the Royal Society of London during 1665-1752, is an integral part of quality control in publishing articles and in awarding research grants. However, there are many lingering problems, which include: 1) anointed experts, 2) blind peer reviews, 3) delays, 4) orthodoxy, 5) bias, 6) groupthink, 7) Peer rejection of ideas (including Nobel-Prize winners), 8) inconsistency, 9) politics, 10) fake peer review and plagiarism, 11) "Sham peer review" in the U.S. medical community, 12) settling old scores, 13) online publications, 14) acknowledgements, 15) controversies in geological sciences, and 16) imbalance of peer reviewers in the biomedical research. Transparency, which is the underpinning trait of science journalism, is lost in the secrecy of blind peer review. Under the blind peer review, there are at least eight examples of scientific papers that were rejected before going on to win a Nobel Prize. Furthermore, there are 33 striking cases of peer rejection in science, including the notorious theory of "continental drift" by Alfred Wegener. My own examples of papers in process sedimentology and petroleum geology show that the same manuscript was rejected by one journal, but was accepted by another, suggesting that the blind peer review is obsolete. A solution is to adopt an Open Peer Review (OPR). Barring an open peer review, an alternative path is to publishing the entire peer-review comments and recommended decisions of all reviewers (anonymous and identified) at the end of a paper. This practice not only would force the anonymous reviewer to be objective and accountable but also would allow the entire peer-review process to be transparent.

Keywords: Blind peer review; Fake peer review; Open peer review; Biomedical literature; Nobel-Prize winners; Orthodoxy; Plagiarism; Peer rejection; Bias; Copernicus; Galilei; Oldenberg; The Royal Society; Journal of Sedimentary Research

Introduction

The issue of peer review is much more strident in medical, biomedical, and other natural sciences than in geological sciences. The practice of peer review, since it was first introduced by a physician named Shaq bin Ali al-Rahway of Syria (854-931 CE) (Kelly, 2014), has become a self-regulating mechanism for controlling quality of articles in journals by experts (peers) in a given domain. At present in 2022, journals adopt a double-blind review process in which the identities of both the author and the reviewer are masked in maintaining objectivity. Although popular, the peer-review process is not without problems. For example, Richard Smith, MD, former editor of the British Medical Journal, stated that "So we have little evidence on the effectiveness of peer review, but we have considerable evidence on its defects. In addition to being poor at detecting gross defects and almost useless for detecting fraud it is slow, expensive, profligate of academic time, highly subjective, something of a lottery, prone to bias, and easily abused." Richard Horton (2000), the current Editor-in-Chief of **The Lancet**, a weekly peer-reviewed general medical journal, has written in the **Medical Journal of Australia** that "The mistake, of course, is to have thought that peer review was any more than a crude means of discovering the acceptability - not the validity - of a new finding. Editors and scientists alike insist on the pivotal importance of peer review. We portray peer review to the public as a quasi-sacred process that helps to make science our most objective truth teller. But we know that the system of peer review is biased, unjust, unaccountable, incomplete, easily fixed, often insulting, usually ignorant, occasionally foolish, and frequently wrong."

During the past 50 years, in publishing over 200 peer-reviewed works, I have encountered many peer-review problems in geological journals. The peer review is so deeply entrenched in publishing articles and in awarding research grants; it is impractical to abolish the entire peer-review system today. However, it is possible to improve the system. Therefore, the purpose of this article is to identify inherent problems associated with peer-review process (Wennerås and World, 1997; Ronnie, 2003; Smith, 2006; Scissor, 2016; Jana, 2019, among others) and to provide solutions to improve the current system. However, this article is not a comprehensive review of peer review per se. Furthermore, I have commonly used my own publications and experiences in this review because I am most familiar with them, but geoscientists who publish could probably supply multiple examples of their own. This review is an attempt to explore peer-review problems with a geological/sedimentological perspective.

Historical events

The history of peer review has been discussed by many scholars and publishing organizations (van Rooney et al., 1999; Biagioli, 2002; Spier, 2002; Kennefick, 2005; Benos et al., 2007; Kelly et al., 2014; Shema, 2014; Vyas and Hozain, 2014; Baldwin, 2015, 2019; Belluz and Hoffman, 2015; Scissor, 2016; Dinerstein, 2017; Ronnie and Flanagan, 2018; Jana, 2019; Al-Mousawi, 2020; Elsevier, 2021; Roy, 2021; Wikipedia, 2021; Hoffman, 2022; among others). From these and other sources, I have selected some historical events dealing with scientific development and peer review. Although broad in scope, I have included the birth of some key journals in geological sciences worldwide:

1) **5th Century BCE**: Introduction of the concept of peer review as a method of evaluating written work in ancient Greece (Kelly et al., 2014; Roy, 2021).
2) **25-220 CE**: Documentation of first paper-making process in China (Wikipedia, 2021).
3) **854-931 CE**: First description of the process of peer review by a physician named Shaq bin Ali al-Rahway in Syria. He described in great details the process in his book **Ethics of the Physician** (Al Kawi, 1997; Ajlouni and Al-Khalidi, 1997; Kelly et al., 2014).
4) **1398-1468**: **Johannes Gutenberg** invented the printing press at around 1440, which revolutionized the world in publications (Roy, 2021).
5) **19 February 1473 – 24 May 1543**: **Nicolaus Copernicus** was a mathematician, astronomer, and Catholic canon, who formulated a model of the universe that placed the Sun rather than Earth at its center. His theory was subjected to peer review and rebuked by the Catholic Church (Wikipedia, 2021).
6) 15 February 1564-8 January 1642: Galileo Galilei was an astronomer, physicist and engineer, from Pisa, Italy. Galileo has been called the "father of modern science". His publications were delayed due to peer review. He was under house arrest for heresy until his death (1616-1642} for his following of Copernican theory that the Earth revolves around the Sun. On 31 October 1992, Pope John Paul II acknowledged that the Church had erred in condemning Galileo (Wikipedia, 2021).
7) **1620**: Francis Bacon wrote the work **Novum Organum**, which is considered to be the basis for shaping the Scientific Method (Spier, 2002).
8) **1662**: The birth of **The Royal Society of London** to formalize a system of discussion and debate (Roy, 2021).
9) **1665**: **The Philosophical Transactions** of the Royal Society of London, which was the first journal to introduce steps to formalize the peer review process under the editorship of Henry Oldenburg (Elsevier, 2021), who was the legendary secretary of the Royal Society of London (Baldwin, 2015). During 2015, the journal celebrated the 350th anniversary of **Philosophical Transactions** (now called **the Philosophical Transactions of the Royal Society**). It is considered to be the world's first science journal.
10) **1665**: The Journal **des sçavans** was the first scientific journal to systematically publish research results in France (Liumbruno et al., 2012).
11) **1731**: The first peer-reviewed publication called the **"Medical Essays and Observations"** was published by the Royal Society of Edinburgh (Kelly et al., 2014).
12) **1752**: The Royal Society of London's development of a "Committee on Papers" to

oversee the review of text for publication in the journal **Philosophical Transactions** (Baldwin, 2015). This was the final step in fully formalizing the peer-review process.

13) **1760s**: The French journal **Académie Royale des Sciences** adopted peer review (Al-Mousawi, 2020).
14) **1800**: The birth of the **Library of Congress** (**LC**), which is the national library of the United States. https://www.loc.gov/about/history-of-the-library/# Retrieved 10 December 2021.
15) **1818**: The birth of the "**American Journal of Science"** (**AJS**) at Yale University. With peer review (visit journal website). It has been the United States of America's longest-running scientific journal, having been published continuously since its conception in 1818 by Professor Benjamin Silliman, who edited and financed it himself. Until 1880.
16) **1831**: William Whewell who is considered to be the inventor of peer review by some science historians (Al-Mousawi, 2020). He was also the one who first proposed an open peer review (Roy, 2021).
17) **1823**: The birth of the British medical journal "**The Lancet"** (Elsevier). It is a weekly peer-reviewed general medical journal. It is among the world's oldest and best-known general medical journals. It was founded in 1823 by Thomas Wakley, an English surgeon who named it after the surgical instrument called a lancet (scalpel). https://www.thelancet.com/lancet/about Retrieved 21 December 2021.
18) **1839**: The birth of the "**Proceedings of the Yorkshire Geological Society**" with peer review (visit journal website).
19) **1845**: The birth of the "**Journal of the Geological Society (London)**" with peer review (visit journal website).
20) **1864**: The birth of the "**Geological Magazine**" at the Cambridge University with peer review (visit journal website).
21) **1883**: The birth of the "**Bulletin of the U, S. Geological Survey No. 1**" with peer review (visit journal website).
22) **1890**: The birth of the "**Geological Society of America Bulletin**" with peer review (visit journal website).
23) **1893**: The birth of the "**Journal of Geology"** at the University of Chicago with peer review (visit journal website).
24) 1893: The "**British Medical Journal"** adopted the practice of assessing submitted manuscripts using external referees (Al-Mousawi, 2020).
25) **1896**: The birth of 'The **South African Journal of Geology"** with peer review (visit journal website).
26) **1896**: The birth of 'The **Journal of Geophysical Research"** with peer review (visit journal website). Former names: Terrestrial Magnetism (1896–1898), Terrestrial Magnetism and Atmospheric Electricity (1899–1948)
27) **1912**: The concept of "**Continental Drift",** fully developed by Alfred Wegener (1912), was originally rejected by his peers due to lack of driving mechanism**.** With the advent of plate tectonic mechanisms or sea-floor spreading (Vine and Mathews, 1963), the Wegener's concept was eventually accepted by experts.
28) **1916**: The birth of the journal "**American Mineralogist**" with peer review (visit journal website).
29) **1917**: The birth of the "**AAPG Bulletin**" {American Association of Petroleum Geologists) with peer review (visit journal website).
30) **1931**: The birth of the "**Journal of Sedimentary Petrology**" (1931-1993) with peer review (visit journal website). The journal was renamed to its present name "the **Journal of Sedimentary Research**" by its parent organization SEPM (the Society of Economic Paleontologists and Mineralogists**),** which is currently known as The Society for Sedimentary Geology.
31) **1936**: Albert Einstein was extremely offended that his manuscript was sent out to be refereed by the editor of **Physical Review (**John T. Tate). Einstein withdrew the manuscript protesting that he had not authorized the editor to do so with a strongly worded letter (see Kennefick, 2015).
32) 1940: The "**Journal of the American Medical Association**" (JAMA) started to use outside referees (Roy, 2021).

33) 1945: The birth of the "**Geological Survey of Canada's Bulletin**" "GEOSCAN" with peer review (visit journal website).
34) **1950**: The birth of the journal "**Geochimica et Cosmochimica Acta"** (Elsevier) with peer review (visit journal website).
35) **1951**: The birth of the "**Geological Journal**" (Wiley) with peer review (visit journal website).
36) **1952**: The "**Joint Commission on Accreditation of Healthcare Organizations"** (JCAHO). This act began requiring physician peer review at all United States hospitals (Goldberg, 1984). However, abuse of peer review has persisted.
37) **1953**: The birth of the journal "**Dee-Sea Research**" with peer review (visit journal website).
38) **1962**: The birth of the journal "**Sedimentology**" (Wiley) with peer review (visit journal website).
39) **1964**: The birth of the journal "**Marine Geology**" (Elsevier) with peer review (visit journal website).
40) **1965**: The birth of the "**Scottish Journal of Geology**" with peer review (visit journal website).
41) **1966**: The birth of the journal "**Earth-Science Reviews**" (Elsevier) with peer review (visit journal website).
42) **1966**: The birth of the journal "Earth **and Planetary Science Letters**" (Elsevier) with peer review (visit journal website).
43) **1967**: The birth of the journal "**Sedimentary Geology**" (Elsevier) with peer review (visit journal website).
44) **1973**: The birth of the journal "**Geology**" (GSA) with peer review (visit journal website).
45) **1973**: The journal **"Nature"** introduced external peer review (Baldwin, 2015).
46) **1976**: The journal **"The Lancet"** introduced external peer review (Al-Mousawi, 2020).
47) **1984**: The birth of the journal "**Marine and Petroleum Geology**" (Elsevier) with peer review (visit journal website).
48) **1986**: The "**Health Care Quality Improvement Act"** (HCQIA). In order to legislatively strengthen the role of peer review in the medical community across the United States, the U. S. Congress enacted the **HCQIA** (Curran, 1989). However, abuse of peer review has persisted.
49) **1988**: The birth of the journal "**Natural Hazards**" (Springer Nature) with peer review (visit journal website).
50) **1989**: The birth of the **World Wide Web** (Wikipedia, 2021).
51) **2006:** The birth of PLOS **One**, which is a peer-reviewed open access scientific journal published by the Public Library of Science (PLOS). The journal covers primary research from any discipline within science and medicine (visit journal website).
52) **2008**: The birth of the journal "**Petroleum Exploration and Development**" (PED) (Elsevier) with peer review started in 2009.
53) **2011**: The UK Government House of Commons Science and Technology Committee's report on **peer review system** for academic publications was published on 28 July 2011 (The Geological Society, 2011).
54) **2012**: The birth of the "**Journal of Palaeogeography**" (Elsevier) with peer review (visit journal website).
55) **2014**: The birth of **F1000Research, which** is an open access, open peer-review scientific publishing platform, covering the life sciences, owned by Taylor & Francis (visit platform website).
56) **2017:** Emergent and future innovations in peer review (Tenant et al., 2017).
57) **2018**: The birth of the "**Journal of the Indian Association of Sedimentologists**" (**JIAS**) with peer review (visit journal website).
58) **2022**: The **Ninth Peer Review Congress** in September 2022. According to Veronique Kiermer, Chief Scientific Officer, PLOS, every four year since 1989, the **Peer Review Congress** has brought together researchers, journal editors and all those who participate in the reporting and publication of scientific research, in order to share their own data and processes under scrutiny openly by peers.
https://theplosblog.plos.org/2021/09/ninth-international-congress-on-peer-review-and-scientific-publication-call-for-abstracts/
Retrieved 11 December 2021.

Peer-review problems

Peer review is the underpinning quality-control mechanism in publishing articles and awarding grants. It is imperative that this process is not tainted by reviewer bias. Unfortunately, "History is replete with evidences of many important, original and innovative papers, many of which even earned the **Nobel Prize** as well at a later time, which had been rejected by the referees under peer review system" (Roy, 2021). Richard Horton (2015), the current Editor-in-Chief of The Lancet, stated that "The case against science is straightforward: much of the scientific literature, perhaps half, may simply be untrue. Afflicted by studies with small sample sizes, tiny effects, invalid exploratory analyses, and flagrant conflicts of interest, together with an obsession for pursuing fashionable trends of dubious importance, science has taken a turn towards darkness". Although there are many issues associated with the quality of science publications compounded by peer-review problems, I have selected the following key ones for this review:

Anointed experts

The problem with peer review stems from the basic question "Who are reviewers?" Ronnie and Flanagin (2018) answered the question as "Editors like anointing colleagues as experts, reviewers appreciate peer review because it tends to confirm their own impressions of themselves as experts, and no one has created a better system to vet the validity of scientific reports. Authors may complain but also may be grateful for expert appraisal and criticism and subsequent improvement in their manuscripts. They realize that their work has been taken seriously and recognize that the incorporation of reviewers democratizes beyond the editor this part of the scientific enterprise." In other words, there are no standard tests to qualify one as being an expert reviewer in a given field. The selection process of a reviewer by an editor is mostly subjective. A related problem is that once someone is anointed to be an editorial board member of a journal for a specific field (e.g., deep-water environments), he or she may be asked to review a manuscript on an unrelated field (e.g., carbonate diagenesis) depending on circumstances and the need. In such cases, the reviewer tends to focus on mundane matters, such as a manuscript failing to adhere to journal format, missing references, typos, etc. than dealing with science content. But under the blind peer review system, the reader will never know the true expertise of the blind reviewer. Here, the science (quality) suffers.

Blind peer review

The two common modes of peer review are single- and double-blind reviews. In the single-blind peer review, the authors do not know the identity of the reviewers, but the reviewers know who the authors are. In the double-blind peer review, neither the authors nor the reviewers know each other's identities. The single-blind peer review is the traditional mode. However, the double-blind mode is also common. According to Al-Mousawi (2020), the first peer-reviewed publication is considered to be the "Medical Essays and Observations" published by the Royal Society of Edinburgh in 1731. The society adhered to the following peer-review process: "Memoirs sent by correspondence are distributed

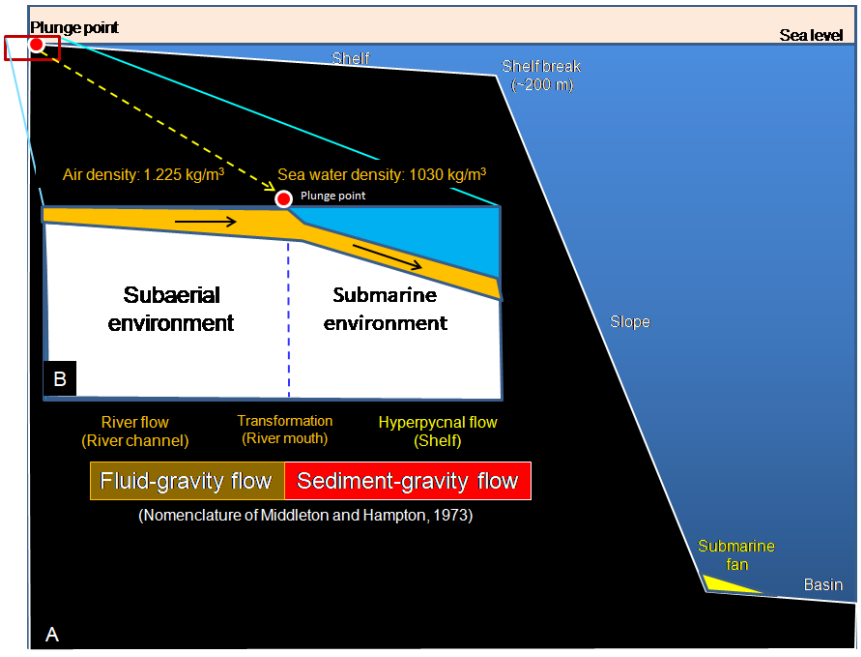

Figure 1. Generation of hyperpycnal flows near the shoreline. A. Continental margin. B. Close-up view showing plunge point (red dot) and hyperpycnal flows near the shoreline. From Shanmugam {2021a). Open Access.

according to the subject matter to those members who are most versed in these matters. The report of their identity is not known to the author." This publication appears to be the birth of blind peer review.

Although the intention behind the double-blind review is good, in practice, it is dysfunctional. For example, Shanmugam (2021a) published an article on deep-water processes in the Journal of Palaeogeography. It was subjected to the double-blind review. However, the author has 23 self-citations, which were necessary in covering the past contributions. In this case, the reviewer should have known that the anonymous author is likely to be "Shanmugam". Similarly, anonymous reviewers often suggest that the author should cite certain articles published by the reviewer, revealing his/her identity to the author. Another common practice is to use the "Track changes" menu in a Microsoft Word document by a blind reviewer. However, under this menu, some reviewers unwittingly reveal their identities by their initials or nick names posted along with their comments. In the 70s and 80s, I used to detect the identity of an anonymous reviewer by his or her handwriting styles using review comments by a pen posted on the manuscript paper pages. According to Benos et al. (2007), "Removing an author's name cannot remove biases against unconventional methodology, radical new ideas, negative results, or results that contradict a reviewer's viewpoints." Clearly, the blind peer review system is defective. A solution is to abolish the blind peer review altogether and adopt an open peer review. All future peer reviews must be transparent in which both authors and reviewers must be identified by name with e-mail address and phone numbers during the peer review. Such a transparent world is critical for creating an academic environment, which would allow authors and reviewers to communicate openly with each other as amicable colleagues, not as adversaries.

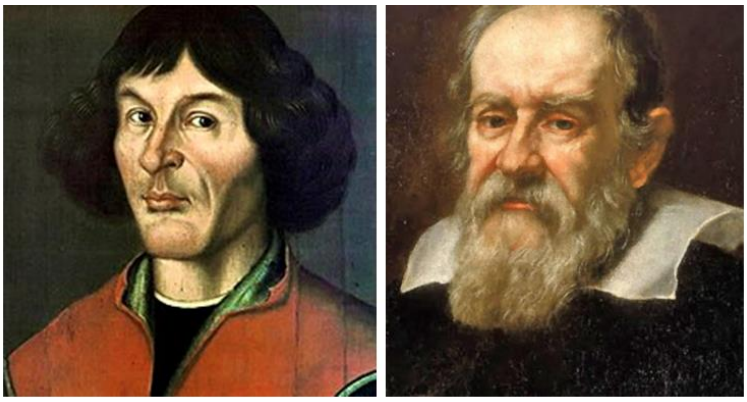

Figure 2. Portraits of Nicolaus Copernicus (1473-1543) and Galileo Galilei (1564-1642). Wikipedia (2021). Public Domain.

Delays

Although most journals have a set time limit of 2 to 3 weeks for review of an article, some reviewers take up to six months. Let me provide an example from my archives of delayed manuscripts. I submitted a comment on a paper by Steel et al. (2016) to the GSA Bulletin on May 22, 2017 (MS # 831848). My comment, which dealt with hyperpycnal flows and hyperpycnites, was entitled "Highstand shelf fans: The role of buoyancy reversal in the deposition of a new type of shelf sand body: Comment." On August 28, 2017, I contacted the GSA Bulletin office to find out the status of my manuscript. The journal office informed me that the editor-in-charge (anonymous) was too busy with other matters and did not have a chance to send my manuscript out for a peer-review. Because most journals reach a decision to accept or reject in three months after submission, I promptly withdrew my manuscript from GSA from further consideration. This disappointing event was the incentive for me to conduct a comprehensive study of hyperpycnal flows at river mouths around the world, including the Yellow and Yangtze Rivers in China.

I have published a review article entitled "The hyperpycnite problem" (Shanmugam, 2018), which included my main points from the withdrawn manuscript (Fig. 1). My review article, "The hyperpycnite problem," had resulted in my publishing four other offshoot publications, including a book chapter (Shanmugam, 2021b). This is an example of turning obstacles into opportunities!

Orthodoxy

Historically, negative peer reviews of scientific works had resulted in serious penalties, including house arrests and even deaths. Dinerstein (2017) articulated the problem of failing to preserve the orthodoxy of the time with the following

statement: "When Guttenberg's press created the opportunity for scientific information to be more widely shared it was followed, eventually, by one of the earliest forms of peer review – scientific criticism by the Church. Copernicus and Galileo both underwent an early form of peer review, and their work was even banned, Copernicus for four years and Galileo's work until 1758, when telescopes better proved heliocentricity (it was proved beyond doubt in 1838.) Their peer review ordeal was relatively tame compared to Miguel Servatus, who was burned at the stake for his beliefs about the Trinity. He was later applauded for his work understanding pulmonary circulation, the idea that blood from the right side of the heart traveled through the lungs to the left side of the heart." (Fig. 2).

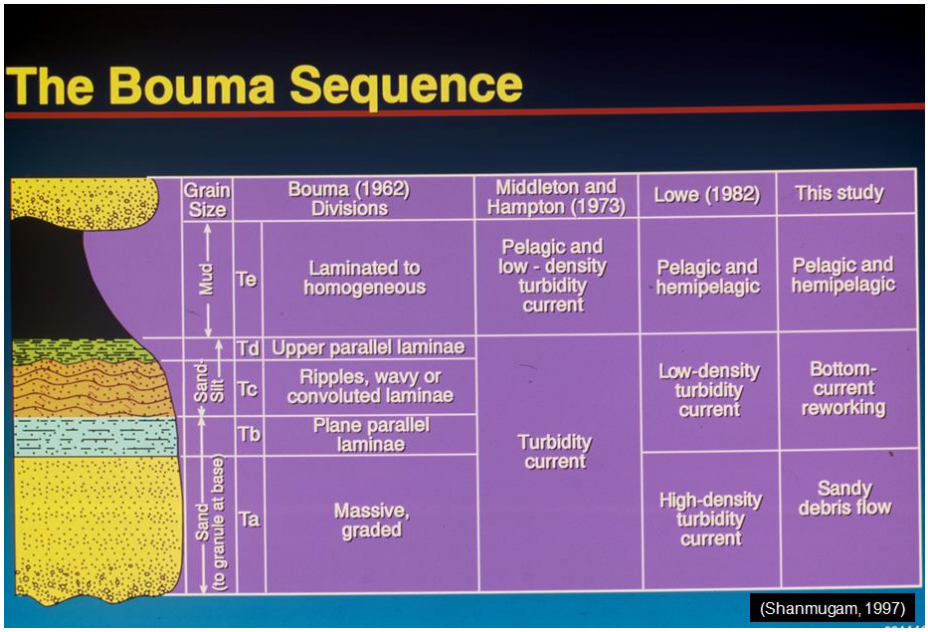

Figure 3. The Bouma Sequence. Note differences in interpretations. From Shanmugam (1997). This turbidite facies model is obsolete (Shanmugam, 2021a).

In the 21st century, peer-review related penalties are much less severe, confining to rejection of manuscripts (Section 3.7), rejection of funding grants, and retraction of published articles (Section 3.10). For example, the geologic orthodoxy in North America was that the Ouachita Flysch was composed of turbidites (Briggs and Cline, 1967). However, our (Shanmugam and Moiola, 1995) controversial reinterpretation of it as debrites was originally rejected by the GSA Bulletin, but was later accepted by the AAPG Bulletin. Not surprisingly, this paper had resulted in 42 printed pages of discussions and replies in the AAPG Bulletin by some of the leading authorities in the field, which included:

Bouma et al. (1997)
Coleman (1997)
D'Agostino and Jordan (1997)
Lowe (1997)
Slatt et al. (1997).

We promptly responded (Shanmugam and Moiola, 1997). No other paper in the history of the AAPG Bulletin, since its founding in 1917, has generated this much controversy.

Bias

Peer-review bias against women has been well documented. Christine Wennerås and Agnes World (1997), in the first-ever analysis of peer-review scores for postdoctoral fellowship applications in Sweden, have shown that the system is riddled with prejudice. For example, women were awarded 44% of biomedical PhDs but held a mere 25% of the postdoctoral positions and only 7% of professorial positions. The authors argued that the policy of secrecy in peer-review evaluation must be abandoned.

According to Smith (2006), the editorial peer review process has been strongly biased against `negative studies' (i.e. studies that find flaws with a certain popular concept or model). Importantly, reviewers have their own bias against certain authors and/or concepts. Let me provide a personal experience on this matter. Arnold H. Bouma (1962) used the Annot Sandstone [Grès d' Annot Formation (Eocene–Oligocene)], exposed in the Peira-Cava Area and vicinity of the French Maritime Alps, for developing the first turbidite facies model. This model is popularly known as "the Bouma Sequence" (Fig. 3). In questioning the basic tenet of the model, I

submitted a manuscript entitled "The Bouma Sequence and the turbidite mind set" to the AAPG Bulletin. The Bulletin selected A. H. Bouma as the reviewer who promptly rejected the manuscript. Then, I submitted the same manuscript to Earth-Science Reviews (ESR). G. M. Friedman, who was the Editor of ESR, selected J. E. Sanders as the reviewer who accepted my paper (Shanmugam, 1997; Sanders 1965) is a pioneer in turbidite research. The point is that selection of unbiased reviewers is paramount in securing effective peer-review comments.

Groupthink

Groupthink, closely related to bias discussed above, is in direct conflict with scientific progress. This is because that scientific progress is often made by departing from conventional wisdom. Conventional wisdom, however, often dictates what is being published by major scientific journals today; geologic publications are no exception. Thus, conventional wisdom can have negative effects on the peer-review process and on scientific progress.

Revolutions in the thinking on continental drift (Wegener, 1912), terrestrial sources for oil in Australia (Shanmugam, 1985), fan deltas and braid deltas (McPherson et al., 1987), chert dissolution along erosional unconformities in Alaska (Shanmugam and Higgins, 1988), ten turbidite myths (Shanmugam, 2002), sedimentary basins (Shanmugam, 20222a), and groupthink on deep-sea research (Shanmugam, 2022b) are just seven of many examples where conventional geologic wisdom has proved to be wrong. Progress in science is made through the introduction and successful testing of new ideas, many of which are bound to displace and overthrow conventional ideas. Unfortunately, many reviewers are so tied to the conventional wisdom that they feel duty-bound to go to extraordinary measures to find reasons for rejecting a manuscript with unconventional ideas (Shanmugam, 1986).

Steve Jobs, the co-founder of Apple Computer, who said that "Your time is limited, so don't waste it living someone else's life. Don't be trapped by dogma – which is living with the results of other people's thinking. Don't let the noise of other's opinions drown out your own inner voice. And most important, have the courage to follow your heart and intuition. They somehow already know what you truly want to become. Everything else is secondary."

https://www.managingcommunities.com/2009/05/25/steve-jobs-dont-be-trapped-by-dogma-which-is-living-with-the-results-of-other-peoples-thinking/ Retrieved 22 December 2021.

Peer rejection of ideas (including Nobel-prize winners)

Braben (2020) in his book "Scientific Freedom" makes a convincing argument that the process of peer review is the primary obstacle for breakthrough ideas in science. In supporting this notion, Ricón (2020) has compiled 33 striking cases of peer rejection in science, including the theory of "continental drift" by Alfred Wegener. These cases were originally rejected during peer review, but were subsequently accepted by the science community. Selected examples are:

1) The ornithine cycle,
2) Jet engines,
3) mRNA vaccines,
4) Airplanes,
5) The structure of DNA,
6) Nuclear Magnetic Resonance (NMR) (see below under Nobel Prize),
7) Lasers,
8) Clustering analysis,
9) Continental drift, and
10) Darwinism.

in addition, there are scientific papers that were rejected by journals before going on to win a Nobel prize. Selected examples are (Macdonald, 2016; Efron, 2019):

1) **Hans Krebs**: Won the 1937 Nobel Prize for citric acid cycle. His paper was previously rejected by Nature, but he resubmitted it to the Dutch journal Enzymologia, which published the paper;
2) **Enrico Fermi**: Won the 1938 Nobel Prize for weak interaction. His paper was previously rejected by Nature, but he resubmitted it to the German journal Zeitschrift für Physik, which published his work.
3) **Murray Gell-Mann**: Won the 1953 Nobel Prize for classifying the elementary particles. His paper was previously rejected by Physical Review.
4) **Rosalyn Yalow**: Won the 1977 Nobel Prize for radioimmunoassay. Her paper

was previously rejected by The Journal of Clinical Investigation, but she persisted and later submitted a revised version of the paper to the same journal.

5) **Richard Ernst**: Won the 1991 Nobel Prize for describing nuclear magnetic resonance (NMR) spectroscopy (NMR spectroscopy). His paper was previously rejected twice by the Journal of Chemical Physics, before finally being accepted and published in the Review of Scientific Instruments.
6) **Kary Mullis**: Won (jointly) the 1993 Nobel Prize for polymerase chain reaction (PCR) method. His paper was previously rejected by two journals, namely Science and Nature. Finally, he resubmitted it to the journal Methods in Enzymology and got it published.
7) **Dan Shechtman**: Won the 2011 Nobel Prize for quasicrystals. His paper was previously rejected by Physical Review Letters. He then submitted his work to the journal Metallurgic Transactions, which published the paper
8) **Peter Higgs**: Won the 2013 Nobel Prize for the Higgs Model. His paper was previously rejected by Physics Letters. He then resubmitted it to the journal Physical Review, and got it published.

Throughout this article, I have cited examples of my own papers that were originally rejected by one journal, but were subsequently accepted by another. There is no logic to this bizarre phenomenon in peer review of articles. Nathan Efron (2019) in his editorial entitled "The shame of rejection (not)" to Clinical and Experimental Optometry explained this phenomenon best: "There are two morals of this story. First, it must be remembered that 'beauty is in the eye of the beholder'. Translated into journal peer review-speak – the scientific worth of a paper will be viewed differently by different reviewers. Just because a paper is rejected does not necessarily mean it is worthless… which brings me to the second, consequential moral: if your paper is rejected by Clinical and Experimental Optometry – or any other journal for that matter – do not despair; just shrug your shoulders, draw in a deep breath, take note of the comments of the reviewers of your paper, and submit elsewhere. You never know what might happen next." In other words, peer review is nothing more than a sophisticated gambling in the game of publications!

The corollary to peer rejection, of course, is equally puzzling. For example, the same reviewers who rejected papers of Nobel-Prize winning caliber were also the ones who accepted other papers for publications. Some of those published papers probably went on to win "outstanding paper" awards!

Inconsistency

In peer-review process, it is a common occurrence that two journals or two reviewers for the same journal can reach opposing decisions, one to accept the manuscript and the other to reject the manuscript. A classic case of opposing decisions

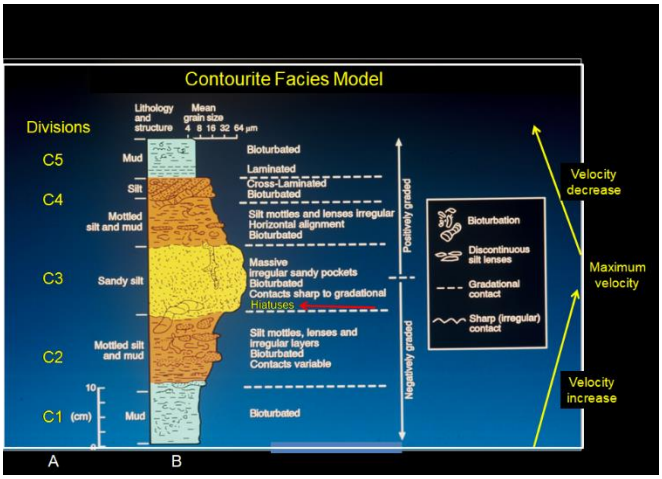

Figure 4. (A) Revised contourite facies model with five divisions (C1–C5) proposed by Stow and Faugères (2008); (B) Original contourite facies model by Gonthier et al. (1984). From Shanmugam (2016). This contourite facies model is obsolete (Shanmugam, 2021a). Fair usage.

between two journals occurred to my manuscript on "Manganese distribution in the carbonate fraction of shallow and deep marine lithofacies, Middle Ordovician, eastern Tennessee" (Shanmugam and Benedict, 1983). First, an SEPM journal rejected it. Second, an Elsevier journal accepted it as submitted without revision.

Second example is a paper on "The landslide problem". It was rejected by the Journal of Sedimentary Research, but was accepted by the Jounal of Palaeogeography (Shanmugam, 2015).

Third example is a paper on "The contourite problem" (Fig. 4). It was rejected by the AAPG

Bulletin, but was accepted as a book chapter by Elsevier (Shanmugam, 2016). Sometimes, a rejection can be used turn an obstacle into an opportunity. For example, at the time when the AAPG Bulletin rejected my paper, I received an invitation to contribute a book chapter to the thematic volume ""Sediment provenance", edited by Rajat Mazumder (2016). His invitation provided me an opportunity to discuss the significance of deep-water bottom currents and their current directions in interpreting provenance of ancient contourites. I simply added this part on provenance to the rejected paper and got it published as a book chapter.

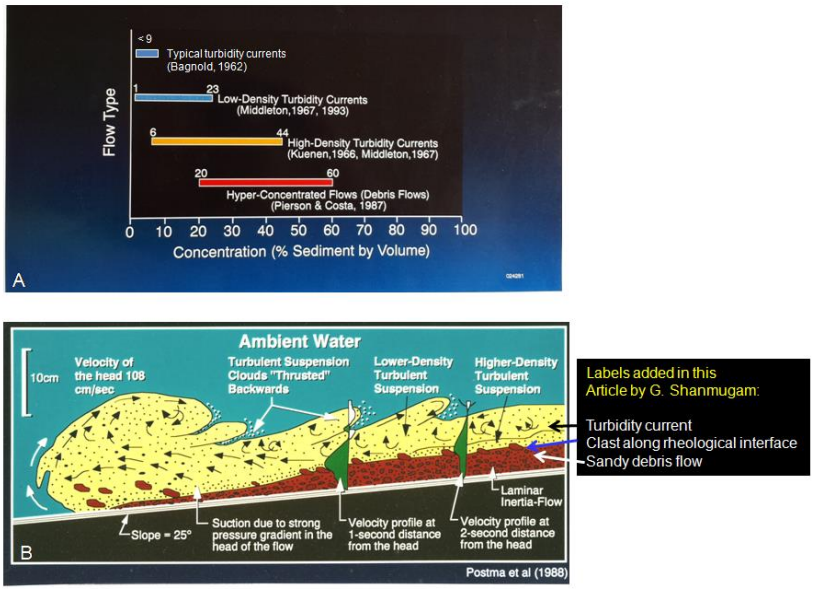

Figure 5. (A) Plot of sediment concentration for different flow types. Note overlap in sediment concentration among low-density, turbidity currents, high-density turbidity currents, and hyperconcentrated flows or debris flows. (B) Experimental stratified flows with a basal laminar-inertia flow and an upper (turbulent) turbidity current that have been termed as "high-density turbidity currents" (HDTC) by Postma et al. (1988). From Shanmugam (2021a). Fair usage.

My fourth example is a paper entitled 'High-density turbidity currents: are they sandy debris flows?' (Fig. 5) (Shanmugam, 1996). As the title suggests that the paper is highly controversial. Prof. John Southard (1995, MIT), who was the editor of the Journal of Sedimentary Research, decided to publish the paper despite mixed reviews (one positive and one negative). Southard informed me that this paper should trigger several academic debates and that should bring some clarity to the controversy. However, no one debated the issue. Six years after its publication, a survey was published by the International Association of Sedimentologists (IAS). Accordingly, my paper 'High-density turbidity currents: are they sandy debris flows?' had achieved the status of the single most cited paper in sedimentological research published in three world-renowned periodicals - Journal of Sedimentary Research, Sedimentology, and Sedimentary Geology - during the survey period of 1996-2003 (Source: International Association of Sedimentologists Newsletter, August 2003) (Racki, 2003). Researchers, who had spent several years on conducting studies on a topic and on writing a paper, are simply not going to discard the paper just because it was rejected by a journal. In my case, all rejected papers got published.

The fourth example raises some serious doubts about the peer-review process. The editor could have simply rejected the manuscript, which would have deprived the reader of this concept. This example also stresses the importance of the editor who should possess adequate knowledge on a given topic to make meaningful decisions on manuscripts with mixed reviews. Fortunately, the editor (Southard) happened to be a world-renowned expert on fluid mechanics (Middleton and Southard, 1977) and who held a full professorship at the Massachusetts Institute of Technology (MIT), when he handled my manuscript. Unfortunately, most editors simply perform a managerial task of assembling review comments and making an obvious decision. Also, it is unrealistic to expect an editor to be an expert on many fields.

Politics

The phenomenon of "Climate change" has become a formidable political force in controlling articles to be published and in awarding research grants. For example, articles and research proposals that do not favor climate change are likely to be rejected during the peer-review process. Scholars have addressed this phenomenon both in government testimony and in publications (Lindzen, 2010; Van der lingen, 2018).

Fake peer review and plagiarism

Gao and Zhou (2017) addressed the issue of fake peer review in science journals. For example, this scheme works in steps:

1) Fake or fraudulent peer review can result when editors rely on authors' recommended reviewers.
2) Although the recommended reviewer names are genuine but they have a fake e-mail address that only the author knows.
3) Consequently, the fake e-mail ID enables the authors to write a favorable review of their own paper.

Recently, Springer Nature geosciences journal has retracted 44 articles filled with gibberish. Most of them had questionable peer-review practices. An example of a nonsensical published article title is: "Distribution of earthquake activity in mountain area based on embedded system and physical fitness detection of basketball." This title is truly absurd. https://retractionwatch.com/2021/11/04/springer-nature-geosciences-journal-retracts-44-articles-filled-with-gibberish/ Retrieved 1 December, 2021

Blind peer reviews provide an ideal ground for stealing intellectual properties in terms of raw data and ideas. Plagiarism and fraud cases have been discussed elsewhere (Benos et al., 2007; Triggle and Triggle, 2017; Al-Khatibb, 2019).

"Sham peer review" in the U.S. medical community

Despite the passing of various government acts, such as **JCAHO** in 1952 and **HCQIA** in 1986, In the United States (see Sction 2), there has been a significant abuse of peer review process in the medical community. This perversion is called "Sham peer review" (Pfifferling et al., 2008). Vyas and Hozain (2014) discussed the history behind "sham peer review". This is a review called for by either a single, or group of physicians, conducted in order to lead to adverse action taken by the review committee.

Figure 6. Distinction between fan deltas and braid deltas near the shoreline. Photographs are courtesy of J. G. McPherson.

Settling old scores

The phrase simply means to harm someone because they have harmed you in the past: Reviewers often use the blind-review to settle some old scores with their opponents. For example, McPherson, Shanmugam, and Moiola (1987) submitted a manuscript on "Fan deltas and Braid deltas" to GSA Bulletin. An anonymous reviewer of the manuscript had some strong comments about my papers on deep-water turbidites that I published in other journals earlier. Ironically, those review comments were totally irrelevant to the manuscript under review on shallow-water fan deltas and braid deltas (Fig. 6). It is worth noting that our paper on braid deltas has become one of the most cited papers on deltas.

Online publications

During the last decade, there has been a proliferation of online journals and blogs. The COVID-19 lockdowns have further accelerated online publications and Zoom conferences. The problem is that unlike the conventional print journals with established editorial boards and methods, the details of online journals and their peer-review methods are not always transparent. Plus, one can post an article, without peer review, on online platforms, such as Research Gate. The relative ease with which one can publish new ideas online quickly has attracted potential authors to online journals. This diversion of contributions from print journals to online journals seems to dilute the overall quality of articles in some cases. On the other hand, there are good quality online publications (e.g., Kelly et al., 2014; Kirkland, 2014; Belluz and Hoffman, 2015; Tennant et al., 2017; Baldwin, 2019; Al-Mousawi, 2020; Roy, 2021; among others). The advantages of online publications are that they are not only fast but also free. In both print and online publications, quality matters.

Acknowledgements

Peer review is a serious and time-consuming endeavor. In some cases, I have spent two or three full days in reviewing a manuscript. Let me cite two examples from which I benefited, namely Shanmugam (2012a and 2022c). The 2012a article was on "Paleo-tsunami deposits" and the 2022 book review was on "River Planet by Martin Gibling". In each case, two anonymous reviewers were involved. These four reviewers were prompt, thorough, and provided detailed review comments. Consequently, the quality of my two publications improved considerably. Unfortunately, I could not acknowledge them by their names because they remained anonymous. It's a pity!

Controversies in geological sciences

Interpretations of geologic units dating back millions of years are, by design, likely to yield differences of opinions and controversies. Not surprisingly, I have participated in 38 published academic discussions and replies during the past 38 years. All of them were peer-reviewed (Shanmugam, 2021b, his Table 6.3). In addition, I have commented on two articles published in the Earth-Science Reviews in 2022 (Shanmugam, 2022d, e). Clearly, it is problematic to expect an objective peer review on a controversial paper under the conventional blind peer review. On the other hand, academic discussions are a viable solution to the prevailing peer-review problems.

Imbalance of peer reviewers in the biomedical research

In a French study of peer review in the biomedical literature, Kovanis et al. (2016) have reported the following key points that are relevant to the theme of my article:

1) Surprisingly, 20% of the researchers performed 69% to 94% of the reviews.
2) Among researchers actually contributing to peer review, 70% dedicated 1% or less of their research work-time to peer review while 5% dedicated 13% or more of it.
3) An estimated 63.4 million hours were devoted to peer review in 2015, among which 18.9 million hours were provided by the top 5% contributing reviewers.
4) There is a considerable imbalance in the distribution of the peer-review effort across the scientific community.
5) Finally, various individual interactions between authors, editors and reviewers may reduce to some extent the number of reviewers who are available to editors at any point.

In summary, this study by Kovanis et al. (2016) suggests that only a small group of the available experts were doing most of the peer review in biomedical research. Such an imbalance of peer reviewers could explain the deficiency of quality in peer review.

A solution: Open Peer Review (OPR)

The basic tenet of science, which is discovering truth, requires scientists to be fully transparent. In this context, Al-Mousawi (2020) stated that "Looking ahead, I believe the focus on transparency in peer review will gain even more momentum and will soon become the 'norm. Innovations will be contingent on what technology is available, but in the end, I believe the biggest hurdle we still need to overcome is a cultural one. There is still a lot of resistance from a small proportion of the research community towards transparency, and it will naturally take time to alleviate their fears around a fully transparent process." Similarly, the Public

Library of Science (PLOS} also advocates "Open Peer Review" (OPR) because it promotes (1) quality, (2) enrichment, (3) credit, and (4) accountability in advancing science (Chen, 2021). For example**,** **F1000Research** is an open access, open peer-review scientific publishing platform covering the life sciences (see Al-Mousawi, 2020). In this process/model, the peer reviewer's names and comments are visible on the site. As part of its open science model, the data behind each article are also published and are downloadable.

Today, many scholarly journals employ versions of Open Peer Review in their day-to-day practice, including BMJ, BMC, Royal Society Open Science, Nature Communications, the PLOS journals, among others. Wolfram et al. (2020) have documented that the growth of Open Peer Review (OPR) journals by discipline groups is improving, in particular, the growth of Medical and Health Sciences among the science group since 2017 (Fig. 7). However, Journals in geological sciences are still reluctant to adopt OPR. Selected publishers of OPR journals are:

1) MDPI (Multidisciplinary Digital Publishing Institute) (Switzerland),
2) SDI (Solitaire Diamond Institute) (India),
3) BMC (BioMed Central) (UK),
4) Frontiers Media S.A. (Switzerland),
5) Kowsar (The Netherlands),
6) Wiley (USA),
7) Copernicus publications (Germany),
8) PLOS (Public Library of Science) (USA),
9) Elsevier (The Netherlands), and
10) EMBO (The European Molecular Biology Organization) Press (Germany).

Although an open peer review is nothing new (McGiffert, 1988; Van Rooney et al., 1999), there has been resistance. One reason is the fear of retaliation. For example, there could be negative career consequences for critical reviewers who happen to be junior researchers and who depend on research grants. However, such fears are not supported by data (Justice et al., 1988; Van Rooyen et al., 1988).

Until we overcome this obstacle, an interim alternative is to make some improvements to existing peer-review process.

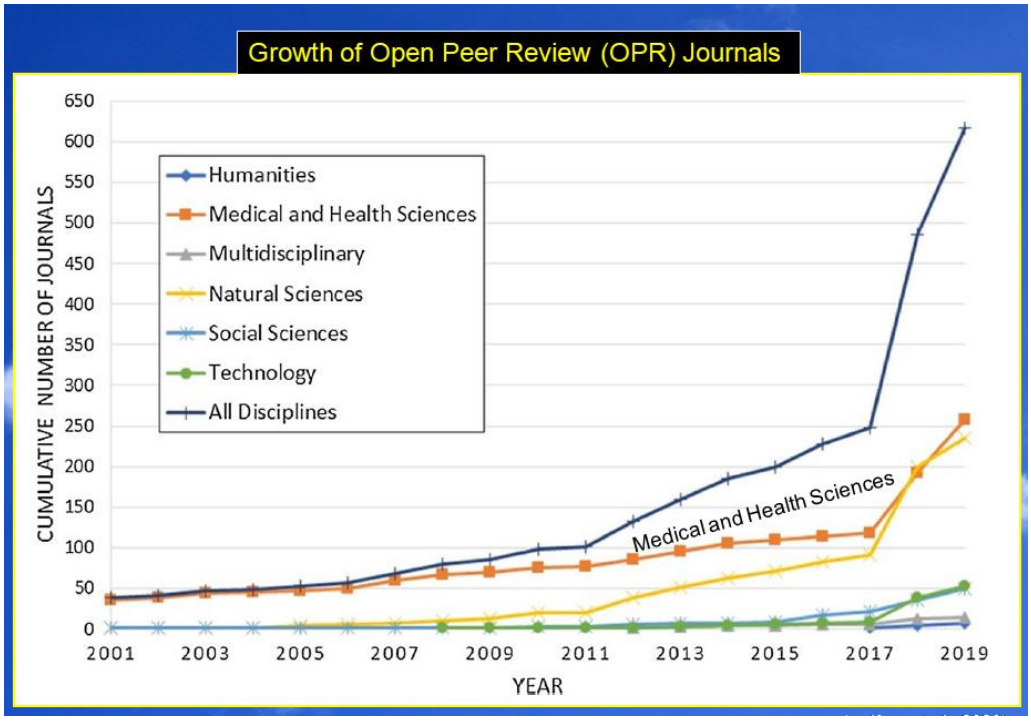

Figure 7. Growth of Open Peer Review (OPR) journals by discipline groups. Note the growth of Medical and Health Sciences since 2017. From Wolfram et al. (2020).

Suggested steps for improvements

1. In the published paper, the entire peer-review comments and recommended decisions of anonymous reviewers should be published at the end of a paper as "History of peer review".
2. This would force the anonymous reviewer to be objective and accountable for his or her comments and recommendations.
3. This would also allow the author to respond precisely to comments made point-by-point by the reviewer.

4. Most importantly, this would allow the reader to appreciate the entire review history from both sides, namely the reviewer side and the author side.

Open Peer Review (OPR) should not be confused with Open Access (OA) journals. They are not one and the same. OPR deals with the review process of an article in a journal whereas OA refers to the availability of an article in a journal. For example, an article accepted under blind review process can be published under OA.

Application of OPR in Petroleum Exploration

The Open Peer Review (OPR) has direct application to petroleum exploration. I know well from my years with Mobil Oil Company (1978-2000), petroleum exploration in frontier areas is a challenging business that requires the best and innovative ideas from everyone involved and it requires being ahead of others in the industry. With that perspective, it is only natural to think through the parallels of peer-reviewed publishing in academia with internal peer review of exploration ideas in the industry. In fact, OPR is already in practice in the industry.

Concluding remarks

The current system of blind peer review is obsolete. This is because there are at least 8 examples of scientific papers that were rejected before going on to win a Nobel Prize. As an active researcher in sedimentology and petroleum geology, many of my own examples show that the same manuscript, which was rejected by one journal, got accepted by another journal without any revisions. Also, there are no practical ways to hide the identities of the reviewer and the author. The current blind review process is an illusion. A solution is to adopt Open Peer Review IOPR). Many publishers have already adopted OPR in some medical and natural sciences. There is resistance from journals in geological sciences to OPR. Barring an open peer review in geological sciences, an alternative path is to publishing the entire peer-review comments and decisions of all reviewers (anonymous and identified) at the end of a paper. This practice not only would force the anonymous reviewer to be objective and accountable but also would allow the entire peer-review process to be transparent to the reader.

Abbreviations and Explanations

AAPG: American Association of Petroleum Geologists;
AJS: American Journal of Science;
BCE: Before Common Era
BCRS: Bottom-current reworked sands;
BMC: BioMed Central;
BMJ: British Medical Journal
CE: Common Era
EMBO: The European Molecular Biology Organization (Germany)
ESR: Earth-Science Reviews
F1000Research: Open Access publishing platform owned by Taylor & Francis
GSA: Geological Society of America;
HCQIA: The "Health Care Quality Improvement Act" was enacted by the U. S. Congress in 1986 in order to legislatively strengthen the role of peer review in the medical community.
HDTC: High-density turbidity currents;
IIT: Indian Institute of Technology;
JAMA: Journal of the American Medical Association;
JIAS: Journal of the Indian Association of Sedimentologists
JCAHO: The "Joint Commission on Accreditation of Healthcare Organizations". This 1952 act began requiring physician peer review at all United States hospitals.
JOP: Journal of Palaeogeography;
JSR: Journal of Sedimentary Research;
LC: Library of Congress of the US;
MDPI: Multidisciplinary Digital Publishing Institute (Switzerland);
MIT: Massachusetts Institute of Technology;
MPG: Marine and Petroleum Geology;
MTD: Mass-transport deposits;
NASA: National Aeronautics and Space Administration;
OPR: Open Peer Review;
PED: Petroleum Exploration and Development
PLOS: Public Library of Science;
SDI: Solitaire Diamond Institute (India);
SEPM: The Society for Sedimentary Geology;
US: United States;
USA: United States of America;
Vox: It is an American news and opinion website owned by Vox Media. The website was founded in April 2014 (Visit media website).

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I thank Prof. G. M. Bhat, Managing Editor of JIAS, Jammu University, India, for encouraging me to submit this Editorial. I also thank Dr. Bashir Ahmad Lone, Co-Managing Editor of JIAS, Jammu University, India, for final processing and formatting of the manuscript. My sincere thanks to Dr. D. W. Kirkland (Retired Mobil Scientist) for a critical and helpful review of the manuscript. As always, I am thankful to my wife, Jean Shanmugam, for her general comments.

About the Author

G. Shanmugam is a person of Indian origin. He was born in 1944 in Sirkazhi, Madras Presidency, British India. He emigrated to the U.S. in 1970 and became a naturalized U. S. citizen in 1990. He has been married to his American wife, Jean, since 1976. They live in Irving, Texas. He is a pragmatic and an iconoclastic deep-water process sedimentologist. His primary contributions are aimed at documenting the volumetric importance of sandy mass-transport deposits and bottom-current reworked sands in deep-water petroleum reservoirs worldwide and at dispelling the popular myth that most deep-water sands are turbidites. Importantly, he debunked the myths of facies models on high-density turbidites (Shanmugam, 1996), tsunamites (Shanmugam, 2006b), landslides (Shanmugam, 2015), seismites (Shanmugam, 2016b), contourites (Shanmugam, 2016a, 2017), hyperpycnites (Shanmugam, 2018), and hybridites (Shanmugam, 2021a). . He has over 380 published works, including two volumes of Elsevier's Handbook of Petroleum Exploration and Production (Shanmugam, 2006a and 2012b) and their Chinese editions. His most recent Elsevier book "Mass Transport, Gravity Flows, and Bottom Currents" contains 540 case studies covering environments on Earth, Mars, and Jupiter, but with a majority on deep-water processes on Earth (Shanmugam, 2021b).

Professional Preparation

1978: Ph.D., Geology, University of Tennessee, Knoxville, TN., U.S.
1972: M.S., Geology, Ohio University, Athens, OH., U.S.
1968: M.Sc., Applied Geology, Department of Civil Engineering, IIT-Bombay, India
1965: B.Sc., Geology and Chemistry, Annamalai University, Tamil Nadu, South India
Note: He served as a research scholar under the Council of Scientific and Industrial Research (CSIR), Government of India, at IIT Bombay during 1968–1970.

OHIO University June 8, 2022 News

See his story on his scientific contributions under "Alumni/Friends" category at:
https://www.ohio.edu/news/2022/06/alumnus-ganapathy-shanmugam-admonishes-scientists-against-deep-sea-groupthink-provides

1978-2000: Employment with Mobil Research and Development Corporation, Dallas,Texas

2000-Present: Adjunct Professor, the University of Texas at Arlington

2010-2011: Scientific Advisor: Research Institute of Petroleum Exploration and Development (RIPED) of PetroChina, Beijing, China

2000- Present: Petroleum Consulting: Reliance, ONGC, China University of Petroleum in Qingdao, Yangchang Oil Field in Yanan.

1997 AAPG Annual Convention Debate Panelist, Dallas, Texas, USA
Topic: Processes of Deep-Water Clastic Sedimentation and Their Reservoir Implications: What Can We Predict?
Moderator: H. E. Clifton.

Panelists: A.H. Bouma, J.E. Damuth, D.R. Lowe, G. Parker, and **G. Shanmugam**

Organizer of International Deep-Water Sandstone Workshops: 15
Examples:

- the UK Department of Trade and Industry (DTI) in Scotland (1995 and 1997);
- Petrobras, Mobil, and Unocal in Brazil and in Dallas, Texas (1998 and 1999);
- Oil and Natural Gas Corporation (ONGC) in India (2002 and 2004);
- Reliance Industries Ltd. in India (2006–09);
- Research Institute of Petroleum Exploration and Development (RIPED), PetroChina in Beijing (2009–10);
- Yanchang Oilfield Exploration and Development, Research Institute of Yan'an Branch (China) (2014);
- China University of Petroleum, Qingdao, China (2014).

Organizer of clastic facies field course (3 weeks) for Saudi Aramco, Dhaharan, Saudi Arabia:

1990 (3-21 November), Saudi Aramco, Saudi Arabia. Field area includes Qassim and vicinity. Modern and anient deposits were investigated in the field. Seismic profiles, well logs, and cores from petroleum-producing fields were used in class exercises

International invited speaker: 87

2018-Present: Editorial Board

- Associate Editor-in-Chief of the Journal of Palaeogeography (Springer)
- Editorial Board Member of the Petroleum Exploration and Development (Elsevier).
- Editorial Board Member of the Journal of Indian Association of Sedimentologists.

Research

He conducted outcrop studies of deepwater deposits in the Southern Appalachians (Tennessee, United States), Ouachita Mountains (Arkansas and Oklahoma, United States), and Peira Cava area (French Maritime Alps, SE France). He described deep-water strata using conventional cores and outcrops (1:20 to 1:50 scale), which include 32 deepwater sandstone petroleum reservoirs worldwide, totaling over 10,000 m in cumulative thickness during 1974–2011.

He also conducted field studies of coal deposits in Victoria (Australia), coniferous rain forests in the North Island (New Zealand), limestone karst in Guilin (China), fluvial deposits in Gujarat (India), 2004 Indian Ocean Tsunami-related coastal deposits in Tamil Nadu (India), shallow-marine deposits in Qassim area (Saudi Arabia), and estuarine deposits in the Oriente Basin (Ecuador). He would like to acknowledge a select group of world-renowned editors, associate editors, and reviewers who evaluated my contributions during the past 50 years:

1 J. Southard (Journal of Sedimentary Research)
2 P. McCarthy (Journal of Sedimentary Research)
3 C. North (Journal of Sedimentary Research)
4 P.J. Talling (Journal of Sedimentary Research)
5 G.A. Smith (Journal of Sedimentary Research)
6 G. Postma (Journal of Sedimentary Research)
7 D.J.W. Piper (Journal of Sedimentary Research)
8 Martin Gibling (Journal of Sedimentary Research)
9 O.H. Pilkey (Journal of Sedimentary Petrology)
10 Jean Lajoie (Journal of Sedimentary Petrology)
11 G. Kelling (Sedimentary Geology)
12 A.D. Miall (Sedimentary Geology and Earth-Science Reviews)
13 G.D. Klein (Earth-Science Reviews)
14 G.M. Friedman (Earth-Science Reviews and History of Geologic Pioneers)
15 André Strasser (Earth-Science Reviews)
16 A. Negri (Earth-Science Reviews)
17 Jingping Xu (Earth-Science Reviews)
18 R. Steinmetz (AAPG Bulletin)
19 J.A. Helwig (AAPG Bulletin)
20 S.A. Longacre (AAPG Bulletin)
21 K.T. Biddle (AAPG Bulletin)
22 N.F. Hurley (AAPG Bulletin)
23 E.A. Mancini (AAPG Bulletin)
24 G.M. Gillis (AAPG Bulletin)
25 M. Sweet (AAPG Bulletin)
26 Barry J. Katz (AAPG Bulletin)
27 D.G. Roberts (Marine and Petroleum Geology)
28 E.M. Moores (Geology)
29 H.T. Mullins (Geology)

30 R.E. Arvidson and M.E. Bickford (Geology)
31 R.D. Hatcher, Jr. and W.A. Thomas (GSA Bulletin)
32 J.D. Collinson (Sedimentology)
33 P. Carling (Sedimentology)
34 B.W. Flemming and M.T. Delafontaine (Geo-Marine Letters)
35 Kuldeep Chandra (Indian Journal of Petroleum Geology)
36 A.J. Michael (Bulletin of the Seismological Society of America)
37 A.J. (Tom) van Loon (Geologos, Journal of Sedimentary Research, Journal of Palaeogeography, and Series Editor for Elsevier's Developments in Sedimentology 60 on "Contourites").
38 Z.-Z. Feng (Journal of Palaeogeography)
39 Yuan Wang (Journal of Palaeogeography)
40 G.M. Bhat and Bashir Ahmad Lone (Journal of the Indian Association of Sedimentologists)
41 J. Rodgers, J.H. Ostrom, and P.M. Orville (American Journal of Science)
42 K.R. Walker and D. Roeder (Appalachian Geodynamic Research: American Journal of Science)
43 A.H. Bouma, W.R. Normark, and N.E. Barnes (Submarine Fans and Related Turbidite Systems)
44 G.G. Zuffa (NATO Conference on "Provenance of Arenites")
G.C. Brown, D.S. Gorsline, and W.J. Schweller (Deep-Marine Sedimentation: Depositional Models and Case Histories in Hydrocarbon Exploration and Development)
45 K.L. Kleinspehn and C. Paola (New Perspectives in Basin Analysis)
46 E.M. Moores and F. Michael Wahl (The Art of Geology)
47 S.P. Hesselbo and D.N. Parkinson (Sequence Stratigraphy in British Geology)
48 R.D. Winn, and J.M. Armentrout (Turbidites and Associated Deep-Water Facies)
49 D.A.V. Stow and M. Mayall (Deep-water Sedimentary Systems)
50 J.H. Steele, K.K. Turekian, and S.A. Thorpe (Encyclopedia of Ocean Sciences, Second Edition)
51 M. Rebesco and A. Camerlenghi (Contourites)
52 A. Kumar and I. Nister (Paleotsunamis: Natural Hazards)
53 J. Cubitt (Handbook of Petroleum Exploration and Production series)
54 Rajat Mazumder (Sediment Provenance)
55 Scott Elias (Reference Module in Earth Systems and Environmental Science)
56 J. Kirk Cochran, H. Bokuniewicz, and P. Yager (Encyclopedia of Ocean Sciences, Third Edition)
57 R.N. Ginsburg (Episodes)
58 W. Nemec and R.J. Steel (Fan Deltas)
59 Scott Elias and David Alderton (Editors) and Nick Lancaster (Section Editors) (Encyclopedia of Geology, Second Edition).

Of over 300 reviewers who reviewed my papers, I would like to single out (1) the late Charles Hollister for his review of my paper (Shanmugam et al., 1993) on bottom-current reworked sands, and (2) the late John Sanders for his review of my paper (Shanmugam, 1997) on the Bouma Sequence.

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