Smell, science and the press

But 'tis my heart that loves what they despise
Who in despite of view is pleased to dote
Nor are mine ears with thy tongue's tune delighted,
Nor tender feelings to base touches prone,
Nor taste, nor smell, desire to be invited
To any sensual feast with thee alone.
But my five wits nor my five senses can
Dissuade one foolish heart from serving thee,

William Shakespeare (Sonnet 141)

The five senses of sight, hearing, smell, touch and taste are taken for granted; rarely do we pause to wonder at our marvellous abilities of sensory perception. It is only when one of these gifts of nature is impaired, that we worry about the disabling effects of conditions like blindness and deafness, the most common disorders of our sensory system. Disabilities of the senses of touch, taste and smell are far more uncommon. At one of the many sites on the internet which focus on the sensory system, I found an on-line poll, querying visitors on the order of importance of our five senses. Predictably the votes cast led to the order: sight (66%), touch (11%), sound (8%), taste (8%) and smell (4%). Clearly, an overwhelming majority of voters did not consider a loss of the ability to smell as a major disorder; at times the absence of the sense of smell might even be considered an advantage. Anosmias or disorders of the olfactory system do occur and can be a significant handicap for affected individuals. My attention was drawn to the area of ‘smell research’ by an unusual editorial in a recent issue of Nature Neuroscience entitled ‘Testing a radical theory’ (2004, 7, 315). The editorial justified the publication of a paper in the same issue which was a ‘refutation of a theory that, while provocative, has almost no credence in scientific circles’. Why then, did Nature Neuroscience, one of the leading journals in the area of neurobiology, decide to publish a paper that appeared to be demolishing a theory that no one believed anyway? The editorial argues that the decision to publish the refutation was influenced by ‘the extraordinary – and inappropriate – degree of publicity that the theory has received from uncritical journalists’. The discredited theory, enunciated by Luca Turin (then, at the University College, London) in 1996, proposed that olfactory (‘smell’) receptors ‘respond not to the shape of the molecules but to their vibrations’. Turin suggested that ‘inelastic electron tunnelling’ provided a ‘plausible mechanism for biological transduction of molecular vibrations’. Turin appeared to argue that the nose (and its plethora of receptors) appear to function as a ‘biological spectroscope’, carrying out ‘inelastic electron tunnelling spectroscopy’. Turin’s thesis challenged the dogma that biological receptors respond to specific molecular shapes of their ligands. The shape theory of molecular recognition was enunciated by the German chemist Emil Fischer, over a century ago, when he described a ‘lock and key’ mechanism for enzyme action. The range of odours that can be distinguished by humans appears to be very large; at present it is not clear if the number of genes that code for olfactory receptors will also be very large or if mechanisms exist to enhance the recognition repertoire.

Turin departs from this view of olfaction to propound a more ‘physical’ model for differentiating odorant molecules. In his paper published in Chemical Senses (1996, 21, 773–791), Turin notes that the simple chemical, acetophenone, and its fully deuterated analogue, acetophenone-d₆, ‘smell different despite being identical in structure’. A substitution of hydrogen atoms by the heavier isotope, deuterium, would be expected to affect molecular vibrations. The dismissive editorial in Nature Neuroscience notes that his paper was rejected by Nature, and it was eventually published (without review, according to Turin’s own account) by Chemical Senses in 1996. For readers unacquainted with the area, Chemical Senses is a specialist journal published by Oxford University Press, with impact factors of 2.6 and 2.5 in 2001–2002. The blurb on the journal’s website places it as the top journal in the area of Food Science and Technology, out of a total of 92 journals in this subject area.

uses a simple protocol of ‘smelling’ by volunteers and a ‘double blind protocol’ for odorant tests and concludes that there is ‘no evidence that regular and deuterated ace- tophenone smell different to naïve subjects’. The authors however add a cautionary note, that they ‘cannot exclude the possibility, however, that olfactory training or experience could alter the outcome of the tests done here’. The editors of *Nature Neuroscience* are less restrained and conclude magisterially: ‘A mature body of a scientific theory is like a large building, and the impulse to demolish it is often little more than a form of intellectual vandalism, an expression of frustration by those who did not succeed as architects. Some buildings outlive their usefulness, of course, but the threshold for knocking them down should be high. We hope that the paper from Keller and Vosshall will serve as a reminder of why it is so.’

The editors of *Nature Neuroscience* and the olfaction orthodoxy appear to have been enraged by the almost uniformly approving reviews in the press, received by a book about Turin, his theory and his jousts with the scientific establishment. *The Emperor of Scent: A Story of Perfume, Obsession and the Last Mystery of the Senses* by Chandler Burr appeared in 2003 (Random House, New York). I have not read the book, but have read several reviews, all of which suggest that it is eminently readable. Turin’s treatment by his peers in the scientific community will strike a chord in many researchers, who quixotically tilt, most often in vain, at windmills. Turin’s obsession with the mechanisms of odour discrimination appears to be of some interest to the $20 billion perfumery industry, which jealously guards its molecular secrets. Blending mixtures of odorant molecules is indeed the key to the making of perfumes. In Turin’s story there is a touch of the underdog versus a powerful and hostile establishment. Unsurprisingly, Turin’s experiences as reported by Chandler Burr and the reviewers of his book, show the scientific community’s peer review mechanisms in poor light. Understandably, the *Nature Neuroscience* editorial reflects the establishment’s dismay: ‘This (controversy) is not just about olfaction. It is about the public credibility of the scientific process and the biases that affect science reporting in the popular press.’

In the West, many of the major newspapers and magazines report with considerable accuracy and depth on major advances in science. This is an essential element in enhancing the public understanding of science and in justifying a high level of public commitment to the support of science, scientists and their institutions. In India coverage of science in the press is much less discerning. Very few newspapers and magazines have ‘science writers’ on their staff. Reporters with little or no knowledge of the subject they write on are assigned the task of reporting on issues of science. The practice of ‘researching a topic’ is largely unheard of among science journalists, although there are, of course, a few notable exceptions. Science writers in India are often uncritical recipients of doubtful information from contacts within the scientific community. These are then reported as established facts. Some recent stories that I have seen would make Turin’s theories and claims appear innocuous. A report in the *Sunday Express* (27 June 2004, p. 32) announces the invention of a ‘Nano Geneseq Chip’ that ‘analyses the entire future genetic proposition of a human at birth itself’. The report talks of a ‘genetic horoscope’ and holds out possibilities of diagnosing and treating ‘a range of disorders, most importantly HIV/AIDS and cancer’. This piece is an example of the kind of gibberish that appears in our newspapers, often misleading gullible readers into believing that major scientific advances have been made in local institutions. Even as I was reading about olfaction and Turin I came across another report in the Bangalore papers. On 4 July 2004 *The Sunday Express* reported that ‘city doctors wield magic wand, treat terminal cancer patient’. A new technique called ‘Rotational Field Quantum Magnetic Resonance (RFQMR)’ was announced and advanced for ‘treating osteoarthritis, osteoporosis, joint diseases, migraine and degenerating and destroying tumours’. *The Hindu* (4 July 2004) carried the same story with a more conservative headline: ‘A “breakthrough” in cancer treatment’. This report noted that ‘clinical trials will shortly begin for establishing the technology’s efficacy for treating cancer’. In many such reports the process of scientific review is far from complete, the results of studies unpublished and the efficacies of treatment unestablished. Nevertheless, the press actively promotes the impression that ‘cures’ are at hand; often raising false hopes in patients who are desperately ill. Sometime ago, unrestrained publicity for stem cell research led to the impression that some Indian laboratories were ready with therapeutic applications. The tendency among scientists and institutions to exploit a lazy and uninformed press, to highlight claims that later on do not stand scientific scrutiny must be deplored.

Scientists and the press have a responsibility to be accurate and circumspect in publicly reporting scientific findings, especially those that have a direct bearing on public welfare. Even in esoteric areas the press can play a role in shaping public perception. The case of Luca Turin and the theory of olfaction is a good example.

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