Publishing and Keeping up with the Research Literature in Biochemistry and Molecular Biology since 1955

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I was a postgraduate student at the University of Sydney in 1955 when ASBMB (the Australian Biochemical Society, or ABS, as it was then known) appeared on the scene. It was certainly a milestone for me in 1956 to attend the first meeting of the Society in the building across the road from our fibro edifice and to meet biochemists from outside our department. While my name had appeared as a co-author on a paper (my first) the year before, I had no concern about accumulating publications at that early stage of my career, nor for several years afterwards. ARC didn't exist and it seemed that research publications were not a major factor affecting the outcome of an application for a junior academic position. How the situation has changed in 50 years!

Some of the more than 200 journals that publish research in biochemistry and molecular biology today.

In 1955, the prominent mainstream journals reporting advances in biochemistry (such as the *Journal of Biological Chemistry*, the *Biochemical Journal*, *Biochimica et Biophysica Acta*, *Archives of Biochemistry and Biophysics*) were well established. Biochemical topics also appeared in several journals with a narrower focus – *Plant Physiology*, for example, was frequently the journal of choice for publishing findings in plant biochemistry, and the *Journal of Bacteriology* was commonly used by biochemists who worked with bacteria. Biochemistry was also covered in academy journals such as *Proceedings of the National Academy of Science USA* and in the broad-interest journals like *Science* and *Nature*. All of the above-mentioned journals are still with us.

The term 'molecular biology' was not very familiar in 1955. It started to be used more commonly soon after that time. The *Journal of Molecular Biology* first appeared in 1959, its emphasis then being heavily on structural and physico-chemical aspects of proteins, nucleic acids and protein-nucleic complexes. Our understanding of the molecular mechanism of gene expression was in its infancy and the genetic code had not yet been deciphered – at that stage a doublet code was still considered a possibility. Molecular biology has come to include much more than it did in the late 1950s – it now embraces molecular genetics and molecular cell biology, for example. It has been the tremendous growth in the more encompassing discipline of biochemistry and molecular biology that has brought about a remarkable increase in the number and variety of journals (notably several of very high impact) in the area that now interests our members. In 2002 there were 50 journals with the name 'biochemistry' in their title. My guess is that there would now be at least 200 journals (some with a very narrow focus) in which work on topics within biochemistry and molecular biology might appear.

Up until the early 1960s the accessibility of the research literature in the state and regional 'teaching' universities in Australia – in which most of the departments of biochemistry were located – was generally poor. This largely reflected the slow delivery of journals from overseas. Electronic access was further away than methods for sequencing DNA! The situation was relieved significantly if a relevant research institute was nearby. I can clearly recall going to the library at the John Curtin School of Medical Research when I visited Canberra to catch up on the literature. Along with the difficulties Australian scientists had in attending international research meetings due to lack of funds, this meant that many of us remained pretty well 'in the dark' about the most recent advances in the northern hemisphere, sometimes for up to a year. Certainly, one of the greatest achievements of the Australian Biochemical Society in the early years of its growth was to progressively reduce this period of darkness – largely through the annual scientific meetings and the presence of overseas speakers. But it was also done in other ways. I can recall having most of my expenses covered in 1975 to allow me to travel to the United States and speak at one of the early Keystone Meetings through an arrangement that the then President of the Society, Tony Linnane, negotiated with the founding organiser of these meetings.

The world of communications is now very different from 50 years ago. Ready electronic access to every important journal puts all scientists worldwide on a more even footing. Since I formally retired in 2000, I have attended very few scientific meetings but I am probably better informed and up-to-date on the literature than ever before. How I misjudged the situation when, several years ago, our then Department of Biochemistry was

reviewed and the review committee did not support our case to enlarge and consolidate our departmental library. Even at that time electronic access seemed to me like pie-in-the-sky.

While the speed of publication and refereeing of journals have become much faster since 1955, other factors should be considered in assessing the overall situation. Nowadays, once a submitted article receives referees' reports that satisfy an editor, it appears in one form or another within weeks rather than months. That's good. But refereeing, in becoming faster, has changed in other ways. In my experience it is more frequently rushed, overcritical and not completely objective. In the 1950s and 1960s referees were much less severe. And they were more likely to go out of their way to be helpful. Rarely do you obtain a report these days in which the referee gone to much effort to help improve the overall presentation of the work. As a young researcher I found this particularly valuable. Perhaps we have become too busy to give adequate time to refereeing.

Also, the expectations of an editor or referee of some journals have become extremely high in comparison with some others. I would imagine that many of us in the last few years have received a prompt reply from an editor along the lines "although the recommendation is against publication in the *Australian Biochemist*, I should like to emphasise that this does not reflect any adverse criticism of the work". Thus, a relatively new factor in determining the speed of publication after the work is completed is the selection of the journal to which one submits. Do you take a chance of delayed publication by going for a very high impact journal in the first (second, third) instance and a higher probability that it will be knocked back? I cannot recall having this dilemma prior to the late 1980s. To a certain extent it has been forced upon us by the extra significance given to a paper in a more prestigious journal, particularly by referees and members of selection committees for research grants, academic and research positions, promotions, etc.

Some interesting insights into the role and significance of our discipline come from the relative standing of journals as measured by impact factors (IFs). IFs have come into common use only in the past 10-15 years. Even though Watson and Crick published the double-helical structure of DNA in *Nature* in 1953, this journal did not then have the pre-eminent standing that it enjoys today. *Nature* has become much more selective with respect to the articles it will consider for publication. In 2003 it achieved the highest IF for a journal describing original research of broad interest, with *Science* not far behind. Other high impact journals like *Cell, Nature Genetics, Nature Cell Biology, Genes & Development* and *Molecular Cell* (IFs > 16) were not around 50 years ago. The first of these, *Cell*, appeared in 1974; the others are much more recent. Notable with respect to the reported top 100 'journals' (which include publications such as *Annual Reviews*) is that the *Annual Review of Biochemistry* is ranked extremely high, second in the 2003 list (IF 37.6) – only the *Annual Review of Immunology* beats it. Clearly, our discipline is very strong. All of the newer high impact journals listed above are included amongst the top 100, but not one of the early prominent mainstream biochemistry journals is there. This should not be misinterpreted to mean that the latter have become less significant than they were in 1955. They certainly haven't. Rather, it reflects the fact that much, possibly most, research in the biological sciences that now has the greatest impact is at the molecular (biochemical) level. And a good proportion of this work is of such significance that it is being reported in the more selective and very high impact journals.

What does the future hold? The situation with respect to research publications will be very different by the time it is the 100th anniversary of the Society. But I expect that most of the current prominent journals will still exist. After all, the *Journal of Biological Chemistry* and the *Biochemical Journal*, have been going now for 100 and 99 years respectively. Will there be a large shift to online publishing? Possibly, but there is no need for this simply for the sake of increasing the speed of publication or enabling better accessibility to the research literature. What about refereeing? The journal literature (and science itself) will deteriorate if rigorous refereeing is not retained. Whatever the next 50 years bring I am confident that there will be an ever-increasing growth of publications in our discipline. But the literature will be less interesting if we are forced to cope with the extent of such growth by just searching electronically for articles on specified topics. I still enjoy scanning the list of titles in the journals I regularly look at.

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