



An evaluation of the process of peer review

James B. Riding

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EDITORIAL

An evaluation of the process of peer review

1. Introduction

The system of pre-publication editorial peer review (normally known simply as peer review or the referee system) has been used to critique, and hence improve, draft academic manuscripts, and documents such as book proposals, internal corporate reports, research grants and teaching materials for many years. In summary, the submitted documents are sent to one or more carefully selected experts (peers), who are asked to read and comment critically on them. In particular, but not exclusively, reviewers are asked to point out any unjustified claims, improper interpretations and extraneous results to the editors. The reviewer reports help the editors reach a decision as to whether the manuscript should be published, with or without revisions, or not at all. All researchers who have a track record in a certain discipline may be asked to undertake peer reviews.

A peer review of a submitted scholarly manuscript is used in two ways. One by the author to improve their nascent work, and secondly by the editors to arrive at a decision (i.e. accept, revise or decline) on submitted manuscripts. There is a very large body of literature on all aspects of the peer review process (e.g. Kassirer and Champion 1994; Rowland 2002; Ware 2008; Ali and Watson 2016). Many of these papers are in journals on the life and medical sciences. This body of literature also includes entire textbooks such as Wager et al. (2002), Hames (2007) and Barczak and Griffin (2021). Recently there has been a tendency for studies on this topic to use experimental techniques, statistical analysis and survey data to analyse the effectiveness of the process (e.g. Fox et al. 2016; Wicherts 2016; Gaudino et al. 2021). In this short article I will review the peer review system, look at the criticisms of it, review how it works in practice, then go on to discuss what makes a good review from the perspective of both authors and editors. The piece is principally aimed at helping early career researchers (ECRs) in palynology to understand this procedure, deal with peer reviews of their manuscripts, and guide them when they receive their first review requests.

2. A concise history of peer review

The introduction of the formal system of peer review of academic work is credited to the German-born polymath Henry Oldenburg FRS (~1615–1677) (Bluhm 1960). In 1665, during Oldenburg's tenure as the founder and first editor of the *Philosophical Transactions of the Royal Society* (the oldest extant scientific periodical), he sporadically sent out submitted manuscripts to specialists on the Council of the Royal Society for technical evaluation and used the replies to

inform his editorial decisions (Zuckerman and Merton 1971; Spier 2002). This procedure was further formalised in 1752 when the Royal Society established a 'committee on papers' (Kronick 1990). This, of course, is the precursor to what now would be termed an editorial board.

To say the least, peer review did not catch on quickly, and was only relatively intermittently undertaken throughout the 18th and 19th centuries, despite the fact that scientific publishing burgeoned at this time. However, the 18th century was pivotal in the evolution of peer review. *Medical Essays and Observations*, instigated by the Royal Society of Edinburgh in 1731, was among the first journals to exclusively use peer review, using an editorial board to help the Managing Editor (Kronick 1990). The practice of requesting reviews from external, independent specialists dates from the middle of the 19th century. In those early days, authors had much more influence than today; indeed, at this time, the burden of proof normally lay with the reviewers rather than the proponents of manuscripts (Anonymous 2003). Peer review gradually expanded to become relatively common by the mid-20th century, with the acceptance of the system throughout the arts and sciences (Burnham 1990). Despite this expansion, peer review only became the norm in academic publishing by the late 1900s (Rennie 1999; Benos et al. 2007).

Interestingly, geology played a substantial part in the evolution of peer review during the 19th century. In 1811, the Geological Society of London established one of the earliest specialist scientific periodicals, namely the *Transactions of the Geological Society*. This journal used the then relatively new system of peer review. The President of the Geological Society of London at this time was George B. Greenhough FRS (1778–1855), who was the first to use the legalistic term referee for peer reviewers in 1817 (Morgan 2016). The distinguished English academic polymath William Whewell FGS (1794–1866), who famously coined the term consilience of inductions or the convergence of evidence (Fisch 1985; Quinn 2017), gave a massive boost to peer review. In 1831, six years before he became President of the Geological Society of London, Whewell persuaded the Royal Society that they should obtain reports from external experts on all manuscripts submitted to the *Philosophical Transactions of the Royal Society*. Then, in 1845, the Geological Society of London decided to appoint a referee for every paper that was read at their proceedings (Morgan 2016).

3. The different types of peer review

3.1. Preamble

The previous section briefly described the early history of peer review. As was stated, this system became the norm during the late 20th century. This was of course prior to the digital revolution. Prior to the 1990s, journal editors would send paper copies of manuscripts, and usually a 'reviewer questionnaire', out to two or more peer reviewers using the analog postal system (aka snailmail). Naturally these days, this process proceeds entirely electronically with reviewers receiving all communications and a single pdf file to review via email. There are two main styles of peer review operating today. These are pre-publication peer review and post-publication peer review; the latter is a relatively recent innovation. In summary, pre-publication peer review is still the predominant and most widely respected form of assessing the quality of academic endeavours. However, the attributes of post-publication peer review are gradually being recognised, and this style of review is gaining in influence. Pre- and post-publication peer review are two very self-explanatory terms and are discussed in detail below.

3.2. Pre-publication peer review

Pre-publication peer review is the most prevalent version of assessing the quality of manuscripts. Firstly, the document is given a fairly quick editorial audit for formatting, phraseology, relevance, style etc. by the editor. If the work is considered to have potential, the manuscript is then sent out to peer reviewers for assessment ahead of possible publication. The referees then report back and if the authors respond to their comments satisfactorily, the editor will likely accept the paper for publication. The alternatives are a further round of peer review or rejection. In the case of the latter, the manuscript will not be published unless it is subsequently accepted by another journal (Riding 2022, fig. 1).

The prevailing norm prior to around the late-1990s, was the system whereby all the reviewers know the identities and institutional affiliations of the authors, but the reviewers are anonymous (unless they make a positive choice to reveal their names). This is a variant of the closed pre-publication peer review system known as single blind peer review, and this system remains the most widespread today. A relatively new system, the open pre-publication peer review process, is also in use today. The closed and open pre-publication peer review systems are described below, and are summarised in Table 1.

3.2.1. The closed pre-publication peer review process

Closed pre-publication peer review is the style followed by most journals today and is where either the reviewers, or both authors and reviewers remain anonymous. These are the single blind and double blind variants (Table 1). In the case of the single blind review, which is by far the most widespread protocol used today, the author is unaware of the identities of the reviewers. In stark contrast, the

reviewers receive the full manuscript including, of course, the identities and affiliations of the authors. The process has been criticised, notably due to the (perceived) balance of power residing with the reviewer. As in all cases where there is an imbalance of power, this can be abused. Specifically, this is largely the potential for conscious or unconscious bias against the authors on the part of the reviewers with regard to, for example, gender, geography, institution, native language, race, religion, seniority, sexual orientation etc. It is unarguably the case that the single blind review gives a reviewer a chance to provide harsh, overcritical, passive-aggressive and subjective anonymous comments, which can ultimately lead to the rejection of a manuscript. Additionally, if (as is highly likely) the author and reviewer work in the same area, the latter could provide a very late review, or entirely fail to deliver, in order to delay publication. This gives the reviewer an unfair opportunity to publish on the same topic and naturally opens up the possibility of plagiarism which may be difficult to prove subsequently. An extreme scenario here is where an editor sends a manuscript written by one of two sides of 'warring factions' in a particularly controversial scientific topic to the other side. In geology, examples of these subject areas would be the Ediacaran Biota of the late Precambrian and the Cretaceous-Paleogene (K-Pg) mass extinction. In this situation, the chance of a deliberately dishonest review in order to suppress the 'other side' is a real possibility. Obviously, a reviewer should constantly bear in mind that the intellectual property (IP) pertaining to any manuscript belongs entirely to the authors. This aspect argues strongly that submitted drafts should be critiqued publicly and not (effectively) in secret (e.g. Davidoff et al. 2001).

Double blind closed pre-publication peer review, where anonymity applies to both authors and reviewers, is an alternative to the single blind system and is increasing in usage (Kearney and Freda 2005; Ali and Watson 2016). It is widely believed that this procedure markedly reduces the possibility of biased reports from reviewers. Nield (2015) made an extremely eloquent plea for all closed pre-publication peer reviews to be double blind, citing the 76% approval of this system reported by Mulligan et al. (2013). However, despite this anonymity of all parties, some reviewers may be hostile generally to anyone working in 'their' field, and will provide excessively critical comments no matter who the authors are. Furthermore many areas of academic endeavour, including palynology, have relatively small numbers of practitioners, and it has been pointed out that both authors and reviewers will potentially be able to easily recognise each other. This is due to person-specific signatures including distinctive espoused views, self-citation, subject matter and writing style (van Rooyen et al. 1998).

3.2.2. The open pre-publication peer review process

By contrast to the above, open pre-publication peer review is where both the authors and the reviewers, and their institutional affiliations, are fully disclosed from the outset (Table 1). In many cases, the names of the authors, the identities of the reviewers and the referees reports, may be published in

Table 1. A summary of the two styles of the closed peer review process, i.e. single blind and double blind, and the open peer review procedure.

Style of closed and open pre-publication peer review	Description	Pros	Cons
Single blind closed	The authors do not know who the reviewers are, by contrast the reviewers are privy to the full manuscript	The anonymous reviewers are free to provide frank and realistic appraisals under no 'identity pressure' from the authors	The reviewers may hide behind their anonymity to provide unnecessarily harsh and/or late feedback
Double blind closed	Complete anonymity; both parties do not know each others details	As above, plus each manuscript is judged completely impartially	As above, but the anonymity of both parties may be compromised by, for example, the area of specialism, espoused views, self-citation and/or writing style
Open	Both the authors and the reviewers know each others details	Reviews should be more thorough if the referees names are published, the reviewer comments will tend to be more diplomatic and the intellectual property of the authors is safeguarded	The open nature may lead to reviews which are over-lenient

Modified from Ali and Watson (2016).

the final version of the paper. This acknowledgement of the reviewers may be an incentive to undertake these tasks. Arguments in favour of open peer review are that the IP of the authors is safeguarded, and the full transparency of this procedure. The scholastic clarity of open peer review is intended to encourage rigorousness, and reduce the propensity of some reviewers to be overly brusque in their comments to authors (Ware 2008). On the other hand, open reviews cannot, in themselves, entirely eliminate an over-rigorous approach and bias. Perhaps more importantly, they are somewhat prone to referees erring on the side of leniency towards authors, fearing that colleagues would judge them for being harsh or overly critical, and/or that the authors will likely respond in kind if the roles were reversed!

3.3. Post-publication peer review

Post-publication peer review is a relatively recent innovation, initiated in the early 2000s. This method is where the peer review of an article is undertaken, in part or in whole, after it has already been published (e.g. Ford 2013; Markie 2015; O'Sullivan et al. 2021). When post-publication peer review was first launched, it was simply to complement the traditional open/closed pre-publication peer review protocol (Ware 2008). This style of review, which may be termed 'publish then screen', is far more prevalent in online only open access journals such as those published by Copernicus and Faculty of 1000 (F1000) (e.g. Hunter 2012; Amsen 2014). A well-known example of these is *Climate of the Past* (<https://www.climate-of-the-past.net>). This method, which ensures rapid publication, is largely divided into primary and secondary, but other variants also exist; these are all described below and summarised in Table 2.

3.3.1. Primary post-publication peer review

In primary post-publication peer review, which is the predominant protocol, submitted manuscripts are rapidly (normally several days) published online following formatting and initial editorial audits, for example to guard against copyright breaches, image manipulation, libel, plagiarism and related ethical issues. At this stage, it can be labelled as a preprint and

'open for discussion and under review' or similar wording. These drafts/preprints are then reviewed by expert referees who are invited by the editorial team and whose reports are eventually published online. However, other interested parties can also post online comments for the consideration of the authors during the review period; these are termed something akin to 'community comments'. As with pre-publication peer review, the editors eventually make an accept or reject decision based on the authors responses to both the peer reviewers and the community comments. All the comments, correspondence, iterations of the manuscript, reviews etc. are archived and open to scrutiny. The article is only entered into databases such as Scopus (<https://www.elsevier.com/en-gb/solutions/scopus>) when it has been accepted following the peer review process.

3.3.2. Secondary post-publication peer review

By contrast, in secondary post-publication peer review, submitted manuscripts are published after initial editorial checks but no formal reviewer invitations are issued. Articles are only vetted by volunteer referees. Some journals which use secondary post-publication peer review insist that any volunteer reviewer should have authored or co-authored a substantial number of publications, or adopt other criteria for potential referees in order to qualify (Ali and Watson 2016). As with primary post-publication peer review, a paper processed in this way is only placed into databases like Scopus when the version of record is finally accepted following review and revision.

3.3.3. Other forms of post-publication peer review

There are other variants of post-publication peer review around, largely using blogs and, in some cases, social media for discussion (e.g. Knoepfler 2015; Ali and Watson 2016; O'Sullivan et al. 2021). Articles processed in this way do not necessarily end up in Scopus or other databases. Another recent innovation in this area is that adopted by the online journal *eLife* (<https://elifesciences.org>). As of January 2023, this journal will cease to make accept or reject decisions following peer review. Authors submit a preprint and, if the journal decides to invite referees, will be published as a

Table 2. Summary of the post publication peer review process.

Style of post-publication peer review	Description	Pros	Cons
Primary	A manuscript is submitted and published as a preprint following a basic editorial audit; referees are invited to review; authors undertake a revision; and the version of record is published upon acceptance	Rapid communication of research, and an open/transparent assessment process which is undertaken by a wide range of referees and discussants who provide collegiate, personalised and rigorous reviews	The risk of poor quality research being published is greater than with pre-publication peer review, plus the lack of anonymity does not obviate overly harsh and/or inappropriate reviewers' reports
Secondary	A manuscript is submitted and published as a preprint following a basic editorial audit; qualified referees volunteer to review; authors undertake a revision; and the version of record is published upon acceptance	As above	As above
Other variants	Third parties may provide critiques on preprints via blogs, social media etc.	As above	This form of pre-publication peer review is highly susceptible to trolling and these articles are unlikely to be placed in databases such as Scopus

Modified from Ali and Watson (2016).

'reviewed preprint'. The latter includes an editorial assessment, negative and positive peer reviewers reports, and an optional response from the authors, who may then choose whether to revise and resubmit or to declare the preprint the final version of record (Brainard 2022).

3.3.4. *Synthesis of post-publication peer review*

There is no doubt that post-publication peer review expedites open and rapid communication. Specifically, this method attempts to ensure the speedy dissemination of research, and that any vetting of manuscripts by referees and other third parties provides dynamic and robust discussions, and is absolutely transparent. Furthermore, it can facilitate online debate between the authors and a wide range of discussants in the pursuit of scientific openness. The two styles of this procedure allow a manuscript to be reviewed by a potentially wide range of referees and revised by the authors as a result of critiques received, thereby allowing it to gradually evolve, improve and progress (Teixeira da Silva and Dobránski 2015). Because the reviewers names and their reports are published, this transparency hopefully ensures that the reviews are both sensitive and thorough. With post-publication peer review, any commentators cannot hide behind anonymity. However, the critics of post-publication peer review contend that the risk of the dissemination of poor-quality data, ideas and interpretations, etc. is far greater than with pre-publication peer review. Moreover, the fact that reviewers are named does not always prevent their comments being unnecessarily severe, nor does it guard against them going off topic and attempting to reinvent the study they are meant to be reviewing (Table 2). There is also the risk of intemperate online comments (trolling) with this system, especially those using blogs or social media.

4. An extremely arbitrary categorisation of reviewer reports

It is probably highly unfair even to attempt to categorise different styles of reports from reviewers however, as any editor

will tell you, certain patterns do emerge. Happily, most referees are extremely collegiate and diligent, and consequently provide constructive and helpful feedback.

What I would characterise as Category 1 reviews are comprehensive, detailed, forensic and incisive. These referees often submit both a detailed report and an annotated manuscript; the latter is a pdf file which has been marked with comments, edits etc. Frequently these stellar reviews subdivide their feedback into major/overarching themes and a list of line-by-line comments (e.g. 'line 967: capitalise Oxfordian' etc.). They also cover the main text, all display materials and any online Supplemental Data. Very often these reviews are from highly engaged researchers who work in precisely the same field as the topic of the manuscript.

Category 2 reviews are less detailed than Category 1 examples. However, these referees will also provide advice on the big issues explored in the article, the overall presentation of the manuscript, plus some input on minor facets such as formatting, spelling and writing style. A final style of review, Category 3, typically provide a relatively short report on the manuscript, perhaps recommending 'accept without revision', and perhaps giving some editorial suggestions for the authors' consideration.

As I referred to earlier, this tripartite categorisation is overly simplistic to say the least. These groupings can be considered arbitrary waypoints on a sliding scale between Categories 1 and 3. I would like to unequivocally state that Category 1 is not necessarily superior to Category 2, which in turn is not better than Category 3. All three groups are equally useful. Clearly, Category 1 reviews provide a plethora of generic and specific detail, and are enormously useful to both authors and editors. However, Category 2 reviews are concise reports on the key points that should be addressed prior to acceptance for publication. Finally, Category 3 reports are extremely reassuring for the authors, and give confidence in the manuscript for the editor. In a ideal world, it would be fantastic if each manuscript received three referee reports broadly representing each of these three categories. A set of three Category 1 reports would be overwhelming for the author and, of course, many of the points would be overlapping and some may be

contradictory. On the other hand, three Category 3 reports may not provide sufficient fine detail. In conclusion, all reviews are useful, no matter where they sit on my informal category scale.

As a reviewer, please bear in mind what most editors really want is a succinct review which identifies the principal scientific flaws or issues. Try not to get bogged down in too much fine detail, and remember the law of diminishing returns and that many textural rephrasings are subjective. Also, endeavour to use caring and gentle language and do not ego-flaunt.

5. Criticisms of peer review and two major ethical breaches

5.1. Bias, groupthink and delay

The peer review process has been extensively critiqued (e.g. Hunter 2012; Lee et al. 2013; Fisher and Parisi 2015; Heesen and Bright 2021; Amaral 2022). The principal criticism of peer review is the perceived balance of power residing with reviewers and occasionally leading to biased and overly harsh reviewer reports. This is where an anonymous reviewer deliberately submits an overcritical, punitive and subjective report in order to either delay or suppress an article and this is fully discussed above. On a similar note, it has also been said that the peer review system maintains and strengthens academic orthodoxy and thereby suppresses novel and innovative studies. It may well be that, in certain situations, conservative, established and mature researchers may resent younger individuals challenging the *status quo* and hence leading to groupthink. An example of this is a leading researcher on the end-Cretaceous biotic turnover who argued against a single bolide impact causing the mass extinction at ~66 Ma, and proposed a hypothesis involving climate change, several impacts and volcanism. This geologist has claimed that they have been unfairly treated by the peer review system in that 'the establishment' have attempted to suppress manuscripts via overly conservative reviewer reports (Nield 2007).

Another aspect of peer review which has been criticised is the time taken for this process. This is typically a minimum of two months, and can be substantially longer than this especially if the editors have trouble persuading reviewers to accept the review requests, or if a manuscript requires multiple rounds of peer review. Upon submission, a manuscript is given an initial appraisal by the editors, then is normally sent to at least two reviewers. When the last review comes in, the editors will appraise all of them and formulate a decision of either accept, revise or reject (Riding 2022). It is understandable that, having worked very hard on their work, authors may resent waiting up to several months for a decision.

5.2. Two curious cases of peer review fraud

Opponents of peer review were no doubt especially interested in two recent discoveries of fraud. Prior to around 2012, journals typically allowed authors to nominate several

potential referees and provide email addresses for them as part of the online manuscript submission process. (Authors are also allowed to suggest that editors do not use certain individuals due to conflicts of interest and similar reasons.) The recommendation of reviewers was, at the time, a very effective system which helped both parties. Authors could possibly speed up the progress of their papers while simultaneously helping editors to locate suitable referees. Naturally editors were not obliged to approach the specialists recommended by the authors, and frequently did not use any of them.

This system was curtailed in 2012 due to the first discovery of a nefarious scheme which flagrantly abused the entire process. Fountain (2014) reported that a blog that reports on the retractions of scientific papers and related topics, Retraction Watch (<https://www.retractionwatch.com>), had, in 2012, reported that a researcher from South Korea had created fake email accounts so that he/she could review her/his own manuscripts. Specifically, each of the bogus email accounts were given the name of a respected academic, and every one of these was associated with a fake email account owned by the South Korean worker which differed only marginally from the genuine one in order to avoid detection. When the South Korean researcher submitted a manuscript, he/she nominated some of the fake referees. This strategy obviously allowed her/him to self-review and obviously provide lenient referee reports! When this fraudulent activity was discovered, over 30 of her/his papers were retracted. A similar scam was discovered a short time later. This time a Taiwanese researcher created a ring of 130 fake reviewers. An eagle-eyed editor noticed a number of these lenient reviewer reports and notified her/his employer (Fountain 2014; Buckeridge 2015).

The discovery of these frauds led to the exposures of the culprits and hence the curtailing the opportunity for authors to self-nominate reviewers, however, authors can still recommend reviewers in their cover letter. As part of the formal submission process, authors are still allowed to request that editors do not ask for reviews from certain individuals. In my experience, some authors who submit manuscripts to *Palynology* mistakenly non-select persons who they really wish to recommend as reviewers.

6. How peer review works in practice

6.1. The perspective of the editor

One of the many responsibilities of a journal editor is to constantly maintain and improve the academic excellence of their respective journal. Obtaining at least two reviews from established experts in the specific topic of each manuscript which is submitted for consideration in the journal is the key part of this endeavour (e.g. Riding 2022). Writing an academic paper is substantial task and authors will of course make inadvertent errors, both major and minor. If a manuscript has been authored by a single person, it is more likely that they will have overlooked one or more important points. Put another way, it is correctly said that any document produced by humans will be flawed in some way.

Being an editor of a journal is also a major undertaking and there is no way that editors would have the time or expertise to comprehensively critique every manuscript that is submitted. Typically, when a new manuscript appears, the editor will take a quick look to ensure that it is suitable to send out to reviewers. Assuming these initial checks are met, the handling editor will carefully select peer reviewers and request that they provide a review. Normally two experts are chosen, but more can be used if the editor considers that this is warranted. The choice of reviewers can be a tricky one. An editor should not use a small cadre of reviewers, or overburden any individual with review requests. We all have busy lives and there is a limit on how many reviews any one person should be asked to take on.

6.2. The responsibilities of peer reviewers

The acceptance of an invitation to review a manuscript brings with it great privilege and responsibility. The former concerns the, albeit potentially unacknowledged, honour associated with the incremental shaping of the literature. Pertaining to responsibility, academic publications are critical for career development, grant applications, job applications and the like so reviewers should take their duties very seriously indeed. The last sentence is not intended to suggest that reviewers should tend towards leniency towards authors. Reviewers should also uphold the values of scientific excellence and the respective journal by providing balanced, coherent, comprehensive and rational critiques of the manuscript before them. The journal editor is primarily concerned with the credibility and scientific standing of their journal, and wishes to ensure that all the papers in it are of the highest possible standard. If you are asked to do a review, please try your utmost to do it, despite any time pressures. However, if you feel that you cannot perform this task to the best of your ability, for whatever reason, do not be afraid to decline. If you do turn a review down, please take the time to suggest alternative referees to the editor.

The reluctance of some workers to undertake peer reviewing was bemoaned by Cope (2018). He reported that some of his colleagues consistently refuse review requests citing pressure of work. The term *prima donna* was understandably used by Cope (2018), who went on to say that if mid-career researchers refuse to undertake reviewing, these tasks will fall to ECRs and retirees. These demographics may not be fully up to speed or out of touch, respectively.

One issue which is more prevalent in recent years is that reviewers should try to identify any plagiarism and the reworking or manipulating of data, or any other ethical issues. Even the casual and minor reusing of previously published text is plagiarism; this is theft by any other word and consequently entirely unacceptable (Buckridge 2015). There have been cases where authors have attempted to publish pre-existing or fictionalised data. Some individuals try to obtain more than one publication out of one study or dataset ('salami publishing' or 'shingling'). Additionally, reviewers should try to keep a lookout for manuscripts produced by so-called research paper mills. These are profit-driven, unofficial organisations that produce and sell

authorship of academic manuscripts. Typically, these articles are based on fraudulent, plagiarised and spurious data (e.g. Else 2021; Else and Van Noorden 2021). Some journals have scanning software which is designed to weed out these (to say the least) unprofessional manuscripts before they are sent out for peer review.

What all editors wish for is a succinct review which identifies the principle scientific flaws or issues. Please try to fill out a checklist or questionnaire if they are included; these metrics are used by editors and can be critical in formulating an editorial decision. Do not try to edit for style or get bogged down in fine detail, and remember the law of diminishing returns. Many textural rephrasings are subjective and not objective; try not impose your writing style onto others. Always remember to be polite, not to show off or flaunt any ego; do not comment simply for the sake of it. In fact, if the review is closed one (subsection 3.2.1.), please seriously consider identifying yourself to the authors. Avoid falling into the trap of trying to review another paper. What I mean here is you can only review the manuscript in front of you. The reviewer is not responsible for conceptualising the article; offer advice but please do not preach. Finally, if a manuscript is perfect in your view, and can be accepted without revision, do not be afraid to tell the editor this.

6.3. Aspects of peer reviewing manuscripts on palynology

Palynology (and palaeontology in general) is a specialist field and there are some aspects which should be addressed by reviewers. Articles on palynology are generally based on sets of plant, rock or sediment samples, and the details of these should be documented impeccably in terms of all relevant aspects like geography and stratigraphy. When checking diagrams in colour, try to ensure that the authors have used inclusive colours that help colour vision deficient individuals (Hornby et al. 2022 and references therein). Any datasets of palynomorphs versus samples should be well-presented and be quantitative. Do not forget that appendices of data can be included as Supplementary Data. Look out for very focussed (e.g. biostratigraphical or systematic) papers which are not well-rounded, in other words the nature of the overall floras is not discussed. It is imperative that any photomontages (plates) should be of the highest standard (Riding and Head 2018), and reviewers should comment on these display materials if they have any issues with them.

7. Some advice for authors on revising manuscripts following peer review

Most academic manuscripts require some revision, either minor, moderate or major, as a result of peer review. This is absolutely normal, and authors should not be in any way daunted by having to revamp their beloved first draft as advised by the referees and the editor. First, read and digest all the feedback received and work out in what order the various reviews should be tackled. It is not generally a good idea to work through them all simultaneously. I would advise that if you received a Category 1 review, work through that one first.

Remember to use track changes from the start so that you can submit annotated and clean copies to the editor. It is extremely important that the editor can easily see precisely how you have revised your manuscript, and the track changes facility provides this. You should also send the editor a separate report on how you have revised the manuscript. It is good to use the reviewer report files and you can adapt these files to use in your report, perhaps as an appendix.

You should of course consider every point made by the reviewers. Clearly, the referees selected by the journal editor do not have a monopoly on wisdom. Therefore, if you profoundly disagree with any points made do not be afraid to rebut them. However, if you do not revise your work in respect of a point made by a referee, you will have to justify this to the editor in your report. Editors are in fact human and will sympathetically consider rebuttals, especially if they are eloquently argued by the authors. I realise that a major revision is not what authors would wish to have to do, but at the end of the rehash it is unequivocally certain that the authors will feel that this process has markedly improved their document.

8. Conclusions

It is clear that the peer review process was instigated in all good faith in order to scrutinise and hence improve academic works submitted for publication. The virtually universal use of peer review is testament to its overall efficacy. It has evolved from informal requests from editors to a highly structured and formalised system which now has several variants. It is safe to say that the different variants are all effective. However, despite the widespread use of the single blind pre-publication peer review procedure, no single one of these systems enjoys complete dominance. Peer review has been criticised for several reasons including the potential for mendacious and tardy reviewer reports. Thankfully these reviews are rare, especially in palynology. Despite this, its detractors have never been able to suggest a viable alternative. Furthermore, peer review enjoys the confidence of the user community and, although the regular criticisms persist, most researchers acknowledge this protocol is the best method of upholding standards and ethics in science and the arts. Publications that have not undergone peer review are regarded with suspicion by all users.

The detractors of peer review are relatively few, and many of these are highly vocal. The critics of the system have, thus far, been collectively unsuccessful in coming up with a viable alternative which has garnered the confidence of the user community. That said, peer review, like all aspects of academic publishing, is in a state of constant flux and it is possible that this protocol will radically change going forward.

It is often commented upon that reviewers are not paid for the important service that they provide. To this end, Cope (2018) recently called for some form of official recognition for reviewers. In any other business apart from academic publishing, would legions of highly qualified individuals routinely voluntarily give up their valuable (often leisure) time to critically assess the written work of their peers on an

entirely *pro bono* basis for the benefit of commercial corporations? The latter is plainly a rhetorical question. That said, some publishers do offer incentives such as free online access to a journal or journals for a limited period, but cash payments are virtually unknown. The Web of Science Reviewer Recognition service offers opportunities to give peer reviewers the credit for their work (see: <https://clarivate.com/products/scientific-and-academic-research/research-publishing-solutions/reviewer-recognition-service/#benefits>).

Despite the provision of crucial advice to the authors, sometimes even going beyond the contribution of some of the co-authors of the paper, the reviewers are sometimes not even thanked in the acknowledgements! I respectfully suggest that authors always thank their reviewers, even if they are all anonymous. My strong advice here to potential referees is that reviewing is an entirely altruistic task and that the *pro bono* nature of it is the same for everyone. You should always remember that someone somewhere will be asked to review your manuscripts.

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James B. Riding

British Geological Survey, Nottingham, UK

 jbri@bgs.ac.uk <http://orcid.org/0000-0002-5529-8989>