(Edited version of original abstract)

This talk mirrors ‘Pathological Science’, a lecture given by Chemistry Laureate Irving Langmuir. Langmuir discussed cases where scientists, on the basis of invalid processes, claimed the validity of phenomena that were unreal. My interest is in the counter-pathology involving cases where phenomena that are almost certainly real are rejected by the scientific community, for reasons that are just as invalid as those of the cases described by Langmuir. Alfred Wegener's continental drift proposal provides a good example, being simply dismissed by most scientists at the time, despite the overwhelming evidence in its favour. In such situations incredulity, expressed strongly by the disbelievers, frequently takes over: no longer is the question that of the truth or falsity of the claims; instead, the agenda centres on denunciation of the claims. An article in the Observer newspaper, containing a number of hostile comments by scientists with no detailed familiarity with the research on which they cast scorn, illustrates this very well. In this ‘denunciation mode’, the usual scientific care is absent; pseudo-arguments often take the place of scientific ones. Irving Langmuir's lecture referred to above is often exploited in this way, his list of criteria for ‘Pathological Science’ being applied blindly to dismiss claims of the existence of specific pheomena without proper examination of the evidence. A similar method of subverting logical analysis featured in a weekly column by Robert Park supported by the American Physical Society.

Other popular forms of attack are ‘if X were true we would have to start over again’ (as we of course had to do with Relativity and Quantum Theory, and so the argument proves nothing), and then there is the dictum ‘Extraordinary Claims require Extraordinary Evidence’, which has the marvellous feature of allowing the requirements for acceptable proof to be stretched indefinitely as more and more support for a contested claim comes in. Its originator, the late Marcello Truzzi, later decided that his comment was ‘a non sequitur, meaningless and question-begging’, and had planned to write a debunking of his own creation. An article by Daniel Drasin takes a light-hearted look at a range of strategies used by critics. “Cold fusion” appears to be the modern equivalent to continental drift, starting with the controversial claim, made by Pons and Fleischmann in 1989, to have generated in an electrochemical cell heat considerably in excess of anything explicable in conventional terms.

This provoked hostile reaction: ignoring the possibility that an aggregate of ions in a condensed matter matrix may behave differently to a collection of freely moving ones, it was asserted that nuclear fusion could not be responsible for the claimed excess heat. Then came 'failure to replicate' by a number of groups, equated with the non-existence of the phenomenon, ignoring the fact that if different groups get different results there can be two explanations, one that the people who see some effects are bad experimenters, and the other that they were in fact better at creating the precise conditions needed for an effect to be seen. Usually in such cases time tells which side is right, but here the steadily mounting evidence that there was a real effect was suppressed through the publication policies of the major journals. Consequently, these apparently supportive results are not known to most scientists, who simply take it for granted that the Pons-Fleischmann claims have been disproved.

In an attempt to promote proper discussion of the issue, I tried in 2002 to upload a survey by Storms to the preprint server arxiv.org, the natural place for facilitating such discussion, but the moderators frustrated this intent by deleting the review, declaring it ‘inappropriate’ (chemists, being a more robust species than physicists, were permitted to see it on their own server chemweb.com). A breath of fresh air has been introduced into the situation now, with the recent decision of the US Department of Energy to review the research; if the reviewers simply look at some of the research going on they will almost inevitably conclude that fusion can take place at ordinary temperatures, with a yield far in excess of the ‘almost undetectable level’ referred to in Langmuir's lecture.

The overall situation seems profoundly unsatisfactory. The system built up over the years to promote scientific advance has become one that narrow-minded people can use to block any advance that they deem unacceptable. This demands urgent review: otherwise, just as astronomy became fixated on the reasonably accurate, but wrong, Ptolemaic model, science will become fixated in a respectable, but inaccurate, view of reality.