



How to write a rather tenacious and legible scientific paper, and convince a bunch of self-acclaimed pundits called editors and their cynical dogsbodies known as peers or reviewers or referees (not the kind who blow whistle, well, maybe their own trumpet)

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#### ABSTRACT

A formal academic writing is primarily primed with two basic ingredients: organization and language. The rest is merely the spice and seasoning. Science has become a gigantic body of knowledge – ever growing – and a scientist is compelled to get his/her findings published. A myriad of scientific papers are churned out every moment so that science professionals are confronted with a staggering array of new information. Thus, it is vitally critical that writing such invaluable material is done in a clear, concise, and accurate manner. Preparing the manuscript in a systematic fashion is the beginning of good scientific literature. It reflects the overall attribute, suitability and impression on the intended readers. As it happens inevitably, a considerable number of manuscripts are being turned down on account not of the standard of the data per se, but ignorance on the way it is presented; they are predestined doom from the start, branded rubbish and straight into waste bin. Although the formats and styles vary from time to time and place to place, the eloquent, succinct, and logical style does not. Therefore, I try to explain, to the best of my ability, I confess which is not much, in this paper the general strategy of constructing a proper scientific literature.

**Key words:** Journal; literature; manuscript; peer review; publication; science.

The most exciting phrase to hear in science, the one that heralds the most discoveries, is not 'Eureka!' (I found it!) but 'That's funny...'

– Isaac Asimov

The first lesson is never use strings of words to make a title to the paper remotely similar to the title of this very article. It is

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over-egged, unfashionable, unscholarly and utterly off-putting (in my case it is deliberate, all with good cause). It does not make the reading anymore compelling nor enticing than egregious, but in some way it does explicitly presents what the article is actually all about, and that the author is a dim-witted designer! In effect, it starts to show one's illiteracy (in this case mine, and mine alone) of the stringent systematic way of composing a scientific literature. Preparing a scientific manu-

script is a tedious task, in which one has to get thoroughly acquainted with the general tips and tricks (the laws, if you like) of writing in the first place.

But in saying all these trifling issues I urge you not to take me to be on my high horse. On the contrary it would be impertinent of me to say that my own expertise is reputable, remarkable or reliable. But circumstances are pressing and I dare to lay bare my modest know-how for my fellow science citizens, who are still in a more 'modest' capacity. If at any point there creep out my imperfection and foible, everyone is encouraged to take full advantage of my weaknesses and instead learn from my Achilles' heel, which I fear is quite multiple.

### THOU SHALT INSCRIBE

Legendary anecdote has it that Archimedes of Syracuse (c. 287–212 BCE) was imposed to determine the purity of gold in the golden crown commissioned by the Greek King Hiero II. This was because the supplier goldsmith was suspected of adulterating some gold by replacing with silver, and the imposing predicament was that not a scratch was allowed on the crown. Archimedes eventually discovered the technique of water displacement, which famously became Archimedes's principle, while he was purportedly in a bath. It is indelibly engraved in the annals of science that Archimedes, of pure ecstasy and euphoria, leaped out into the street stark naked, and presumably shouted at the top of his lungs, 'Eureka!' (Fig. 1).

The finale of the story is too good to be true, as historical evidence seems to lack credible support. It does not appear in any known works of the man himself; it's all Greek to us.

The point here is that we have come a long way from such kind of unbound hysterics and fanfares when it comes to new discoveries, although the excitement is certainly not less intense. For a start, scientists do not stroll

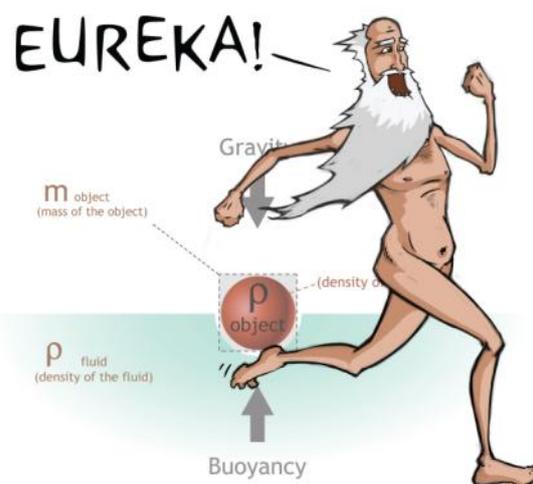


Figure 1. Archimedes overjoyed [Warning: not to be taken as role model]. Courtesy of <http://weadmire.net>

about naked, nor do they explode in overshot decibels about their new discoveries in the streets. Rather they sit and write, quietly and discreetly. Apart from research discoveries being either monumental or mediocre, the nub of the profession is in communication.

In today's scientific community the catchphrase 'publish or perish' rings a practical truth, though with an ironic tone. Writing is the nucleus of information, for words are tools of science no less than numbers are. Humankind has adequately learned from experience that it is awfully unreliable when information is conveyed by word of mouth. Putting down scientific information in black and white is the first and foremost procedure and followed by academic publication. By academic publication it means that there is a formal system, not like simply making print out in a press, in making new research into literature. It is often an excruciatingly tedious exercise, compounded by a bit of mental exertion.

A proper scientific literature is therefore a standard academic publication that consists of two sequential components: preparing the manuscript based on fixed guidelines and getting it published in a journal, or more rarely in a book. Thus, the most relevant scientific

literatures can be classified as:

**Primary literature** when the information content is purely the original research published in scientific journal; sometime patents and technical reports can be primary literature if they are the original research; and also proceedings of scientific conferences that are allied to scientific authorities or organizations.

**Secondary literature** when the information is in the form of reviews in scientific journal or books or compilation of primary literature in separate book form.

**Tertiary literature** when the information is generalized for public consumption, such as in the form of popular articles, encyclopaedia, magazines, or general scientific books.

Therefore, primary literature is considered with high prestige, and less so of secondary sources. Tertiary sources cannot be trusted as the absolute and reliable scientific information, but commendable to general public for understanding the basic stories in scientific developments; and thus have important role in disseminating the overall workings of science to lay audience. This is because primary and secondary sources are strictly limited to the scientists in a rather restricted field, and the technicality are often incomprehensible to those outside, even to other scientists, of the research sphere.

## SO START WRITING

Even though there are no hard and fast rules, and the style and pattern of presenting an article differs from one discipline to another, from journal to journal, the broad layout can be organized as follows:

**Scope of the journal.** Although there are scores of multidisciplinary journals, a large majority of journals are subject-specific. Therefore, a target journal must be cautiously chosen; for example it is not wise to write for the *New England Journal of Medicines* if your data is about Big Bang.

**Instructions to authors.** Every scientific

journal has its own standardized style and formatting for preparing a manuscript. These are to be followed to the letter while writing.

**Language matters.** The scientific community is spread out all over the world and the only unifying language of scientists is English. Therefore, the basic task is to obey English grammar, punctuations and usage. Generally the presentation should be concise as well as precise, avoiding redundant embellishments and word plays. For these reasons scientific articles are customarily very short. The common problem in language is the differences in English usage. So that it is also important to bear in mind if the intended journal is British or American English oriented. For example 'anaemia/analyse/colour/programme' are acceptable in British English community, while it is preferable to use 'anemia/analyze/color/program' in place on the farther west coast of the Atlantic.



Figure 2. Don't try your luck with this enticing journal – it is virtually [literally! Take my word] nonexistent.

**Structure of the article.** The content of a manuscript should generally be arranged in an organized sequence, thereby containing the sections such as:

*Title.* This should be brief but declarative of the main result of the work. For example giving a title 'Animal diversity' would be too ambiguous even though the research is on the topic, but because there are so many types of animals from so many different parts of the world. Therefore, a better picture would be 'Study of fish diversity in Dampa Sanctuary, Mizoram, India.'

*Author details.* In the by-line, name(s) of the author(s) should be supplied along with their contact address, including phone number and e-mail address, if available. This is ever more important these days for correspondence, not only from the editors of the journal, but from the readers.

*Abstract (or summary).* Arguably the most integral part of a scientific paper is the abstract, from where a reader is able to conceive all the vital elements of the research. There are often specified lengths for an abstract, so the text should highlight the problems, methods and outcome of the research in few sentences. As a matter of fact the abstract should incorporate all the vital elements of the research that a reader should be able to grasp about the entire work without actually having to read through the main body of the article. Simply put, a sip should give the full flavour without having to actually gulp down the whole glass, if it were a wine [non-alcoholics may go for alternative metaphoric beverages like tea – served hot].

*Introduction.* The rationale, problem and background of the work should be neatly delivered first. An already available information, the literature review, is discussed here in support of the work so that references are cited from existing literature. Citation is the practice of referring to the work of other authors in the text of your own piece of work. Such works are cited to show evidence both of the background reading that has been done

and to support the content and statements.

*Methods.* All materials and methods applied to the research should be furnished here. The techniques employed should be concise but adequately detailed to allow other workers to repeat the same experiment and reproduce the result.

*Results.* This section is to summarize information contained in research findings such as tables and figures, and theoretical conclusion. It is most important that the data of the experiment, or theoretical calculation, are reproducible by performing each experiment several times, with several replicates within each experiment. Data can include mathematical calculations, statistical analyses, figures, images, graphs and tables. These are to be explained in a logical sequence.

*Discussion.* The research finding should be properly interpreted and justified. The data of the result are to be explained in light of pertinent literature and the significance of the study, especially how it (or at least attempt to) fills the gap in the prevailing knowledge, should be clearly discussed. An important

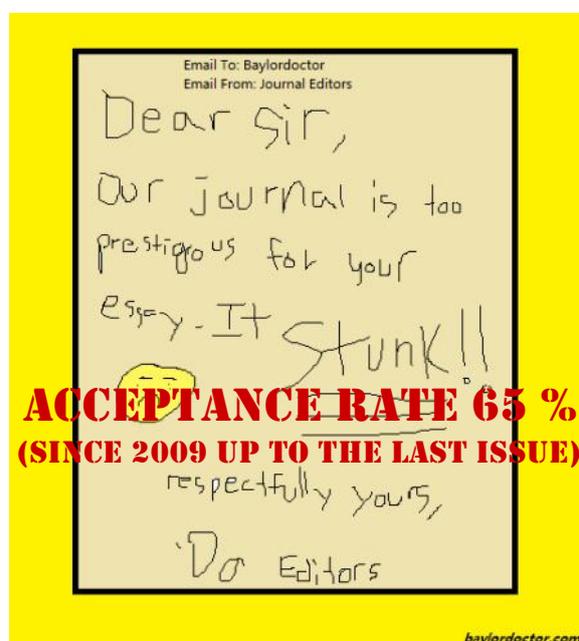


Figure 3. Manuscript acceptance rate in *Science Vision*.

component is that it must be concluded with future perspective of the study, and speculation on the prospect. Many journals encourage the condensation of Results and Discussion into a single section. In such case, the significance of the result can be explained after each data being presented.

**References.** Each citation requires a reference at the end of the work; this gives the full details of the source item and should enable it to be traced. Referring accurately to such source materials is part of sound academic practice and a skill that should be mastered. References cited in the text are listed according to the standard format and style of a journal. This is where meticulousness comes into force, and it is guaranteed that there will be errors. Every nitty-gritty of punctuations, spaces and font styles (italics, bold) counts.

treatment displays a good photocatalytic activity for the degradation of rhodamine B under visible light.

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**Supplementary data**  
Supplementary data associated with this article can be found in the online version at <http://www.xxx.com>.

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Figure 4. Genuine article published in *Journal of Materials Science & Technology* (2010). Parental advisory: the cited site contains inappropriate materials! [Trust me, I verified it! It is a 'free adult entertainment', certainly not the kind of chemistry you would hope for].

In this way science is maintained in a fastidious system and is a fact that a large num-

ber of manuscripts are rejected. Notwithstanding the quality of the content, the major reasons manuscripts are mostly rejected outright from the editorial office are:

1. Out of the scope of the intended journal.
2. Failure to follow the instructions.
3. Poor presentation in terms of language and style.

Therefore, science is as much art as anything. The scientific information has to be written properly in order to get it published. A good presentation creates the best impression, regardless of the quality of the data – of course, data matters immensely. Especially for novices, tweaking each and every sentence and honing the entire manuscript time and again will render an article alluring.

**The Ratio of Proton and Electron Masses**  
FRIEDRICH LENZ  
Düsseldorf, Germany  
(Received April 5, 1951)

**T**HE most exact value at present<sup>1</sup> for the ratio of proton to electron mass is  $1836.12 \pm 0.05$ . It may be of interest to note that this number coincides with  $6\pi^2 = 1836.12$ .

<sup>1</sup>Sommer, Thomas, and Hipple, *Phys. Rev.* **80**, 487 (1950).

Figure 5. We can not expect all articles to be as concise as this.

### WATCH YOUR BLOODY MOUTH AND MIND YOUR LANGUAGE

Once there was a plumber, rather foolhardy but innovative nonetheless, who proudly presented his report to the US Bureau of Standards regarding his discovery that hydrochloric acid was extremely effective for dissolving away and cleaning clogged drains, one of the major crises in the cities. After evaluation the Bureau responded, 'The efficacy of the hydrochloric is indisputable, but the corrosive residue is incompatible with metallic permanence.' The plumber was very glad and complimented the Bureau for agree-

ing. But the Bureau replied, 'We cannot assume responsibility of toxic and noxious residues with hydrochloric acid and suggest that you use an alternative procedure.' The plumber replied with a note of satisfaction and gratitude. Then, finally the Bureau unreservedly fired back, 'Don't use hydrochloric acid. It eats hell out of pipes.' The plumber understood, and acquiesced.

The irony is that the Bureau's first two responses are perfectly ordinary plain language understandable to scientists, but for non-technical person like the plumber, they hardly make sense. Therefore, it is imperative that we choose our words carefully when we communicate. An easy way to irritate the editors or reviewers is with sloppy presentation. To err is human, but to irritate is unforgivable. Publishing is not such a lucrative business, therefore, editors are not that keen to spend a lot of time and dissipate their valuable ATPs for polishing the manuscript; the onus is on the authors. The coherence of the text, i.e. choice of words and syntax, should be carefully considered, and not only the grammar and punctuation, but how the story is nar-

rated. In fact the storyline should be crafted in such a way that even a lay reader can get a sizeable grasp of the general points of the article, even in the midst of jargons.

To reiterate, English is the lingua franca of science so that its basic rules are to be learned and abide by. Craftiness may not be everyone's gift, but conscientious writing is to anyone's ability, but an obligation, essential to avoid the embarrassment of sounding like a prize idiot. A researcher's companion – other than those who would only borrow something – is an inanimate friend called dictionary.

I cite few notable examples from a pile of editing works we had the honour to have encountered that can be slightly improvised to make better sense of the language:

Swap 'unmine' with 'pristine/natural.'

Swap 'which is consists of' with 'which consists of.'

Swap 'for a period of 1 hour' with 'for 1 hour.'

Swap 'pinkish colour' with 'pink.'

Swap 'were under gone' with 'subjected to.'

Swap 'each cultures were' with 'each culture was.'

Swap 'present study was undertaken to access' with 'present study was undertaken to assess.'

Swap 'in the year 2004' with 'in 2004.'

Swap 'generic name of *Mizo* which' with 'generic name *Mizo*, which.'

Swap 'were found to show high resistance' with 'were highly resistant.'

Swap 'big landslides' with 'huge landslides.'

Swap 'study ... is strongly suggested to know' with 'study ... strongly suggests.'

Swap 'in the state of Mizoram' with 'in Mizoram.'

Swap 'Tanhril, which is located at the south-western side of Tanhril village, around 10 Km from Aizawl city' with 'Tanhril, which is 10 km away from Aizawl.'

**Can apparent superluminal neutrino speeds be explained  
as a quantum weak measurement?**

M V Berry<sup>1</sup>, N Brunner<sup>2</sup>, S Popescu<sup>1</sup> & P Shukla<sup>2</sup>

<sup>1</sup>H H Wills Physics Laboratory, Tyndall Avenue, Bristol BS8 1TL, UK  
<sup>2</sup> Department of Physics, Indian Institute of Technology, Kharagpur, India

**Abstract**

Probably not.

**Keywords:** quantum measurement, interference, neutrino oscillations

**PACS numbers:** 03.65.Ta, 03.65.Xp, 14.60.Pq

**Submitted to:** *J.Phys.A*, October 2011

Figure 6. Genuine manuscript, but the abstract might be a little too obvious.

Swap 'once for three months' with 'once every three months.'

Swap 'calculated by using the method given by' with 'calculated by the method of.'

Swap 'throughout the year for 365 days' with 'throughout the year.'

Swap 'raising drug resistance' with 'rising drug resistance.'

Swap 'Mizoram of North East India' with 'Mizoram, India.'

Swap 'several beneficial roles which holds' with 'several beneficial roles that hold.'

Swap 'Schmidt introduce a name to this gas. He called it as RADON' with 'Schmidt gave the name radon' or better still 'Schmidt named the gas 'radon'.'

Swap 'purify the crude product' with 'the crude product was purified.'

Swap 'it's pretty easy' with 'it is easy.'

Swap 'Students of mammals' with 'students studying mammals.'

Swap 'I want to acknowledge' with 'I acknowledge.'

Swap 'due to the fact that' with 'due to' or 'because.'

Swap 'during the time that' with 'while.'

Swap 'in the month of May' with 'in May.'

Swap 'be merge with' with 'be merged with.'

A binomial can be abbreviated once a full name is already mentioned (e.g. if *Homo sapiens* is mentioned earlier, it will be *H. sapiens* in subsequent mention)

Another point that springs to mind is the constant careless use of upper-case, bold and italic letters, commonly used to express exclamations and emphases. There are strict rules in scientific terminologies where specific font styles are mandated; if otherwise unavoidable, we should not use them unnecessarily, better not at all.

When making the final statement of the research outcome, a humble and incisive language – down-toning – is most impressive and appreciated. For example, using the phrase 'the findings suggest/imply/are likely ...' in-

stead of 'the findings demonstrate/prove ...' Even if the experimental results are expected to incite huge impact, it is always a decent way of scholarship to avoid outlandish and pompous expression – politeness does not harm anyone's prestige. To be precise, *Eureka!* is not a subtle choice of testimony.

#### TIME TO KEEP THE FINGERS CROSSED

Complying up to this stage, the manuscript is ready for submission. Submitting is not a delicate procedure but there is definitely a respectable way. There are no foolproof nuts and bolts but trying to convince and impress the editor from the start is a sign of an honest professionalism. This is done by writing a cover letter. If the cover letter that accompanies the manuscript is poorly presented, the editor will be promptly prejudiced against the submission even before reading the main text.

As a matter of suggestion, not in an authoritarian decree, a structure can be roughly like this: salutation (Dear Sir/Madam/Editor), mentioning the title and author(s) of the paper, contribution of each author (in case of multiple authorship), declaration of originality and authenticity (explaining why the paper is suitable for the specific journal in one sentence would be convincing), sometimes declaration of conflict of interest, closing salutation (yours sincerely/faithfully).

Let us construct an entirely fictitious cover letter:

Dear Editor

I submit herewith a manuscript entitled 'How to write a rather tenaciously legible scientific paper ...[in full]' written by [name of authors]. I consider the paper vitally relevant as most researchers nowadays and readers alike are not paying attention to the art of scientific literature. I present here the systematic process of scientific writing to the best of my ability. I believe that the journal [name] would benefit most for its readers from this humble paper.

I declare that the manuscript is an original work

and has not been published or submitted to any other journal for publication. The author has no conflict of interest in writing this paper, in private or professional matters.

I hope the paper is worth reading. And I look forward to hearing your response.

Yours faithfully/sincerely,

[Author's name]

If the above example is not worth abiding, you can find few more we have actually received, which are appallingly discouraging (spellings, spacing, punctuations and texts are copied verbatim), as below:

my dear Pu Chhandama,

I am herewith attaching the file of my revised manuscript of research paper entitled, '**Physico-chemical and bacteriological investigations of tuikhur water, Saiha town, Mizoram**'.

**All of your comments and suggestions have been incorporated in the revised manuscript.**

**I hope you will find it ready for publication in Science Vision**

**However, any queries in this regard will be appreciated**

**with love,**

Dear, Editor-in-chief (Science vision)

ka manuscript chu hei ka rawn thawn ve e. khawngaihtakin a rang lam a min lo en-sak tur in ka ngen a che.

Hello

I dam tha zel mo? Hei, Science vision a chhuah tur paper kan siam leh chhin a, ka ron thon chom che a, I remchannah min lo en sak chhin la ka lawm viau ang

Outrageous!

While we try in our feeble capacity to make our journal impressive, credible and accessible to international readers, these cover letters are definitely not a promising inspiration – in spite of the overwhelmingly gracious greetings ('with love' is particularly a bit odd!).

If I have to insert *sic* after every spelling and syntax error, there will be [*sic*] all over, and it is sick.

### PRIDE AND PREJUDICE – THE WOES AND WOWS

Peer review is the bedrock of science, and it renders science an extremely successful human enterprise in our intellectual advancement. Manuscripts worthy of attention are sent to the peers for evaluation, to sort the wheat from the chaff, and poke at the loopholes. Referees and editors are like the obstinate child in *The Emperor's New Cloth* – adept at seeing the obvious, that is, the emperor's nakedness, or in our case, the flimsiness of the manuscript. I would relate a few phenomenal incidents indelibly ingrained in the memoirs of the history of science.

What would be the perfect retaliation for a scientist whose paper is turned away from *Nature*? A Nobel Prize, of course. Such was the case for Hans Krebs, the German-British biochemist, who first elucidated the key pivotal chemistry of cellular energetic pathway, which he himself called the citric acid cycle and everyone else calls it the Krebs cycle – the enzymatic reaction that converts carbohydrates, fats, and proteins into energy. When he submitted the manuscript to *Nature* he received a prompt note that the journal had a backlog of 'letters' and could not publish it without a significant delay (Fig. 7). 'This was the first time in my career, after having published more than fifty papers, that I experienced a rejection or semi-rejection,' Krebs recalled in his memoir. After a subtle dose of dejection he resubmitted his findings to the

journal *Enzymologia* in Holland, where they were published within 2 months. Krebs nabbed the 1953 Nobel Prize precisely for the discovery. In 1988, 7 years after Krebs's death, an anonymous editor of Nature admitted calling the rejection the journal's most 'egregious error,' and in 2003 another conceded, 'Our notorious rejection'.

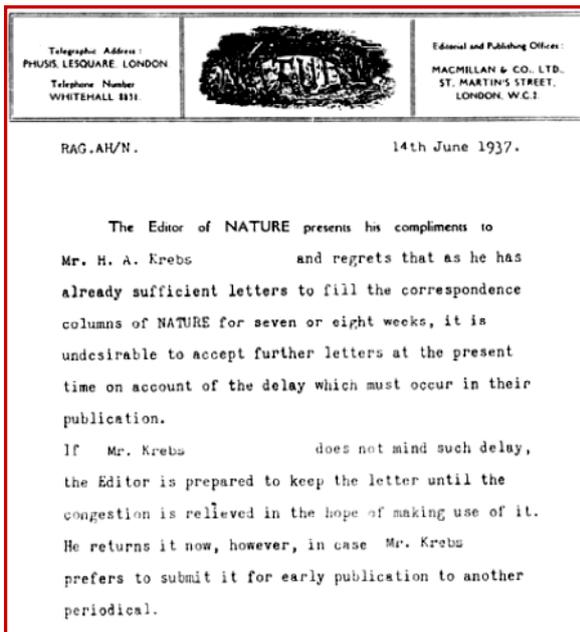


Figure 7. The original *Nature's* rejection letter of Krebs.

The 2005 Nobel Prize in Medicine or Physiology was awarded to Robin Warren and Barry Marshall for their discovery of the bacterium *Helicobacter pylori* as a major causal agent of stomach ulcers. Their original discovery was not a sweeping victory either. Before 1985 the medical doctrine held that gastric ulcers were caused by stress, spicy foods, and too much acid, and nothing else. Their manuscript was received with sarcastic scepticism and their earliest communications were rejected as incredible. Even the later accepted papers were significantly delayed, by obstinate reluctance. Marshall had to go even as far as drinking himself an entire bacterial culture to persuade the stubborn people; and verily he developed the ulcer. After 1994 *Helico-*

*bacter* was generally accepted as the cause of most peptic ulcers and gastric cancers, and rightly so. As a result of this discovery, pharmaceutical treatment is simply prescribed and the previously mandatory stomach surgery can now be evaded.

Now it's time to present the record-holder (with the greatest number of unjustified rejections of one paper, to the author's best knowledge). Arguably one of the most strident scientists, feisty would describe her best, a bulwark of reason, Lynn Margulis wrote a paper on symbiogenesis in 1966 (then in holy matrimony to an affable physicist Carl Sagan), which laid the foundation for the pervasive and elegant theory called 'endosymbiotic theory.' Currently the theory is heralded as the best explanation on the origin of eukaryotic cells (cells with discernible nucleus) from prokaryotic forms. As she revealed three decades later, her original paper 'The origin of mitosing cells' was 'rejected by about fifteen scientific journals, because it was flawed; also, it was too new and nobody could evaluate it.' Without a flinch from dejection, she kept trying, with the obstinacy that would try the patience of a saint. Ultimately *The Journal Theo-*

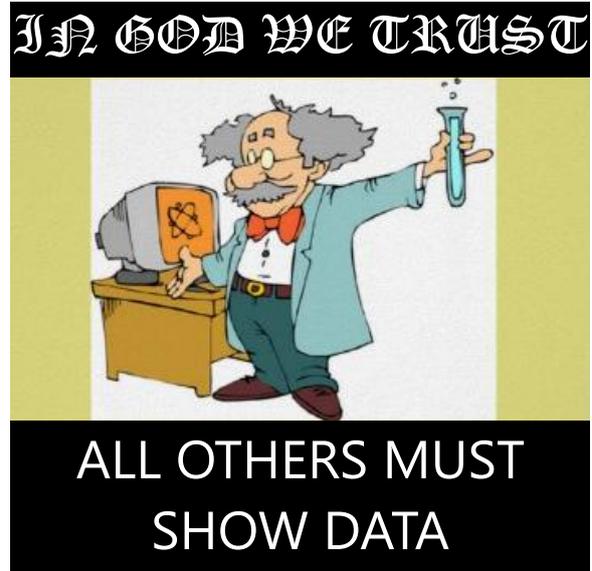


Figure 8. Scientific publication is a way of saying 'give the evidence, if not, bugged off, moron.'

retical Biology accepted it and eventually published it in 1967 under the name Lynn Sagan (then divorcee) – showing that marrying can outpace publishing. Her contribution is now recognized as a landmark and a key to the understanding of origin of complex cells and their organelles.

The most mischievously intentional prank in scientific literature is what became known as ‘Sokal’s hoax’ after the perpetrator. In 1996, Alan Sokal, professor of physics at New York University, concocted a deliberately nonsensical and parodic paper entitled ‘Transgressing the Boundaries: towards a transformative hermeneutics of quantum gravity’. A carefully drafted manuscript from a respectful scientist was readily accepted and published in a reputed journal *Social Text* by a renowned publisher, Duke University Press, and printed even without any doubtful question from the editor’s side. The paper was nonsense from start to finish, a jumbled-up technical hermeneutic. Sokal himself ascribed his quick success to the fact that his text had been in perfect conformity with the editor’s ideological preconception, and he later revealed his conscious hoax. The editors were rightfully awarded the 1996 Ig Nobel Prize in Literature, for their gullibility.

In a strange and inconceivable way, for the James Watson and Francis Crick’s 1953 phenomenal paper on the structure of DNA (Fig. 9), *Nature* did not send the paper out for peer review at all. John Maddox, the editor, stated that ‘the Watson and Crick paper was not peer-reviewed by *Nature*... the paper could not have been refereed: its correctness is self-evident. No referee working in the field ... could have kept his mouth shut once he saw the structure’.

*Environmental Microbiology* has a record of reviewers’ remarks, some of which are desperately hilarious and also thought provoking, for your kind entertainment:

The biggest problem with this manuscript, which has nearly sucked the will to live out of

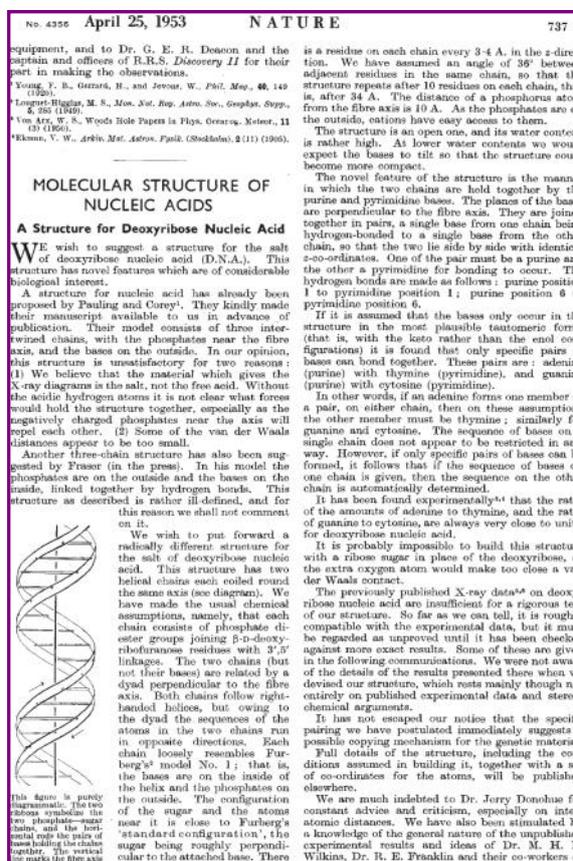


Figure 9. The revolutionary paper, the manuscript of which was totally prohibited from tampering with any dirty old hand of referee, on Earth or in heaven.

me, is the terrible writing style.

The abstract and results read much like a laundry list.

I have to admit that I would have liked to reject this paper because I found the tone in the Reply to the Reviewers so annoying. It may be irritating to deal with reviewer’s comments (believe me, I know!) but it is not wise to let your irritation seep through every line you write!

There is a great deal of freely available genomic data in the world and the authors would be much better off training themselves on that while waiting for genomic data to be generated for their system.

I agreed to review this Ms whilst answering e-mails in the golden glow of a balmy evening on the terrace of our holiday hotel on Lake Como. Back in the harsh light of reality in Belfast I realize that it's just on the limit of my comfort zone and that it would probably have been better not to have volunteered.

Preliminary and intriguing results that should be published elsewhere.

Well, I did some of the work the authors should have done!

Reject – More holes than my granddad's string vest!

The writing and data presentation are so bad that I had to leave work and go home early and then spend time to wonder what life is about.

**ON THE SHOULDER OF THE GIANTS**

It is on the other hand a gruelling dilemma that scientific literature has become jam-packed with jargon, rendering awful dullness and repugnance. Science need not be this way. There are ways of making technical papers captivating, memorable and even leavened with a touch of wit and humour.

But to contradict me, presumably, there is a scientific paper in the *Journal of Information Science* (2007) in which Itay Sagi and Eldad Yechiam declared that the more amusing and pleasant titles tend to be less frequently cited (Fig. 10). I still would argue that their study was limited to only two journals in *Psychological Bulletin* and *Psychological Review*, that too with the publications between 1985 to 1994. The wider perspective can be quite different.

Albert Einstein submitted a one-page manuscript to *Science* in 1936. He started his covering letter, 'Let me also thank you for your cooperation with the little publication, which Mister Mandl squeezed out of me. It is of little value, but it makes the poor guy happy.' The wit was augmented in the main text, which was no less fascinating (Fig. 11). It opened thus, 'Some time ago, R. W. Mandl



Figure 10. A study in the *Journal of Information Science* says people don't buy scientific jokes – rubbish.

paid me a visit and asked me to publish the results of a little calculation, which I had made at his request. This note complies with his wish.' And he intermittently regurgitated that there is no chance or hope of observing the phenomenon. One can feel the humour and humility in these words. The paper turned out to be a milestone on the nature of

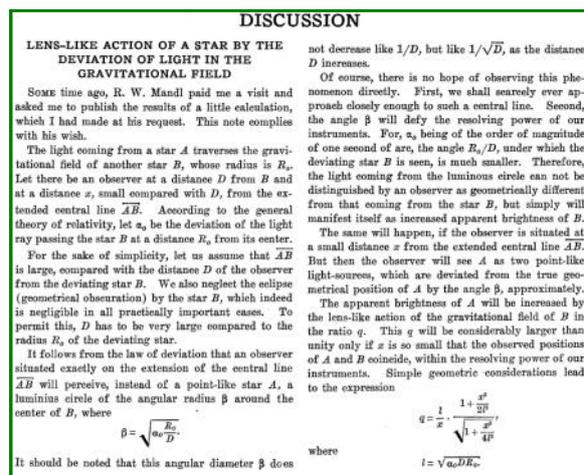


Figure 11. Einstein's little fidgety in *Science*.

space, how it can act like lens, bend light and magnify it. It not only incited the happiness of a certain Mr. Mandl the poor guy, but every physicist's (or humankind's for that matter) delight.



Figure 12. Einstein at work.

I have heard more often than once that scientific writing should not be in flowery, artistic and poignant narratives. Stick to the technicality, raw language, and kill yourself with boredom seem to be the tradition. I, for one, am protesting. Scientific literature can, and should be, as witty, stirring and creative. There are tip-top scientists to back me up; and dissenters are advised to try this for a size:

'We wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This structure has novel features which are of considerable biological interest... So far as we can tell, it is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against more

exact results... It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material.'

Without a doubt this nine-hundred-word, one-page article (actual page number covers two) is the single most important publication in all fields of biology, before and after the Big Bang, and indubitably preordained for the Nobel Prize. I am not exaggerating a bit. One of the authors, James Watson recalled how they persuaded his sister Elizabeth to type the manuscript: '[W]e told her that she was participating in perhaps the most famous event in biology since Darwin's book.' It was the truth, nothing but the truth.

I implore you to notice the fanciful, electrifying and speculative remark of the opening and closing statement of the *Nature* paper. They are Francis Crick's, who clearly foresaw all the biological implications, especially the mechanism of DNA replication. He knew DNA was 'the secret of life.'

Present-day scientist might have written, 'We have found a new explanation of the structure of DNA ... Thus, we demonstrate that DNA is a right-handed double helical chain. *Period*,' [exaggeration mine]. The artistry vanishes, the ingenuity disappears, the amusement departs, the excitement evaporates, and the humility fades out.

There are some of us who hold an amicable view that scientific writing can be spiced up with humour to promote readability and fascination. I cannot help but admire the brevity and joviality of Sanjay Kinra and Mona Okasha. As if the very title of their paper 'Unsafe sax: cohort study of the impact of too much sax on the mortality of famous jazz musicians' is not humorous enough, they close it with an irony: 'We acknowledge all those famous jazz musicians who laid down their lives for the sake of a long-drawn solo.' That is not all. On declaring the competing interests, they appended: 'SK loves jazz, MO doesn't care; hence there is no competition of interests.'

Perhaps the most whimsical but ingenious scientist Mother Nature has ever spawned is George Gamow. In 1948 he published a short but monumental paper entitled 'The origin of chemical elements' with his student Alpher (fig. 13). The text per se was absolutely technical. The joke was in the list of authors. Queerly the middle author was Bethe. Hans Bethe had no prior knowledge or contribution to the research. The name was inserted purely for comedic sense to render the list of authors sounds like the first three letters of Greek alphabet, alpha, beta and gamma! In return Bethe was also the kind who did not run short of humours, and would not go empty-handed in such matter of defamatory inclusion. But instead of going to the law to file for insult, when after the 'αβγ paper' was catapulted to fame, he publicly considered changing his name to Zacharias.

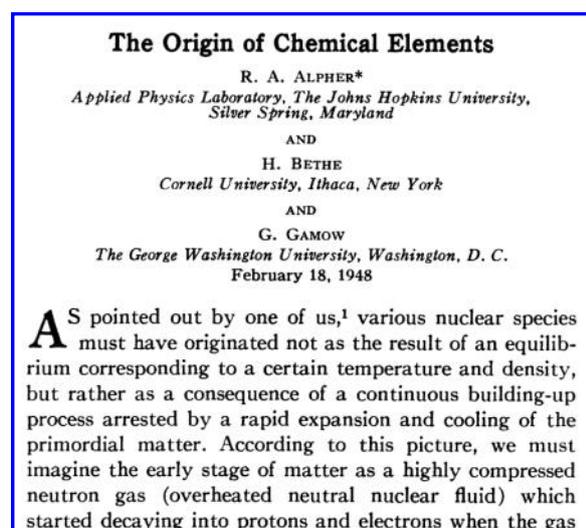


Figure 13. Jocularly authored but monumental paper.

*Canadian Medical Association Journal* is profuse with a collection of genuine but humorous research papers. One of my favourites is a clinical study to test the veracity of the Franklin-Thurber hypotheses. Benjamin Franklin had famously posited that 'early to bed and early to rise makes a man healthy, wealthy, and wise,' which turned out to be an iconic

international proverb. Corroborating it, James Thurber elaborated the hypothesis as: 'early to bed and early to rise makes a male healthy and wealthy and dead.' The study was executed to validate whether the statements hold any water, or not. The subject included 949 men hospitalized at the Beth Israel Deaconess Medical Center, Boston, USA. The results revealed that early to bed and early to rise is not associated with health, wealth or wisdom. They do disclaimed that the study had its limitation such as unhealthy patients in the first place; and lack of reliable and validated instruments to measure it; and they conceded education is but an ill-schooled substitute.

The ending remark is more interesting:

In conclusion, we found no evidence to support the Franklin or Thurber hypotheses that sleep habits dictate health, wealth or wisdom, either for the good or the bad. Further research remains necessary to determine whether Franklin's ('He that lives upon Hope, dies farting') or Thurber's ('It is better to have loafed and lost, than never to have loafed at all') other hypotheses fare better under formal scrutiny.

On top of it all, the paper closes with a hilarious disclaimer:

This article was peer reviewed by someone. Peggy? You read this, right?

In closing we need to emphasize once again that science is a form of literature, and requires scrupulous writing skill – the yoke is neither easy nor the burden light. Without literature scientific knowledge would hardly be useful; but writing it down is one heck of a dreadful practice. Who better than the genius Charles Darwin is to acknowledge this predicament; in a letter to Charles Lyell on 1 June 1867, he begrudged thus:

I hope you are getting on with your book better than I am with mine, which kills me with the labour of correcting, and is intolerably dull,

though I did not think so when I was writing it. A naturalist's life would be a happy one if he had only to observe, and never to write.



Figure 14. Trust this bloke [I mean the man behind the caricature], the job is to write.

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