

# HERBAL HYPOTHESES TWO

MEDLINE &

## *The Mainstream Manufacture of Misinformation*

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The legacy of political suppression of herbal medicine in America in the early 20<sup>th</sup> Century casts a long shadow - in the early 21<sup>st</sup> Century the practice of herbal medicine in the United States still remains effectively illegal. In 1910, the Rockefeller-financed Flexner Report on Medical Education that forced the closure of all botanical medical schools (Haller 1994), was a result of the fledgling alliance between the new pharmaceutical companies and the then recently formed AMA. The same alliance has become the dominant feature of the contemporary medical landscape (Smith 2003; Smith 2005), and the current intensification of anti-herb propaganda in response to widespread resurgence of public interest in herbal medicines suggests that history does indeed repeat itself.

A persistent strategy of the mainstream is to hold herbs and herbal medicine accountable to the tribunal of medical “science”. Unchecked, this process has potentially disconcerting implications for herbalists; ultimately it implies that mainstream medical science is the authoritative arbiter, not only of the efficacy of herbal medicine, but for the form and availability of herbal medicines, and possibly of the legitimacy and validity of clinical herbal practice itself. As herbalists we have yet to elaborate much more than sporadic, partial or emotional

critiques of the epistemic credentials, clinical relevance and socio-political values that characterize mainstream medical science, and as a consequence we are not especially well-equipped with the theoretical tools to battle its encroaching influence, both overt and covert, over our own territory.

Central to a discussion of how mainstream medical science impacts herbal medicine is the issue of what kind of data should be taken as meaningful evidence in support of the claims and credibility of herbal medicine. In modern biomedicine the measure of ‘scientificity’, i.e., scientific authoritativeness or credibility, has progressively come to rest upon a hierarchical taxonomy of methodologically defined evidence, within which controlled clinical trial data is the ‘gold standard’. Therefore any analysis must at some point deal critically with the appropriateness of applying of this hierarchical system to herbal praxis, now commonly known as ‘evidence-based herbal medicine’.

A robust critique of evidence-based herbal medicine is clearly a priority, but there is an even more pressing problem, which although it appears superficially to be connected with issues of evidence, explanation, and scientific credibility is in fact a pseudo-scientific epiphenomenon that I call the “*mainstream manufacture of*

*misinformation*” about herbal medicine. This will be analyzed below with particular reference to the unique role of MEDLINE in the process, using examples from the topic of herb-drug interactions; but initially we have to clarify some terms and definitions about science itself.

### GOOD SCIENCE, BAD SCIENCE AND NON-SCIENCE.

It has been remarked that scientists typically have no more understanding of the philosophy of science than fish do about fluid mechanics. Whilst some sciences such as quantum physics have a more developed connection with their philosophical ramifications, others, including hybrid disciplines such as medicine are peculiarly deficient in this respect. In any event, philosophy does not seem to be a pressing cause for concern for working physicians who appear to view metaphysics with the disinterest typically reserved for clinical specializations unrelated to their own. A survey of epistemological beliefs of 237 resident physicians found that more than two-thirds did not know what epistemology was; less than 25% could give an appropriate definition of science, and none could state the philosophical presumptions of science (Peña, Paco, and Peralta 2002). Here we need to ask two initial questions: how do we properly distinguish between “science” and “non-science”? and how do we distinguish between “good” vs. “bad” science?

Following the publication of Thomas Kuhn’s seminal *Structure of Scientific Revolutions* (Kuhn 1962) the philosophy of science became progressively dominated by historical relativism. With hindsight, the notion that the questions asked by science may be significantly affected by values, assumptions and sociopolitical factors extrinsic to the process of scientific inquiry is hardly controversial. Indeed, it

is arguable that much of the content of the claims of science are also intrinsically determined by such “non-scientific” factors. An interesting consequence of this is an exacerbation of the difficulty of determining philosophically exactly how science can be differentiated from non-science. (Dupré 1993)

Consequently, philosophers and historians of science have recently tended to abandon big-picture questions like “what is science?” in favor of micro-examination of the actual practice of particular sciences, down to specific laboratory experiments and technologies as well as their socio-historical setting. As a result, philosophy of science today has followed the post-modern tendency and migrated to some form of pluralism, in which the now discredited vision of one ‘unified science’ progressively attaining true (ultimately mathematical) knowledge of the natural world via ‘*the scientific method*’ has been replaced by the idea of a number of different coexisting sciences with complementary (or possibly even contradictory) methodologies, each the product of its peculiar field of enquiry and associated historical determinants.

Such pluralistic views range from the anarchic extreme of Feyerabend who argued that all methodologies however incongruent can be held equally valid (Feyerabend 1975), through to those that maintain the apparent disunity of sciences is simply a necessary reflection of the “dappled world” (Cartwright 1999). This view varies in detail from an agnostic position typified by Evelyn Fox Keller (Keller 2002), who describes a democracy of scientific methodologies based on relative “explanatory satisfaction” for their practitioners, through to the more extreme view that the diversity is an expression of an underlying real disunity in the nature of nature itself (Dupré 1993).

What is most important for our purposes here is the notion that ‘science’ is actually a collection of distinct sciences and there co-exists a corresponding pluralism of more or less different but equally valid explanatory systems. Although this has fascinating implications for a potential redefinition of herbal science, it has obviously complicated the original question of demarcating science from non-science.

However, when it comes to the *mainstream manufacture of misinformation* we are concerned with an entirely different kind of non-science. This is a false, purely sociological form of non-science that is easily identifiable, best characterized as “scientism”. Scientism describes the use of the term “scientific” applied in honorific reference to the sociological or institutional trappings of science in order to accord a pseudo-authoritative status to the opinions of individuals simply because they have a doctoral degree in a subject generally regarded as a science. When white-coated actors (or paid physicians) make hyperbolic testimonials about drugs in TV commercials for pharmaceutical companies the process is ludicrously obvious, and may cause embarrassment even for some medical commentators (Moynihan et al. 2000).

However, scientism has more insidious and subtle manifestations. Scientism was originally defined by Habermas as follows:

*“...science’s belief in itself: that is the conviction that we can no longer understand science as ONE form of possible knowledge, but rather must identify knowledge with science.”*

(Habermas 1971)

Today, scientism is generally considered a term of abuse, and is usually understood in an ideological sense in reference to arguments that appear authoritative by claiming to be scientific “*independent of any general consensus about what makes scientific claims any more deserving of credit than beliefs from any other source*” (Dupré 1993).

This brief excursion into definitions of science enables a taxonomic classification of the problem at hand; what we have termed the ‘*mainstream manufacture of misinformation*’ of herbal medicine can now be identified as a form of scientism, (which is by definition non-science). Our specific hypothesis is that it derives substance from intrinsic or structural features of MEDLINE.

### MEDLINE

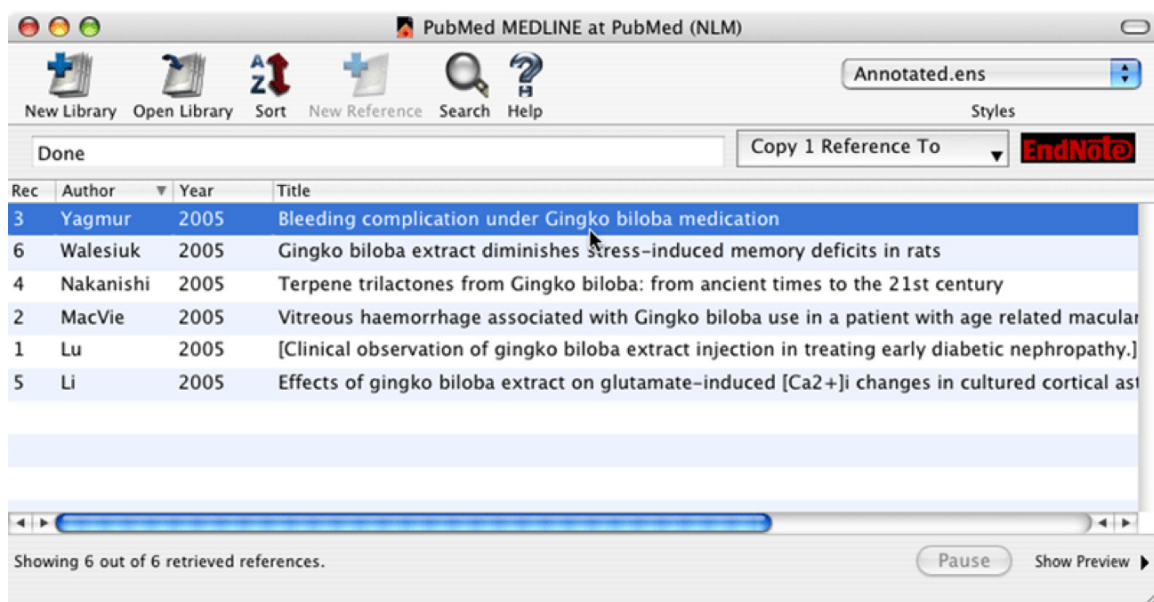
Publication of peer-reviewed papers in learned journals is sociologically accepted as a defining aspect of scientific activity. A corpus of academic literature defines the knowledge base of a given science, acts as a forum and vehicle for the communication and development of ideas, testing of hypotheses and recording research findings for its professional practitioners. In biomedicine, the National Library of Medicine operates a well-known electronic database called MEDLINE consisting of over 4,800 learned journals containing over 12 million citations relating to medicine and life sciences which are searchable via the world wide web at no charge. The indexing system of MEDLINE incorporates a regularly updated thesaurus of MESH (Medical Subject Headings) terms which are attached to each record or article in the indexed journals. In addition to its MESH tags, every article (record) is identified by a number of standard database field descriptors which are also searchable such as <title>,

<abstract>, <author>, <journal>, <date of publication> etc. Although the system is somewhat more sophisticated than outlined here, this basic description is sufficient for our analysis.

### BAD SCIENCE (BS)

It is hard to imagine a paper being accepted for publication by a learned journal if the title and text of the paper systematically incorporate a major spelling

Inaccurate spelling of herb names is not uncommon in medical literature as all herbalists can attest, but more frequently there is a complete failure to use proper scientific nomenclature for botanicals. This is not a trivial issue, because without a validated description of a herb by its binomial name (and preferably the naming Authority) the identity of the herb cannot be established. A botanically educated reading of these reports can however, by



Screenshot of MEDLINE interactions search for <gingko> (sic) results showing title spelling errors not retrieved by a <ginkgo> search.

mistake of the principal subject, for example a paper on the NSAID drug ibuprofen spelled throughout as "bifuprofen". But when it comes to mainstream medical articles about herbs anything goes, including major spelling errors. For example, a search of MEDLINE for papers published on <ginkgo> interactions misses some potentially important reports because they are entered under the misspelled name ginkgo (sic) hence do not appear in a search for <ginkgo> in the title.

means of a little sleuthing, reveal the not uncommon error of mistaken identity.

### THE GINSENG - PHENELZINE "INTERACTION"

The technical literature persistently claims there is an adverse herb-drug interaction between the monoamine oxidase inhibitor phenelzine and Asian ginseng (*Panax ginseng* C.A. Meyer). This is documented by conventional medical authorities such as Stockley's (Stockley 2002), and is

repeated in several botanical monographs e.g. World Health Organization (WHO 1999).

The original report of this alleged interaction was a brief mention in a 1985 editorial by the then editors of the Journal of Clinical Psychopharmacology, Shader and Greenblatt. In this speculative commentary they devoted a couple of lines to the case of 64 year-old woman who took (an undisclosed dose for an undisclosed time) of a combination dietary supplement product apparently called “Natrol High” while concurrently taking phenelzine 60 mg qd. She experienced symptoms of “insomnia, headache, and tremulousness”.

In sleuthing mode, this writer was able to rapidly establish that the product “Natrol High” contained no *Panax ginseng* whatsoever. This discovery required a simple e-mail inquiry to the manufacturer who sent back in ten minutes the (now discontinued) product label with its ingredients list which revealed that it actually contained Siberian ginseng (*Eleutherococcus senticosus* (Rupr. & Maxim.) Maxim.).

In other words this is a typical case of mistaken herbal identity. These authors simply assumed incorrectly from the diminutive common name “ginseng” that the material was *Panax ginseng*.

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The authors did not include any medical details or history, and crucially did not identify the ingredients of the Natrol product, other than the fact that it contained “ginseng”. They attributed her symptoms to the adverse effects of ginseng and phenelzine in combination (Shader and Greenblatt 1985).

Verification of the herb’s identity, either at the time of the observed adverse event, or at least before publication of the report, would hardly have been onerous but it clearly never occurred to Shader and Greenblatt. Similar confusion of these two herbal medicines has been established by Chen as being involved in several of

the infamous so called “ginseng abuse syndrome” reports (Chen 1981). Mills and Bone have also pointed out that this error is frequent in mainstream literature (Mills and Bone 2005). One of the basic scientific aspects of an apple is that it is not a pear. Except in MEDLINE reports about herbs that are replete with elementary errors of nomenclature and plant identification.

The fundamental point is, of course, that the Shader editorial is not really a report at all; it lacks the most rudimentary elements of scientific precision and rigor, and ultimately is nonsense because it misidentifies the herb involved. As is typical for drug-herb interactions claims, the authors fail to consider the known adverse effects of the drug alone, which in this case are entirely consistent with the observed symptoms, particularly at the high (60 mg qd) dose involved. In one of the few critical appraisals of the literature that has reviewed validity of interactions reporting, this report was classified as “unreliable” (Fugh-Berman and Ernst 2001). A clear example of bad science, it nonetheless has the fatal implication that *any* published report about botanicals that does not verify the identify of a herb is *prima facie* inadmissible as evidence of anything (other than ignorance). Perhaps the original authors might claim in mitigation that they only intended this as a speculative editorial comment, but herein lies the genius of the MEDLINE mechanism...

#### **MEDLINE AND THE CHINESE WHISPERS CASCADE EFFECT (MORE BS)**

Crucially, different derivative <article types> such as editorial opinions and readers letters, typified by the ginseng-phenelzine example, that are not ‘peer reviewed’ primary data are classified in MEDLINE with the same MESH attributes that are attached to bona fide

primary papers. Furthermore, although primary papers such as clinical trials are usually clearly described by their titles, the opposite is often the case with op-ed and correspondence items. Apparently, journal editors often assign inappropriate titles to these items, which ultimately become searchable via the <title> field of MEDLINE. For example, the same journal that carried Shader’s speculative editorial later published a letter from Jones a couple of years later that also claimed to describe an interaction between ginseng and phenelzine under the title “Interaction of ginseng with phenelzine” (Jones and Runikis 1987). This letter had almost as little detail as the original Shader editorial and failed to ID the herb once again, but by simple virtue of the title ‘proof’ of the interaction has become established. The <title> field of MEDLINE always shows whatever the title may be.

Now the “method used” in almost all the secondary literature (i.e. review articles) on herb-drug interactions is ... to perform a literature search. Although it is theoretically possible to include a Boolean operator such as <NOT CORRESPONDENCE> in such search algorithms, this is apparently not a common practice. Thus the searches that are used as ‘evidence’ for interactions routinely retrieve assorted MEDLINE records by title which contain unverified and erroneous data, but that are treated by the database as equivalent to peer reviewed data. Authors of such secondary and derivative papers rarely appear to evaluate the full texts of the citations they gather, (more bad science) and, in turn, their reviews become quoted as principal sources in subsequent generations of reviews.

This process is like the classical game of Chinese whispers, in which repetition progressively adds distortion, but here also

involves a cascade amplification effect. To observant readers, the conspicuous repetition of egregious errors from previous papers is a “give-away” fingerprint symptom of the process. For example, one of the most infamous anti-herb reviews on the subject of herb-drug interactions was by pharmacist Lucinda Miller, published in the Archives of Internal Medicine (Miller 1998). This article was so riddled with errors of commission and omission that it has become a legendary example of its genre. Among Miller’s many mistakes was the incorrect assertion that ... “*echinacea is hepatotoxic if used for more than 8 weeks, due to the presence of toxic pyrrolizidine alkaloid ingredients*”. This speculation was a curious hybrid combination of the well-known Commission E myth on duration of administration of echinacea, together with ignorance about the chemistry and pharmacology of certain trace alkaloids present in certain *Echinacea* spp. (which are not at all hepatotoxic). Despite publication of ruthless criticisms of Miller’s review article, and total lack of evidence for her claims about echinacea, they have been endlessly perpetuated by subsequent generations of secondary reviews... for a recent example... “if echinacea is taken for more than 8 weeks hepatotoxicity may result”(Kumar, Allen, and Bell 2005).

Miller also provides disconcerting confirmation that reviewing authors may look only at the <title> of MEDLINE records before jumping to conclusions when she asserts that “Kava when used with alprazolam has resulted in coma”(Miller 1998). This erroneous claim is based upon an imaginatively titled letter “*Coma from the health food store – an interaction between kava and alprazolam*”(Almeida and Grimsley 1996), which upon detailed evaluation certainly did not involve coma, and probably did not involve a kava interaction. According

to the systematics of scientific publishing, a ‘primary’ paper is an original report or study. ‘Secondary’ literature reviews the primary literature, and the ‘tertiary’ literature is made up of formal meta-analyses of the available/eligible primary studies (such as in the Cochrane database). Primary observations shown to be significant by tertiary analyses are deemed to be validated ‘real’ effects. Here however, we see that the system actually works in reverse, with successive generations of secondary reviews amplifying the errors of previous derivative articles that were in turn based on erroneous primary data or speculation.

For example, performing a MEDLINE search using the MESH term <herb-drug interactions> for the year 2000 will retrieve about 35 records. Of these, one was a solid case report (St. John’s Wort and cyclosporine), none were clinical trials. Repeating the same search for the year 2005 generates a total of 164 records. Of these, once again there was one single case report (myrrh and warfarin), and one was a clinical trial. Interestingly, this trial found, contrary to mainstream myth, several herbs commonly alleged to interact adversely with warfarin in fact did not alter coagulation or clotting parameters (Jiang et al. 2005). However, the main point is that actual number of bona fide primary papers on interactions has remained consistent and very low over the five year period, whilst the derivative literature has proliferated by an order of magnitude. The vast majority (98%) of the remaining 2005 records retrieved are assorted secondary reviews, correspondence items, and editorial opinion pieces.

Their overall effect however is the illusory appearance of a substantial body of negative literature about purported interactions of herbs with pharmaceutical drugs that appears authoritative but which

lacks any meaningful foundation in clinical, scientific or any other reality. Overstated and speculative misinformation and scare stories are subsequently peddled to consumers via dumbed-down news wires, press releases and attention-deficit driven headlines by a sensation-hungry mass media (Moynihan et al. 2000). Popular perception is inevitably influenced by the process, and ultimately herbal practitioners have to spend valuable time reassuring fearful patients concerned about largely non-existent dangers, while consumers become neurotically suspicious of even the most benign herbal remedies. By contrast, and almost unbelievably, no attention is given to the alarmingly high mortality associated with even the most commonly available OTC drugs such as aspirin (Pirmohamed et al. 2004) and acetaminophen (Watson et al. 2004), let alone to the fact that pharmaceuticals are by objective accounts a leading cause of death in the US. (Lazarou, Pomeranz, and Corey 1998)

### INDEXING BIAS (PILED HIGHER AND DEEPER).

The *mainstream manufacture of misinformation* is in large part possible because of the inherent property of MEDLINE to act as a "scientistic" device, lending pseudoscientific authority to information that may in fact have not a shred of genuine credibility. This is distinct from the important questions about bias in the process of selecting which journals are indexed in MEDLINE in the first place, which cannot be entered into in depth here. Suffice it to say that the process of selecting the journals for indexing is carried out in secret by a non-accountable committee. There is a significant under-representation of journals relating to areas such as nutritional, environmental and alternative medicine, quite apart from the huge absence of literature from non-English

speaking countries. The ostensible reasons for rejection of journals for indexing is that they are "not scientific" enough in content (Hickey 2005). This of course, is purely a "scientistic" defence, since Time magazine, Newsweek, never mind the Kansas Historical Quarterly and similar trivia are all indexed in MEDLINE. Although there is an increasing concern and debate about bias in the selection of journals for indexing, it is unlikely that the process will change dramatically in the near future.

### LIBERATING KNOWLEDGE

On the positive side, MEDLINE and its inherent biases could become increasingly irrelevant in the future. The movement for "open access" of scientific publications is rapidly gathering momentum and support; this sidesteps the entire question of MEDLINE structural bias and indexing. Simultaneously, new forces are emerging in the 'bioinformatics' marketplace for scholarly literature, most strikingly in the form of privately owned search engines such as Google, Yahoo, and MSN search. Arguably, despite their corporate ownership, these can be seen as a contribution to the process that Mae-wan Ho has called Liberating Knowledge, which she describes as a "*one of the most urgent tasks facing humanity*". (Ho 2006)

The original analysis of scientism was developed by Habermas and others partially to account for the cynical and deliberate exploitation of science by governments to justify policy and manipulate public opinion (the use of science by Nazi fascism being the classic example). In an ironic socio-historical twist, the present Bush administration is arrogantly anti-science rather than sophisticatedly scientistic, to the absurd point of advocating creationist ideologies such as "intelligent design" or simply denying rather than distorting science e.g.

on global warming. Meanwhile, contrary to Mae-wan Ho's view which identifies corporate ownership of intellectual rights as a critical issue, progressive corporations developing free search engines appear (to date) to be above concerns of professional territorialism, mainstream bias and conservatism and free of pharmaceutical corporation influence.

Google Scholar already provides access not only to the PubMed collection, but to many thousands of medical conference papers, poster reports, slide presentations and journal articles including alternative medicine resources, and this constitutes a significant threat to the hegemony of MEDLINE. The BMJ recorded that during one month (November 2005) 446,000 visits to its web site articles came from Google and Google Scholar, and only 14,522 from PubMed in the same period (Giustini 2006). Even *herbological.com*, the author's own modest web site and second home to *Herbal Hypotheses* receives over 1000 hits per month directly from Google searches. Meanwhile, other Google plans include Google Print, an open access support project, along with the more controversial Library Digitisation scheme. While the data retrieval and ranking systems of Google Scholar need refinement, they are nonetheless free from MESH taxonomic constraints and includes innovative features such as "cited in". A laudable BMJ editorial has already called for a dedicated medical portal to Google (Giustini 2006). Free public access to on-line medical literature including herbal and alternative medicine will increasingly develop from this trend; this could eventually transform the current landscape of mainstream misinformation about herbal medicine.

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