

## Scientific Journals are 'faith based': is there science behind Peer review?

*'The strongest arguments prove nothing so long as the conclusions are not verified by experience. Experimental science is the queen of sciences and the goal of all speculation.'*

(R Bacon)

Journals were important for the advancement of science. The birth of the scientific journal 300 years ago helped to change science from a hodgepodge of different formats and virtually no quality control to a uniform system with peer review for research communication. Now, however, after three centuries, with the advent of the Internet and other new modes of research communication, there is the need to establish a system to determine if journals are the optimal means for research communication.

Figure 1 presents some of the technology in modern biotechnological laboratories. Almost all the technology was invented after 1995. We do not find 1931 state-of-the-art calculators, such as the one advertised in the *Lancet* (Figure 2) in modern laboratories. The pocket calculator is over a million times less powerful than PCs and laptops that currently reside in the laboratory. As a result, the Otis King Calculator became extinct. In contrast, there is one 300-year-old technology that has survived almost untouched and still used today in virtually all the laboratories of the world: the scientific journal. Isn't it perplexing that the *Lancet* and others have survived with little change over centuries, whereas almost all other 300-year-old scientific technologies have died out? Why is this?

We would argue that the primary reason that journals have not changed is that they are 'faith based': we believe in them, we dare not question them. Most certainly, research communication is successfully shared through journals. Most scientists in developed countries have access to the research knowledge of our peers though journals, but the literature is almost inaccessible in developing countries. The adage of 'if the shoe fits, wear it' is how we look at the journals. However, this argument did not fit with the Otis King 1931 pocket calculator. The 1931 calculator works, but other technologies out-paced and displaced it.

Let us dissect the scientific research process as seen in Figure 3. We are all familiar with this process of research and publication. We first complete our research and then prepare it for publication. The structure is very specific to scientific publication, with the IMRaD organization (Introduction, Methods, Research, and Discussion). Virtually all journals use this structure—with some notable exceptions,

such as *Science* and *Nature*. The manuscript is then sent out for peer review, with two or three reviewers providing comments. The article is returned to the editor for a final decision.

The three primary tenets of a scientific journal are IMRaD, peer review and editorial decision. This model has had a long history and has been used millions of times. In 2002, there were 22 000 scientific journals, each publishing on average 154 articles (3 388 000 articles in total). In 1960 there were 2815 journals published.<sup>1,2</sup> We can interpolate backward and conservatively estimate that there have been about 50 000 000 scientific articles published, almost all of which have used the model of publication as presented.

Why hasn't peer review, IMRaD, the editorial decision process and the overall journal process evolved into a new form of research communication? We would argue that the reason is that this has been due to the almost non-existent use of the scientific method to question and test the publication process itself. We use the publication process to collect, describe and distribute the results of research using the scientific method. We almost never turn this onto itself to use the scientific method to test the scientific publication process. We combed the literature on Medline and could find only 13 articles on IMRaD, with no scientific hypothesis testing studies of the structure (e.g. if it were better than other forms of research communication in terms of understandability, interest, recall, etc.). Jefferson recently presented an outstanding review of peer review and could find only 19 studies on peer review that were scientifically sound.<sup>3</sup> We could find only 14 articles examining the editorial board/editorial decision making. Thus, with over 50 million articles and 300 years of the traditional journal approaches, there has been only a handful of studies questioning or testing the journal process itself. We scientists keep using the process without question, but with no data to show that it is effective. There is thus no evidence-based approach to the science of research



Figure 1 The modern molecular biology laboratory

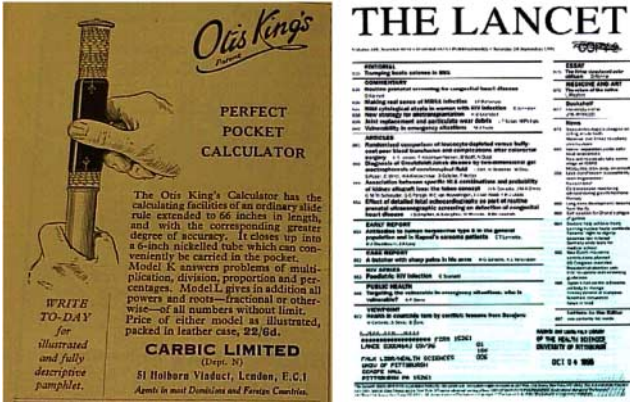


Figure 2 The Otis King Calculator, advertised in the *Lancet*, 1931. In colour online

communications. Recent studies reveal that peer review often misses major methodological problems in articles.<sup>4</sup> No wonder it has not changed or improved, as there are no data questioning the process. Hypothesis testing research and randomized trials could easily and cheaply be initiated to understand the ‘grand challenges’ of research communication, but sadly they have not.

Isn't it strange that three features that are inherent to research communication have not been looked at scientifically? There are several possible reasons for this. The most likely is that we scientists have almost complete faith in the journal process as right and unassailable. We thus take a ‘faith based’ approach to research communications. Faith is defined as a firm belief in something for which there is no proof. Many of us might view questioning of the journal process as an attack on science itself. Clearly, the scientific journal process is not a part of the scientific method. We are taught early in our training about the

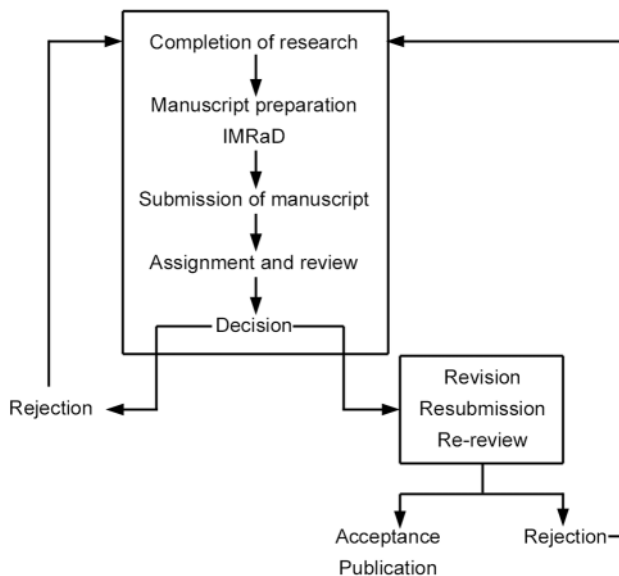


Figure 3 The research process

importance of learning to write articles (e.g. IMRaD), the power of peer review and a belief in the editorial system. We do not question the process, despite the fact that the essence of science is questioning. Questioning peer review is like questioning the Bible, Quran or Torah. One role of science is to help separate science from dogma, which we should now do with journals, and avoid a faith based approach. New approaches need to be taken—you cannot teach dogma new tricks!<sup>5</sup>

In many ways, scientists in 2006 are similar to Galileo in the early 1600s.<sup>6</sup> Galileo had enormous difficulty in trying to publish his classic work *Dialogue concerning the Two Chief World Systems* (Figure 4). His book presented a strong argument for a heliocentric universe. The organization of this book was vastly different from other scientific books, as it was a dialogue between three people arguing the merits for different views of the universe, particularly whether the

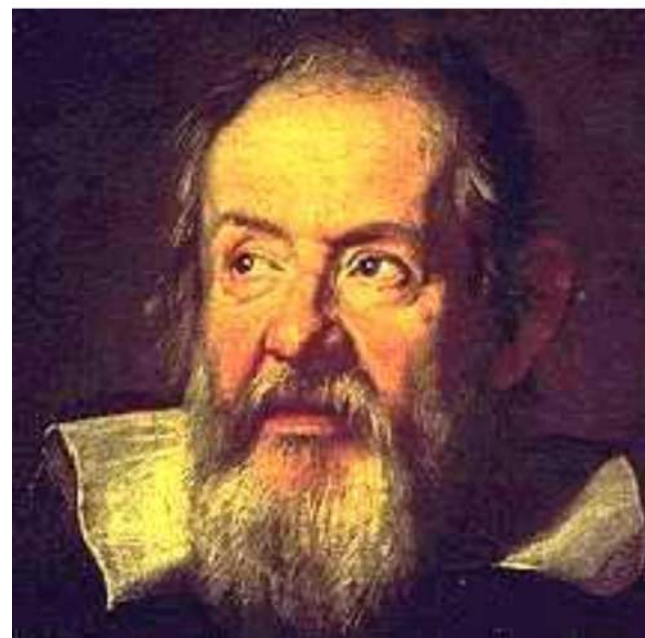
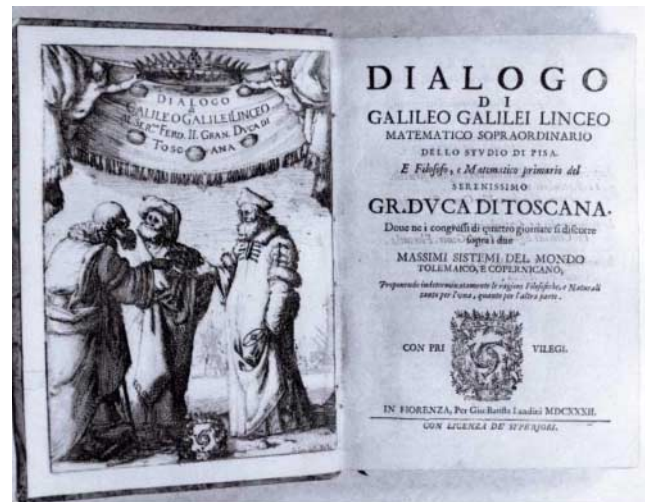


Figure 4 Galileo's *Dialogue*, and Galileo himself. In colour online

Sun (Galileo's view) or the earth (the Church's view) was the centre of the universe.

The Inquisition board set up by Pope determined that the *Dialogue* had major problems. The first fault was the format, whereby the typeface was inappropriate and the organization quite different from a scientific book, and therefore did not fulfill the definition of a research communication. A parallel problem now would be to submit a Noble Prize lecture in PowerPoint to the *BMJ* or *Lancet*. It would be rejected in an instant, but should it be?

The major problem for the *Dialogue* was that Galileo questioned the faith that the church had in the earth as the center of the universe. This is similar now with the journal-centric view that the scientific journal is central to all research communications. We and others have pointed out that this is not true anymore, with the Internet and even PowerPoint becoming primary tools of research communication.<sup>7</sup>

It is the scientific method that is central to science, not the scientific journal. The scientific method should be central to other research communication processes, but it is not and has not been used to continuously improve how we communicate research. Because of this, we are forced into a conundrum—we cannot change the process if the process is based upon faith, not data.

Experiences of various fields, including industry, demonstrate there are other forms of quality control besides peer review that could potentially be utilized in the biomedical journals. These methodologies include 6-sigma, statistical quality control, and web based, consumer driven systems such as that employed by Amazon, eBay, and Slashdot. There are thousands of studies in business and sociology evaluating the decision making process that could be brought to bear to evaluate the decision process at the editorial level, but they have not been used. It would seem very simple to develop randomized trials to determine which system best improves the quality of publication. As Jefferson has pointed out, there are almost no data suggesting that the existing peer review systems work and none to suggest that they are better than any other system.

What can be done? We argue that there needs to be developed a 'Science of Research Communication'. This would be a new discipline that would be defined as 'that branch of science which assesses the optimal means by which research can be communicated.' It needs to be an interdisciplinary approach driven by scientists, not editors.

With the introduction of the scientific method to the peer review process we hope we can move from the level of a 1931 pocket calculator to the level of the supercomputer. Based upon the data, we cannot reject the hypothesis that scientific journals are faith based. We need to increase the power of the design through experimentation to adequately test the hypothesis.

*'The dogmas of the quiet past are inadequate to the stormy present . . . we must think anew and act anew.'* (A Lincoln)

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## Palpation of the skin—an important issue

A common concept is that dermatologists look at a rash, lesion, or even a photograph, and make an instant diagnosis. This can be true, but a clinical history, other sensory modalities, examination of other sites and supporting tests (biopsy, patch tests, etc.) may all be required to make a diagnosis and management plan. An experienced dermatologist typically touches lesions and rashes to accumulate extra information, a striking difference from new students, who rarely do so unless specifically instructed. This article concentrates on palpation, and specifically on quality of scaling, as an additional component of the examination of skin.

### WHY PALPATE SKIN?

Touching a patient conveys empathy and reassurance (where appropriate) that the patient's rash is not contagious. Palpation, specifically, is an important but underestimated examination modality.<sup>1,2</sup> It assesses quality of scale or keratosis, texture changes, and skin temperature or sweating differences. For localized lesions, palpation identifies tenderness, consistency, induration, depth and fixation. Palpation can be essential—small actinic

keratoses are much easier to feel than to see, chilblains are described as 'burning' but are palpably cold.

Variations include pressure, demonstrating oedema, blanching, or the dermal defects of anetoderma or neurofibromas; stretching, which causes blanching; shearing, for Nikolsky sign in pemphigus; stroking or rubbing, to demonstrate demographism or urtication of mast cell lesions (Darier's sign); and squeezing, for expression of mucin in follicular mucinosis. Picking at scale may cause Auspitz sign (bleeding points after picking off scale, typically in psoriasis but not specific) or demonstrate the follicular plugging of discoid lupus; scratching scale in psoriasis ('grattage') makes it more silvery in colour, by introducing light-reflecting air-keratin interfaces. Additionally, skin laxity and relaxation lines for skin surgery are assessed by palpation.

### QUALITY OF SCALING—A BIT OF HISTORY

Two centuries of dermatology textbooks identify the quality of scaling in eczema (dermatitis) and psoriasis to be different, the latter having unique hard silvery scale (Figure 1). Fox uses scaling and lesional demarcation to distinguish eczema from psoriasis.<sup>3,4</sup> 'The scales of psoriasis . . . have been compared to silver and to mother of pearl . . . in chronic cases they become thick and hard like plates of armour'<sup>3</sup> contrasts with the description of eczema squamosum ' . . . scaling varies greatly in different cases, ranging from a slight mealiness of the skin to thick whitish masses or irregular flakes of epidermis curling up at the margin' and (in eczema) 'When the scales are thick and whitish and the patches are isolated and numerous the appearance . . . may suggest psoriasis, but the rounded and circumscribed character of psoriatic patches is always lacking in eczema.'<sup>4</sup>

Similar differences are recorded between other erythrodermic conditions: 'Psoriasis . . . lesions are congested areas covered with masses of silvery scales', 'in pityriasis rosea the patches . . . are covered with fine scales,' and 'erythroderma . . . scaling, which is often profuse, a regular exfoliation.'<sup>5</sup>

### DISEASE IDENTIFICATION BY SCALING

In order to demonstrate that research does not require test tubes, that dermatological thought can be a bit lateral, and that scaling is truly important, I recently performed a simple trial to determine whether I could distinguish psoriasis from eczema by palpation alone. With ethical approval, formal consent, etc., a cohort of 16 adults (five atopic dermatitis, nine psoriasis) were examined using touch alone, the patients being behind a screen and the

examining hand being guided to a representative area by a Nurse Practitioner. Sites of predilection, or that might cause embarrassment, were excluded. The diagnosis was correctly made in 14 of 16 cases ( $\chi^2$ ,  $P=0.012$ ). This study shows that, at least in distinguishing between two inflammatory dermatoses with a different scale quality, palpation alone may be sufficient to make the diagnosis. It is unlikely that these diagnoses would not have been made visually, so quality of scale may not have been essential, but the research was to prove a concept rather than to imply that palpation is always necessary.

### WHAT ABOUT TELEDERMATOLOGY?

Teledermatology has fans and critics. It precludes discussion of history-taking and discussion of management with the patient unless 'real-time' teledermatology is used, and this is about four-fold more costly than a clinic appointment. 'Store-and-forward' images reduce this cost but may have problems with image quality, inability to 'examine' other body sites (e.g. nails in psoriasis, mouth in lichen planus) and may miss 'incidental' lesions of importance. Diagnostic accuracy rates of teledermatology compared with face-to-face diagnosis are consistently lower (about 55–90% correlation in different studies<sup>6–8</sup>), and there is a higher rate of suggested need for skin biopsy by teledermatology consultation (probably reflecting lower diagnostic certainty). However, this is not always the main issue—the use of teledermatology for triage (is a clinic visit required?, is a biopsy needed?) may answer important patient management questions without needing a fully correct diagnosis.



Figure 1 Psoriasis. From Taylor RW. *A Clinical Atlas of Venereal & Skin Diseases*. Philadelphia: Lea Brothers & Co., 1889. Plate XXIX (in colour online)



Some studies have suggested that diagnosis of rashes is less reliable than that of localized lesions.<sup>9</sup> Several contributory reasons are discussed above; diagnosis of rashes is often difficult anyhow, but an additional problem with 'store-and-forward' teledermatology is that (even if high quality), the submitted picture(s) may not be adequately distant to show the distribution or adequately close to show fine detail. Also, even good quality photos are two-dimensional; raised lesions of urticaria, for example, may be difficult to distinguish from flat lesions of a similar colour, and quality of scaling can only be guessed at. Touching the skin is a modality that is omitted in teledermatology, but there are clearly situations where it can be important. Indeed, the inability to palpate lesions has also been given as a reason for dermatologists being less satisfied than primary care physicians with the results of teledermatology.<sup>7</sup> Even enthusiasts admit that this can be a problem.

## CONCLUSION

Dermatological diagnosis involves both history and clinical features. Palpation is a modality that most dermatologists automatically do concurrently with visually observing, and, unconsciously or otherwise, the results are incorporated into the diagnostic conclusion. Palpation of lesions or rashes may appear to be something of an orphan part of skin

examination but it is an important issue—I hope I have convinced you.

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## Access to psychological and psychiatric services needs to be improved for the dying

Psychological and emotional support is fundamental to the provision of comprehensive end-of-life care. This is true not only for people with cancer, but also for people with illnesses such as heart failure, chronic obstructive pulmonary disease and dementia, all of which are increasingly common.<sup>1</sup>

The survey by Price and colleagues reported in this issue of the *Journal* highlights problems with access to specialist psychological and psychiatric support for patients and staff in hospices nationally.<sup>2</sup> They note a large discrepancy in provision compared with the recommendations made in the recent National Institute for Clinical Excellence guideline on Supportive and Palliative Care for adults with cancer.<sup>3</sup> Of particular concern is the finding that 45% of hospices report that they have no access to psychological and psychiatric services. These deficiencies clearly need to be addressed given the high levels of mental health problems in this population.

This lack of access to specialist psychological support reflects a broader picture of unmet need both in the general population and also for those who are dying in other settings. It is, for example, important to note that despite the deficiencies reported, UK patients in hospices typically have their needs—including their psychological and psychiatric needs—met much better than do patients dying in the community. Whereas specialist palliative care as delivered in hospices is judged to be of near excellent quality,<sup>4</sup> generalist palliative care services in the community tend to be under-resourced and patchy, with typically less access to counselling, social work, dietetic and occupational therapy support when compared to hospices.

Hospices have been and remain at the vanguard of palliative care improvements for cancer patients and it is thus reasonable and indeed expected that they would wish to highlight and seek improved services for their patients. However, not all cancer patients die in hospices. Some sections of the community face barriers to accessing hospices for cultural reasons, whilst others, sadly, decline to attend a hospice due to on-going stigma

or distance to travel. Furthermore, people without cancer are still infrequently admitted to hospices due to a lack of capacity and staff training, and for historical and funding reasons.

Increasing access to psychological support in the hospice sector without parallel increases in other sectors will therefore increase the current inequalities in end-of-life care. The solution is probably planning and provision at regional or primary care trust level so that these much-needed psychologists and psychiatrists can work across care settings. Hospices in the UK might learn from Australia, where many community palliative care teams include counsellors, and sometimes psychologists, who may visit patients at home after initial nursing assessment. But, even though access to holistic end-of-life care is a basic human right which the government is committed to supporting,<sup>5</sup> such workforce changes are unlikely, at least in the short-term, in the current cash-strapped NHS. That said, the NHS Service Delivery and Organisation R&D programme is currently funding a scoping exercise into the provision of generalist palliative care in the community, which is to be welcomed. This will hopefully bring neglected areas of provision, such as lack of psychological and spiritual support for people with advanced illness in the community,<sup>6</sup> onto the radar screens of the bold new NHS End-of-life Initiative in England.<sup>5</sup>

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