

## Editorial

# The Hirsch Index and measuring the quality of scientific papers

Quantifying the quality of a scientist's output is difficult. Publishing papers in journals gets increasingly more difficult as standards increase and publishers compete to survive in a cut-throat world. The universities recently completed the latest research assessment exercise (RAE). Submissions included the 'best four papers' – usually based on impact factor. Journal impact factor is measured by taking two years of journal issues and dividing the number of papers published into the number of citations – the higher the impact, the 'better quality' the paper. This method has several disadvantages – often the best paper that impacts on scientific practice and changes things for the better, may not be published in a high citation journal favouring cutting edge science that may contribute to treatments some years later.

JE Hirsch recently proposed a scientific index – now known as the Hirsch index  $h$  – which is defined as the number of papers with a citation number higher or equal to  $h$ , as a useful index to characterise the scientific output of a researcher<sup>1</sup> – (Box 1). For example, Stephen W Hawking has published several physics papers and 62 of these have been cited at least 62 times giving him an  $h$  index of 62. The index has the advantage of allowing easy comparison between researchers of different ages in different fields, and helps measure the importance of their work. Prominent researchers in medicine with a high  $h$  index include Robert Gallo ( $h = 154$ ) for HIV research and Bert Vogelstein ( $h = 151$ ) for colon cancer research. Hirsch has suggested that based on a typical  $h$  value, professorial status could be conferred at  $h \sim 18$ , with entry to senior lecturers or tenured posts at  $h \sim 10-12$ . Those bright academics gaining coveted membership of the US National Academy of Science could be  $h \sim 45$ , and so on for other elite bodies. The next RAE may be using some  $h$  indices rather than impact factors in an attempt to be fairer.

Box 1 – Hirsch index  $h$

A Scientist has index  $h$  if  $h$  of his/her  $N_p$  papers have at least  $h$  citations each, and the other  $(N_p - h)$  papers have no more than  $h$  citations each

Accessing published research is also improving. The *Ulster Medical Journal* is now on PubMedCentral (PMC) – the US National Institutes of Health (NIH) digital archive of biomedical and life sciences journal literature. This will allow increased access to articles in the journal and issues will be posted on the PMC server ([www.pubmedcentral.nih.gov/](http://www.pubmedcentral.nih.gov/)) some months after the publication of the paper and online copy of the journal to subscribers and society members. The entire 2006 and 2007 volumes are now available, and with a Wellcome Trust grant, the entire back file since 1932 has been shipped to PMC in the USA for digitization in 2008.

Two articles in this issue of the journal deal with two eminent Professors of a bygone era who would have scored well in a RAE if there had been one<sup>2,3</sup>. The first – James Lorrain Smith – the fairly eccentric foundation holder of the Musgrave professorship of pathology – did some interesting and cutting edge experiments with JS Haldane (father of the biologist JBS Haldane), and established Belfast as a leader in respiratory research in the early part of last century. Some experiments on himself and Haldane were downright dangerous with hindsight and clearly with the safety regulations of today such self experimentation would not be possible. With the help of PMC, you can read the original articles he published with free access in the *Journal of Physiology* from 1894 onwards.

The second, John Edgar Morison – was the longest serving editor of the *Ulster Medical Journal*<sup>4</sup> from 1951 – 1984. He established the journal on Medline and when former editor David Hadden and I visited him and his wife Ellen at home two years ago, John Edgar was delighted with progress on the journal and the fact that I had managed to get a Wellcome grant to put the journal onto PMC. He always enjoyed the editing and encouraging young authors and correcting their grammar and fledgling works for publication. He told us 'the only time editing the journal was a nuisance was when I was revising one of my textbooks, otherwise it was a complete joy to edit'. The journal only exceptionally publishes obituaries – minimum criteria being either a former editor or an honorary fellow of the *Ulster Medical Society* – John Edgar Morison was both.

We pass our condolences to his wife Ellen, and also our thanks to Ellen for tolerating his editing and substantial contribution to both the journal and the *Ulster Medical Society* over so many years.

Patrick J Morrison

### REFERENCES

1. Hirsch JE. An index to quantify an individual's scientific research output. *Proc Natl Acad Sci* 2005;**102**(46):16569-72.
2. Hedley-Whyte J. Pulmonary oxygen toxicity: Investigation and Mentoring. *Ulster Med J* 2008;**77**(1): 38-41
3. Biggart JD, Hayes DM, Allen IV. Obituary – Professor John Edgar Morison OBE, MD, DSc, FRCOG, FRCPATH (1912-2007). *Ulster Med J* 2008;**77**(1): 3
4. Hadden DR. The Editors of the *Ulster Medical Journal*. *Ulster Med J* 2006;**75**(1):5-10.

Footnote - PJM has an  $h = 17$  and feels he has justified holding his honorary Professorships according to a Hirsch threshold of  $h = 18$  for salaried Professors. Hirsch says nothing about  $h$  indices for honorary posts so holding down a full time busy NHS job whilst editing a journal and other such things should perhaps be factored in for honorary post holders in case Universities start getting ideas.

# LIST OF REFEREES FOR 2007

We pass on our sincere thanks to all of our referees for 2007.

|                           |                            |
|---------------------------|----------------------------|
| Dr Derek Allen            | Dr Alex Magee              |
| Dr Pooler Archbold        | Dr Samina Mahsud           |
| Dr Robin Ashe             | Dr Glen Marshall           |
| Mr Paul Blair             | Professor Peter Maxwell    |
| Dr Declan Bradley         | Dr Paul Miller             |
| Professor J Bridges       | Dr Mike Mitchell           |
| Dr Norman Campbell        | Dr Jim Moohan              |
| Dr Jonathan Cash          | Professor Patrick Morrison |
| Professor Chee Soong      | Dr Joanne Murdock          |
| Mr Kishor Choudhari       | Professor Liam Murray      |
| Dr W D Barry Clements     | Dr Damien McCall           |
| Dr Rory Corbett           | Mr Kevin McCallion         |
| Mr Harry Cowie            | Dr Kathy McClean           |
| Dr Peter V Coyle          | Professor Neil McClure     |
| Dr Peter Cusick           | Dr Vivienne McConnell      |
| Dr Peter Dace             | Dr Graeme McDonald         |
| Mr Tom Diamond            | Dr Neil McDougal           |
| Mr William Dickey         | Dr Philip McGarry          |
| Dr Deidre Donnelly        | Professor Martin McKee     |
| Dr David Eedy             | Dr Shane McKee             |
| Dr W Elbaz                | Dr Pascal McKeown          |
| Professor Stuart Elborn   | Mr Lloyd McKie             |
| Professor Michael D Finch | Dr Andrew McKinley         |
| Dr Raeburn Forbes         | Dr Joanne McManus          |
| Dr Keith Gardner          | Professor Gary McVeigh     |
| Mr Robert J Gilliland     | Dr Tony O'Neill            |
| Dr Andrew Gilliland       | Professor Michael A Patton |
| Mr John Gray              | Dr John Price              |
| Dr Moyra Gray             | Dr Ralph Roberts           |
| Professor David Hadden    | Dr Laurence Rocke          |
| Mr Roy Hannon             | Dr Madeleine Rooney        |
| Dr Mark Harbinson         | Dr Aline Russell           |
| Dr Stanley Hawkins        | Mr Colin Russell           |
| Dr Niall Herity           | Mr Stephen Sinclair        |
| Mr Chris Hill             | Dr Brendan Sinnott         |
| Mr John Hood              | Dr Ruth Spedding           |
| Dr David Hunter           | Professor Roy Spence       |
| Dr Brian Johnston         | Dr Fiona Stewart           |
| Dr Simon Johnston         | Dr Ian Taylor              |
| Dr Barry Kelly            | Professor W Thompson       |
| Dr Khurosh Khosraviani    | Dr Peter Trimble           |
| Dr Tong Lioe              | Dr Peter Watson            |
| Dr Clodagh Loughrey       | Dr Ivan Wiggam             |
| Dr Maurice Loughrey       | Mr Alan Wilkinson          |
| Dr Roy Lynas              | Mr Colin Willoughby        |
| Dr Domhnall Macauley      | Professor Ian Young        |