Beware Scientism's Onward March!

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Abstract: The *American Journal of Medicine* recently published an attack on homeopathy authored by United Kingdom-based 'sceptics,' Professors Michael Baum and Edzard Ernst. This present paper seeks to demonstrate how such attacks are based on opinionated *scientism*, not *science*-based fact, while highlighting the essentially globalized context in which the current climate of so-called scepticism against homeopathy and complementary and alternative medicine (called the New Fundamentalism) is able to flourish.

Keywords: scientism vs. science; scientism, as a belief system and its influence on acceptance of homeopathy

Introducing Some Concepts

First, it is necessary to make a clear distinction between *science* and *scientism*. The former might be defined as a continuing effort to increase human knowledge and understanding through observation (with the important proviso that in spite of its more outlandish proposals, post-modernism still serves to warn that objectivity in observation is always conditioned by expectations and past experiences; regardless of the 'rigour' of the science). Scientism, on the other hand,[1] is the totally unscientific *belief* that:

- Only scientific knowledge is real knowledge.
- There is no rational, objective form of inquiry that is not a branch of science.
- Science is the absolute and only justifiable access to truth.

Significantly, there is no sign of post-modernism's warning being heeded here. Indeed, supporters of scientism (which has its roots in materialistic logical positivism[2] and naïve inductivism[3] - both of which are seriously limited interpretations of science[4]) see it as their bounden duty to do away with most, if not all, metaphysical, mythological, philosophical, sociological (in any non-reductive sense) and religious claims to knowledge, as their truths cannot be apprehended by the scientific method. And precisely because scientism's supporters are so jealous of what they believe is their monopoly on truth (especially as exemplified by the science *of the day*: science too has its fashions), they represent a form of dogmatic intolerance bordering on fundamentalism, even fascism. As neurophysiologist and Nobel Laureate Sir John Eccles once so eloquently put it, "*Arrogance is one of the worst diseases of scientists and it gives rise to statements of authority and finality which are expressed usually in fields that are completely beyond the scientific competence of the dogmatist. It is important to realise that dogmatism has now become a disease of scientists rather than of theologians.*" We shall see how ominously prescient were these words.

Who are the New Fundamentalists?

To be sure, there aren't many scientists who would wish to see themselves cast in such a light. Indeed, the present scientistic clamour against homeopathy and most forms of complementary and alternative medicine (CAM) emanates from a small but highly voluble group of mainly biomedically oriented scientists and media 'communicators.' In the United Kingdom, they include so-called sceptics (deniers would be a better term) Professors Michael Baum, Edzard Ernst, David Colquhoun and Richard Dawkins, science writers Simon Singh and Ben Goldacre, the pro-science campaigning organization Sense About Science (HYPERLINK http://www.senseaboutscience.org.uk/) (of which Singh is a trustee, and whose backers openly include pharmaceutical companies, *The Lancet* medical journal and *The Guardian* newspaper).[5] They also include ex-Liberal Democrat MP and spokesperson for science Evan Harris and Lord Dick Taverne, the Chair (HYPERLINK: http://www.senseaboutscience.org.uk/index.php/site/about/7) of Sense About Science.

Best described by British geneticist Professor Steve Jones as part of a, "*....broad church full of narrow minds trained to know even more about even less.*",[6] when it comes to ho-

meopathy and CAM, the above individuals prove beyond a shadow of doubt that the biomedical sciences have more than their fair share of narrow, scientistic, one track minds.

But make no mistake: this is not some dry exercise in academic mud-slinging. In the United Kingdom, scientism is on the march, attempting to crush beneath its positivist boot the public's right to complementary and alternative medical therapies such as homeopathy, free on Britain's National Health Service. This more militant form of scientism that attempts to impinge directly on the public's healthcare choices (supported by globalised concerns such as the pharmaceutical industry and the media), I have termed the New Fundamentalism.[7]

Baum and Ernst Preach to the United States

A good example of what might be considered the New Fundamentalist's 'catechism' may be found in a recent comment in the *American Journal of Medicine* by Professors Baum and Ernst entitled 'Should we maintain an open mind about homeopathy?'[8] I have singled out this particular article because its authors exemplify so well the arrogance, ignorance, and self-contradictions mentioned previously in the quote from Sir John Eccles. Thus, quite early on in their article, Baum and Ernst refer to manipulative physical therapies as "some of the more plausible aspects of alternative medicine," *in direct contradiction* to Ernst's own published stance on chiropractic.[9]

Baum and Ernst then describe homeopathy as "....*among the worst examples of faith-based medicine that gathers shrill support of celebrities and other powerful lobbies in place of a genuine and humble wish to explore the limits of our knowledge using the scientific method* ...."[8] Apart from astounding hypocrisy (the pharmaceutical industry constitutes one of the most powerful lobbying organizations on the planet), Baum and Ernst repeatedly cite the 2005 *Lancet* meta-analysis by Shang, *et. al.*,[10] as the '*genuine and humble wish to explore the limits of our knowledge...,*' etc. They put this analysis forward as conclusive 'proof' that homeopathy is no more than placebo. Nothing could be further from the truth. In fact, this paper was severely criticized on methodological grounds by several independent authors,[11-14] and contains significant scientific flaws.[15, 16] Not only were literature citations non-existent or difficult to find (a fundamental academic gaff that makes one wonder why the paper was passed fit for publication in the first place), the Shang, *et. al.*, meta-analysis violates even the *Lancet's* own strict guidelines on methodological and publication transparency.[17]

More importantly, Baum and Ernst neglect the *conventional* medical and scientific literature on one of homeopathy's core tenets; i.e., hormesis. This is a biphasic dose response to an environmental agent; e.g., toxin, drug, remedial agent, etc., characterized by a low-dose stimulation or beneficial effect, and a high-dose inhibitory or toxic effect.[18] It is a concept with a long history in medicine, precisely because of its association with a core tenet of homeopathic practice, namely the potency of the minimum dose. Nevertheless, as Calabrese has pointed out, "....*the hormetic dose-response is far more common and fundamental than the dose-response models.... used in toxicology and risk assessment.... Acceptance of the possibility of hormesis has the potential to profoundly affect the practice of toxicology and risk assessment....*"[19]

In addition, there are high quality laboratory studies Baum and Ernst rubbish or persistently ignore which suggest infinitesimal dilutions prepared in the homeopathic manner (of serial dilution and agitation), may well exert biological effects.[20-23] Indeed, most recently, very low doses of the cytokines IL-12 and IFN-γ were reported by Gariboldi, *et. al.*,[24] to be much more effective in a mouse asthma model when the cytokines had been prior subjected to what these authors described as 'sequential kinetic activation;' in other words, homeopathic serial dilution and agitation (interestingly, this paper was only passed fit for publication once all words referring to homeopathy had been excised from the original manuscript: so much for scientific 'objectivity.')

The Scientific Evidence Shows that Homeopathy Works

Nevertheless, Baum and Ernst continuously assert the results of homeopathic prescribing lack efficacy beyond a placebo response.[8] Closer examination of this claim reveals that it is based on just two systematic reviews, both by Ernst;[25, 26] as if his are the only well-designed high-quality studies, and that those of others,[21, 22, 24, 27-29] considered by many to be of at least equally high quality, should be discounted. But vaunting hubris aside, Baum and Ernst are just plain wrong: by end of 2009, 142 RCTs of homeopathy had been published in peer-reviewed journals. In terms of statistically significant results, 74 of these trials were able to draw firm conclusions; 63 were positive (patients given a homeopathic medicine improved significantly more than the comparison group given either an inactive placebo or established conventional treatment), and 11 were negative (no significant difference was seen between the action of the homeopathic medicine and the comparison group).[30]

Baum and Ernst then go on to suggest that the scientific validity of homeopathy must exist in some 'parallel universe,' because if correct, it would mean that "*much of physics, chemistry, and pharmacology must be incorrect.*"[8] Meanwhile, in Baum and Ernst's universe of gold standards and systematic reviews, all is not well with evidence-based medicine (EBM) and its experimental 'grand inquisitor,' the randomized controlled trial (RCT).

As mentioned earlier, much of Baum and Ernst's ire against homeopathy/CAM stems from their unquestioning logical positivist mindset.[2-4] For understanding how guns, rockets, and washing machines, etc., work this might appear to be perfectly adequate. When applied to medicine (as much an art as it is a science) and the therapeutic encounter, however, it effectively downgrades or ignores other no less important but less scientifically defined forms of evidence.

How Relevant is "Evidenced-Based Medicine (EBM)"?

The result is that clinical decisions are now supposed to be based solely on the scientific evidence (which incidentally was never the intention of those who originally formulated the principles of Evidence-Based Medicine (EBM)).[31] The irony here is that if such a draconian approach were to be enforced throughout the whole of medicine, nearly half of all its current procedures would have to be halted until their effectiveness had finally been 'proven,'[32] and much time, money and effort wasted in the process.

Ultimately, it could well turn out to be a double-edged sword. Trials of one of the biggest selling drugs—Prozac—recently found it to be no better than placebo.[33] Interestingly, one does not hear Baum and Ernst campaigning for the removal of Prozac, as they do for homeopathy/CAM. Fortunately, their scientific 'fundamentalism' is not shared by all in medicine. Thus, top UK cancer clinician Karol Sikora (around sixty percent of whose patients use some form of CAM as adjuvant therapies) roundly excoriated attempts by what he calls 'inexperienced,' 'armchair physicians,' to tell him how to do his job, while at the same time referring to their attempts to rid the NHS of its CAM services as 'Stalinist.'[34]

Questioning Medicine's Gold Standard: The Randomised Controlled Trial

Even Sir Michael Rawlins (Chair of the UK's National Institute for Clinical Excellence and no great friend of homeopathy) in his 2008 Harveian Oration,[35] warned: "*RCTs, long regarded as the 'gold standard' of evidence, have been put on an undeserved pedestal. Their appearance at the top of hierarchies of evidence is inappropriate; and hierarchies are illusory tools for assessing evidence. They should be replaced by a diversity of approaches that involve analysing the totality of the evidence base.*"

This merely echoes one of the founders of EBM, David Sackett's earlier concern that EBM might be in danger of turning into an evidence 'mono-culture,' where an 'ideal' scientifically-determined efficacy would subsume other no less important forms of evidence, to the detriment of patient and clinician concerns.[31] Indeed, Leggett warned[36] of the damage scientism could do if allowed to encroach into medical practice. By assuming proper patient management equates solely with correct management of disease, Leggett concluded medical scientism propagates a fundamental disconnect between medical practitioners, and patient individuality and humanity.

That a decade later, voices within the UK nursing profession were being raised concerning EBM's intolerance of therapeutic pluralism in healthcare systems,[37] suggests Sackett and Leggett's early warnings went unheeded.

But perhaps the most damning demolition of the kind of scientistic fundamentalism expressed by Baum, Ernst and others over-impinging on clinical practice, was provided seven years ago by Smith and Pell.[38] Their slightly tongue-in-cheek paper on the use of parachutes 'to prevent death and major trauma related to gravitational challenge' (i.e., falling) makes the point rather well by concluding, "*As with many interventions intended to prevent ill health, the effectiveness of parachutes has not been subjected to rigorous evaluation by using randomised controlled trials. Advocates of EBM have criticised the adoption of interventions evaluated by using only observational data. We think that everyone might benefit if the most radical protagonists of EBM organised and participated in a double blind, randomised, placebo controlled, crossover trial of the parachute.*" Perhaps Baum and Ernst might care to volunteer ....!? (See postscript)

Memory of Water: A Mechanism for Homeopathic Effectiveness?

In fact, many conventional medical procedures are well known to lack scientific evidence;[32] fraud in biomedical and pharmacological research is alarmingly rife and has been exposed,[39, 40] while clear evidence exists for the harm that can result from routine conventional medical practice and prescribing.[41] It would have been to their credit had Baum and Ernst campaigned for an open mind to the shortcomings of conventional biomedicine. Instead, they assert that "*The true sceptic...takes pride in closed mindedness when presented with absurd assertions that contravene the laws of thermodynamics....*"[8] No doubt this is a reference to the Memory of Water hypothesis as a possible biophysical explanation for the efficacy of remedies prepared by the method of serial dilution and succussion as in homeopathy.

Though the Memory of Water hypothesis has yet to provide definitive evidence supporting the tenets of homeopathic medicine,[42] it is factually incorrect to assume that it contravenes basic scientific principles. There is a growing body of evidence[42] from chemistry,[43-46] physics,[47, 48] and materials science,[49] which suggests the properties of water may well depend on its dilution history.[44] The question then is how?

Considering the Memory of Water (MoW) as an *emergent* property of bulk liquid water (i.e., the whole is greater than the sum of its individual molecular parts) defies explanation in terms of high-school chemistry, or the notion that water molecules move completely randomly in relation to one another. Certainly, the ability of water molecules to affect each other over long ranges via dynamic switching of hydrogen bonds may be crucially important here, as would be weaker intermolecular interactions, known as van de Waals forces.[42] From this dynamic interplay of molecular forces could arise coherent supra-molecular behaviour, (i.e., involving large numbers of water molecules) that the *equilibrium* laws of thermodynamics one learns at school, and the known short life-time of hydrogen bonding in aqueous solutions,[42] *cannot* explain.

To understand MoW requires a knowledge of systems operating far from chemical equilibrium, as described by Professor Ilya Prigogine's Nobel Prize-winning work on *non-equilibrium* thermodynamics in near-chaotic chemical

reactions, and importantly, as exists in all living organisms.[50] Here, it has been suggested that quantum points of local instability may act as dynamic 'attractors' of the whole macroscopic system, leading to long-range coherent supramolecular behaviour.[51]

More than twenty years ago, Italian physicists del Guidice, *et. al.*,[52] advanced a theoretical mechanism for MoW which modelled the effects of homeopathic serial dilution and agitation in terms of the continued formation and dissolution of such dynamic supra-molecular structures.[42] These so-called 'coherent domains' are calculated to be thermodynamically more stable than a totally random collection of water molecules, and remain (hence the 'memory effect') long after all traces of the original dissolved substance have been removed. Indeed, a recent paper authored by Professor Luc Montagnier (winner of the Nobel Prize for Medicine for his discovery of the HIV virus) has demonstrated memory effects in aqueous DNA solutions that depend on interactions with the background electromagnetic field.[53] Consequently, MoW is not only an increasingly plausible hypothesis, it contravenes no known (except presumably to Baum and Ernst) scientific laws and principles.

But Baum and Ernst's general ignorance of areas outside their level of competence runs deeper and is far more simplistic than MoW. The same could be said for their understanding of science's history. For example, they say,[8] *"Homeopathic principles are bold conjectures. There has been no spectacular corroboration of any of its founding principles. An example of the spectacular corroboration of a bold conjecture is that the planet Pluto was predicted by observing minor discrepancies in the orbit of its neighbouring planet Neptune, and its discovery was counted as a spectacular corroboration of a bold conjecture...."* And later on, *"....homeopaths remind us of Galileo's battle with the dogma of his day and how in the fullness of time this heretic was proven right...."*

Astronomy, Bold Conjecture, Dogma, and Bad Science

With this, Baum and Ernst demonstrate how little they know about astronomy or celestial mechanics. It was the earlier discovery of *Neptune* (not Pluto) which was corroboration of a bold conjecture that, based on Newton's Laws of Motion, discrepancies in the orbit of Uranus could be explained by another large planet further out from the Sun. The discovery of Pluto actually was a fluke, seeing as the now-known mass of this dwarf planet is far too small to have any gravitational affect on Neptune's orbital behavior.

A far better example that Baum and Ernst could have chosen would have been Einstein's prediction of anomalies in the orbital behavior of Mercury as spectacular corroboration of his own bold conjecture; namely, general relativity, one of the pillars of twentieth and twenty-first century physics. This ultimately pointed out the inadequacies of the classical Newtonian view of the universe to which, misguidedly, Baum and Ernst both still appear to cling.

And Galileo? His 'battle with the dogma of his day' was not as Baum, Ernst, and others like to depict. Galileo insisted on proposing heliocentricity not as a theory, but as a truth for which at the time there was no proof, and chose instead to argue scripture not science with those who believed and promoted a fundamentalist interpretation of the Bible. In this respect, Galileo was not playing the role of some heretical proto-scientific hero: he was being arrogant and stupid, arguably delaying uptake of a new idea by creating unnecessary resistance in those that might have been more sympathetic had he not appeared to be attacking their own self-interested power base. In this respect, Baum and Ernst's absurd attitude of closed mindedness to homeopathy, and casting themselves as 'defenders' of science against a presumed rising tide of irrationality, resembles that of the Inquisition.

Of course, everything happens for a reason. No matter how dogmatically idiotic and contrary to the real spirit of scientific enquiry the New Fundamentalism and those who promulgate it truly are, it serves a purpose beyond dry academic discourse. The pharmaceutical industry is having a hard time lately. A combination of plummeting profits (because many blockbuster drugs are coming off patent and there are few to replace them), successful class action suits over drug side-effects costing Big Pharma billions, substantiated claims of cheating and plagiarism in drugs trials, etc., are stoking the public's growing distrust of the pharmaceutical industry. In addition, increasing interest in and use of health alternatives (e.g., homeopathy, CAM) by millions across the world all adds up to the pharmaceutical industry feeling itself threatened. And it will do everything in its considerable economic and political power to fight back. Against this background, the New Fundamentalism and those pushing its agenda may be seen simply as witless cats' paws of globalized corporatism.

What's Really Going On....

So what is The New Fundamentalism? It is an insidious 'crypto-fascist' brew of scientism, globalized corporatism, and (ironically, originally left-wing) militant materialistic nihilism which denies humanity any inner metaphysical reality. Thus, it reduces human beings to mere complex biochemical mechanisms, from which it is but a short step to regarding humans as nothing other than biologically-determined economic units. This suits globalized conglomerates very well, which, via their encroaching control over individual governments, would no doubt wish to see representative democracy reduced to the irrelevance of some inane reality game show. With apologies to Juvenal, *Rememdium, panem et circenses.*

We have of course, been here before, and indeed, history does not disappoint. Drawing on the work of the twentieth century German philosopher Jürgen Habermas, Professor Martin Ryder of Colorado State University warns of the dangers of unbridled scientism encroaching into public policy.[54] *".....Policy can be informed by science, and the best policies take into account the best available scientific reasoning.*

Law makers are prudent to keep an ear open to science while resisting the rhetoric of the science 'industry' in formulating policy. It is the role of science to serve the primary interests of the polity. ***But government in a free society is not obliged to serve the interests of science*** (my emphasis).... *positivism and scientism move in where the discourse of science lacks self-reflection and where the spokesmen of science exempt themselves from public scrutiny."*

Here in the UK, the signs might not be all gloom and doom. Although the House of Commons' Science and Technology Committee recently recommended homeopathy should no longer be made available on the British NHS (National Health Service), the new UK coalition Government has responded by thanking them for their 'advice' and politely reminding them of democratic principles by effectively saying that homeopathy is the public's right to choose if it wants it. It remains to be seen whether current reforms of the NHS and public pressure will ensure that homeopathy remains a free health resource within the UK.

Meanwhile, the onward march of scientism has been evidenced recently in the UK by the huge sums given away to pharmaceutical companies in 2009 for a flu drug of questionable efficacy (the UK Government tried to claw back some of that money), and an interesting spate of resignations from the UK Government's Advisory Council on the Misuse of Drugs (ACMD).[55] It appears the scientists involved not only expected (perhaps quite reasonably) their advice to be listened to, but more importantly acted upon as if science should be the only consideration.

While it is no doubt time society grew up and took a more considered and mature attitude towards the burgeoning problem of illegal drugs, the idea that in a democratic society science should be the only arbiter of political decision making on such issues is dangerously scientistic and would set us on a path Jürgen Habermas knew only too well.[56] For he grew up in a climate that produced one of the world's first attempts at engineering a society along scientistic lines: it was called Nazi Germany.

Postscript

Since the publication of the original version of this article on the Alliance of Natural Health International website (http://www.anh-europe.org/search/node/Beware+Scientism) two interesting trials have come to light. The first suggests that in an RCT on the treatment of irritable bowel syndrome, even when participants *knew* they were receiving placebo pills, they still got better.[57]

In the second trial, it was suggested adjunctive homeopathic treatment produces sizeable clinically relevant benefits in patients with active yet relatively stable rheumatoid arthritis, but that these effects could only be attributed to the innately empathic nature of the homeopathic consultation, not any prescribed single or complex homeopathic remedy. Though seeming to support what homeopathy's detractors have always said about it, the paper nevertheless concluded with the ringing endorsement, *"Given the magnitude of these effects and the lack of reported side effects, the impact of the homeopathic consultation is of clinical relevance to patients and clinicians alike."*[58]

By no means the last word, both of these trials suggest quite powerfully that though long excoriated by main-stream medicine, the so-called placebo effect and its intimate correlation with the empathic involvement of practitioners (the entangled context of which is quite likely destroyed – or 'collapsed' – by the essentially reductionist *modus operandi* of the RCT),[59] not only needs to be taken far more seriously than it is, but could fundamentally change our attitudes to health and disease.

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About the author: Lionel Milgrom has been in practice as a professional homeopath (LCH, MARH, RHom) for over a decade. He has also had a parallel career as a research scientist for well over thirty years, with over seventy academic papers published in leading chemistry journals (BSc, MSc, PhD, CChem, FRSC). He was the founder and first CEO of an anti-cancer bio-tech spin-out company in 2001. Lionel also writes and comments about science and has been a sometime broadcaster on the subject.

Combining these talents, he has spent the last eight years developing new ideas about the therapeutic process, based on the discourse of quantum entanglement. Lionel is a keen observer and critic of the current debate around homeopathy/CAMs, coining the phrase 'New Fundamentalism' to describe the mind-set of those currently waging a campaign to see homeopathy and CAM axed from Britain's National Health Service (NHS). He has published many peer-reviewed papers in CAM journals and articles in CAM magazines on these subjects.

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