

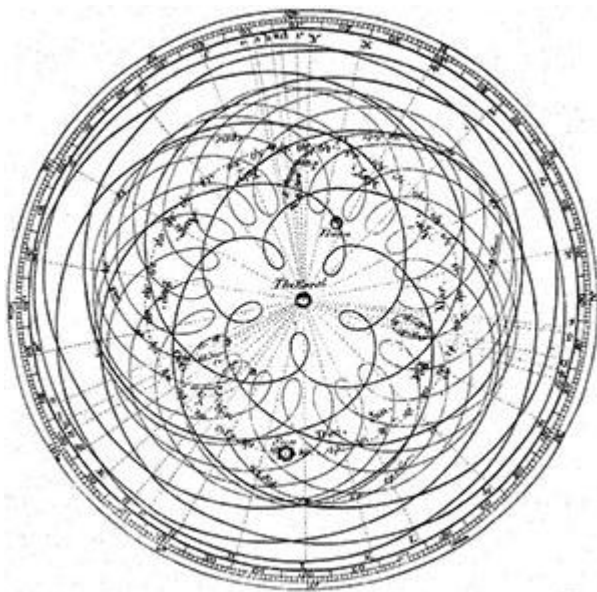
# Of Loose Wires, Green Goblins, and Other Matters

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(July 2019)

When I was a lad, I would regularly gather with a few chums in my uncle’s garden shed to share puffs of a purloined cigarette and listen to the popular BBC show “Much Binding in the Marsh” on an old floor model radio, well past its prime, which had a tendency to wheeze, buzz, and distort the signal. When such an interruption occurred, we dealt with the inconvenience by slapping the machine hard—if necessary several times—until order was restored.

We had differing accounts of why the cure was (generally) effective. On the basis of what I had learned by observing my family, I claimed that all machines had wires inside, that sometimes these got loose, and that a good blow often put them back into place. The lad who lived next door opined that there was a green goblin inside who occasionally dozed off and needed to be woken up in order to keep the radio working properly. And the twins from across the street produced various answers, usually involving long accounts of



Ptolemaic Model of Planetary Orbits

dust particles and various environmental influences—they were much more interested in the artistic ingenuity of their explanations than in their plausibility and, being Irish, they could really go on (and on) about them in an amusingly imaginative way. We had no interest in checking the inside of the machine or arguing about the truth of our differing accounts; we were quite happy to accept them all. What mattered was that the radio worked and we could hear the show.

For centuries a good deal of scientific thinking in western civilizations was not unlike our pre-teen shed conversations—an alliance of practical loose-wire thinking (“People have always said that

this is a good way of dealing with this problem”), irrational or tautological green-goblin theories (“This potion will heal you because it has the healing virtue” or “This bird’s feathers were created this way in order to remind us of the Trinity”), and increasingly complicated explanations (“Let’s deal with it by tinkering some more with the epicycles and nested spheres”). For well over a thousand years this mixture satisfied most people

that they had what they needed to know in order to function in a purposeful natural world created for their contemplation, enjoyment, and use.

The arrival of the new science in the seventeenth century, however, created a new demand—power over nature for the “relief of man’s estate”—and possessed a fairly clear sense of how to satisfy it. The first step was to discard one’s faith in the old notions and insist that from now on all explanations had to be reasonable and material and, if possible, mathematical (no appeals to final causes, divine intervention, action at a distance, and so on). The second was to stress the importance of experiments under proper conditions. Just because people claimed that certain explanations or procedures were “validated by tradition” or “carried the authority of Aristotle” was no reason to accept them. Loose-wire thinking had to be tested (and confirmed or rejected on the basis of replicable empirical results), green-goblin thinking eradicated, and overly complicated speculation trimmed with Occam’s Razor.<sup>1</sup>

The publication of Isaac Newton’s *Principia* (1687) was—in spite of occasional grumbling about gravity being “action at a distance”—a triumphant and reassuring vindication of the new science, but, of course, the old thinking did not disappear. The work of Robert Boyle illustrates that well enough. One of the most prominent proselytizers of the cause and a pioneer in the development and promotion of the new scientific method, Boyle was also an alchemist striving to change metals into gold, an ardent supporter of causes to promote the Christian faith (including financing a publication of the Bible in Irish), and, in his medical practice, a champion of traditional folk treatments.<sup>2</sup> His book *Medical Experiments: or, A Collection of Choice and Safe Remedies, For the most part Simple, and easily prepar’d: Very Useful in Families* contains over five hundred medical recipes, including one for *Paracelsus’s Zebethum Occidentale* (powdered human dung) to be blown into the eyes to relieve strain and a “homely, but experienced Medicine for a sore Throat”—a linctus of *Album Graecum* (or “white Dogs-turd”) to be swallowed slowly. The book was extremely popular, going through several editions, even after Boyle’s death in 1691 (a new edition is at present available on Amazon).

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<sup>1</sup>This new emphasis on strictly secular scientific thinking was tempered considerably (especially in England) by the fact that most natural scientists were faithful church-goers, fond of making reassuring appeals to the design argument: the truths revealed by their methods would attest to (perhaps even confirm) the existence of God. “[W]hen a man . . . seeth the dependence of causes, and the works of Providence, then . . . he will easily believe that the highest link of nature’s chain must needs be tied to the foot of Jupiter’s chair” (Francis Bacon, 1605).

<sup>2</sup> For his contributions to the new empirical method, Boyle received the ultimate accolade modern science can confer, a law and an equation named after him. Almost all high school students encounter Boyle’s Law ( $P_1V_1 = P_2V_2$ ) very early in their study of chemistry.

For the general populace (as opposed to, say, natural philosophers and divines), the obvious place where received wisdom, superstition, and the new science most frequently collided was medicine. Patients with pains and illnesses (then as now) always needed relief and reliable guidance, especially since many of the options were at best dubious and at worst lethal. Here, the new empirical science, in spite of its rudimentary theoretical understanding of diseases, achieved a triumph rivalling Newton's work in physics, one which has long been celebrated as the finest contribution ever made by a single individual to "the relief of man's estate": Edward Jenner's work in the 1790's to eradicate smallpox (which in his day was responsible for the deaths of between 10 and 20 percent of people in England—the percentage varying depending on where one lived).

Jenner is often credited with the discovery of immunology. But, in fact, immunization against smallpox had been known and practised for centuries long before him (mainly in non-European lands) and had been introduced into western Europe early in the 18<sup>th</sup> century. The procedure (called *variolation*, after the Latin word for the disease) was effective but risky, since it involved rubbing smallpox pustules or scabs from smallpox victims into a scratch on the patient's arm and hoping that the procedure would not bring with it a full-blown attack of the disease. Since some patients did succumb to smallpox as a result of the immunization, variolation was a fiercely contested practice: Was the immunity worth the risk?<sup>3</sup>

Jenner sought an alternative to variolation in the growing but still not widely known country practice of infecting people with cowpox, a mild disease endemic among milkmaids, which seemed to bring with it an immunity to smallpox. Jenner was not the first to notice the connection, but he determined to test it by inoculating subjects with cowpox, waiting for some time, and then injecting them with smallpox, and in a series of textbook experiments he demonstrated that cowpox was indeed an effective and safe immunizing agent against smallpox. He published his findings in 1798. In subsequent decades the procedure he laid out (which came to be called *vaccination*, after the Latin

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<sup>3</sup>For the Parisian the choice was approximately as follows: a 1 in 7 longer-term chance of dying of smallpox versus a 1 in 200 short-term chance of dying from the immunization. Were these good odds when the average life expectancy in Paris was under 30 years and old age came early and was often agonizing? Such questions called attention to a brand-new scientific discipline, the mathematical study of probability, and stimulated some of Europe's most famous mathematicians to participate in the arguments. The overall conclusion was that the procedure was probably advisable (although some of the variables could not be computed mathematically).

word for cow, to distinguish it from *variolation*) became widely implemented throughout Europe, and Jenner has been world famous ever since.<sup>4</sup>

For all its revolutionary successes, however, the new science also created a new problem: the growing influence of increasingly powerful scientific societies (designed initially to foster research and communication) and professional associations, whose members were eager, among other things, to defend and augment their reputations, social influence, and income, if necessary at the expense of any threat they perceived to their acknowledged expertise. Jenner's work, for example, was met in some quarters with abuse and hostility fostered, in part, by physicians who had a large stake in the commercial aspects of variolation and wished to defend their turf.<sup>5</sup> Such professional self-interest was at the time particularly significant in the treatment of scurvy, another terrible illness, which killed more sailors than storms and warfare combined (sometimes reducing crews on long voyages by two-thirds). The cure for scurvy (lemons, limes, oranges) was known and written about as early as 1593, and accounts of its efficacy were common in the 18<sup>th</sup> century, especially in Spain. A very small and incomplete clinical trial strongly suggesting the efficacy of lemons and oranges as cures for scurvy was conducted onboard ship by James Lund, a navy doctor, in 1747 (for some obscure reason his published study drew little attention). The medical establishment in England, however, had its own ideas (scurvy was a disorder of the digestive system and had nothing to do with diet) and stubbornly refused to listen, let alone to explore or approve alternatives. Their opposition had a pernicious influence, especially on the Royal Navy, until the 1790's, when the Lords of the Admiralty, with a war on their hands and desperately in need of sailors, preemptively disregarded expert scientific advice and ordered lemon juice to be issued as a

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<sup>4</sup>Jenner (like Charles Darwin after him) is thus an excellent example of Francis Galton's dictum: "In science credit goes to the man who convinces the world, not the man to whom the idea first occurs." Jenner's findings were confirmed by the Royal College of Physicians in 1807, and he reaped a considerable financial reward (he continued to vaccinate the poor free of charge). The term *vaccination* initially referred only to the use of cowpox, but in the 19<sup>th</sup> century the word was applied to similar procedures for other illnesses. Incidentally, for those interested in tidbits from the history of science, the bovine source of the cowpox used in Jenner's most famous experiment was called Blossom. Her hide is still on display in the library of a medical school in Tooting, and her horns have been preserved for public viewing in the Jenner House Museum in Gloucestershire.

<sup>5</sup>To judge from the fortunes of the Suttons, a family of physicians specializing in variolation, the old methods could be very profitable, so much so that the family franchised their version of the procedure and treated over 300,000 patients. Variolation was carried out in England until it was banned by law in 1840. In some countries, the practice has continued up to the present day. For details of the early opposition to Jenner, see Abbas M. Behbehani, "The Smallpox Story: Life and Death of an Old Disease," *Microbiological Reviews*, December 1983, 477 ff. (available at <https://mmlbr.asm.org/content/mmlbr/47/4/455.full.pdf>).

daily ration to the crews on its ships.<sup>6</sup> The instant disappearance of scurvy as a serious shipboard illness confirmed the rightness of their decision and has served ever since as a warning: scientific experts have agendas, and these do not always include unswerving allegiance to the appropriate procedures or the loftiest goals of the new scientific enterprise.

Not that we need that example, of course, given that we have more than enough from our own times. For the pursuit of genuine science nowadays requires one to remain vigilant not only about the self-interest of professional associations but also about politically motivated government largesse and the “scientific” pronouncements of large companies peddling improvements in any number of areas. In search of knowledge, fame, and fortune, scientists have, of course, had many astonishing successes (transplant surgery, transistors, genome sequences, antibiotics, and the Green Revolution, to cite only a few that immediately come to mind). Our faith in these successes and the humanitarian and economic benefits they confer has led us to transform our education system in public universities (where scientific and quasi-scientific research or training is now *de rigueur*), to increase government funding for science exponentially, and to look to science to deal with our most important problems. However, we have also witnessed, especially in medicine, any number of loose-wire procedures posing as science turn into (sometimes richly rewarded) disasters.

The nadir in the history of modern science might well be the 1949 Nobel Prize for Physiology or Medicine awarded to Antonio Egas Moniz for his pioneering work in developing lobotomy, a procedure whose main attraction, it seems, was making patients, the majority of whom were female, more manageable.<sup>7</sup> As a rival for this honour, one might also like to nominate the compulsory sterilization of tens of thousands of Americans by zealous scientific proselytizers of eugenics, who, with the assistance of the American Breeders Association, in 1927 won the legal right to treat people they deemed “feeble-minded” (a notoriously imprecise term) in this way by duplicitously engineering a Supreme Court case (*Buck v. Bell*) in which the justices voted 8-1 to uphold the verdict of the lower courts, because, in the words of the majority opinion (written by Oliver Wendell Holmes): “It is better for all the world if instead of waiting to execute degenerate

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<sup>6</sup>One is tempted to remark that in order to rule the waves, the admirals had to waive the rules.

<sup>7</sup>In order to make his daughter Rosemary more docile and less of a potential embarrassment to the family, Joseph Kennedy (father of JFK) in 1941 had the young girl lobotomized at George Washington University. The result was so catastrophic that Rosemary Kennedy spent the rest of her life secretly stowed away in a medical institution in Wisconsin, where she died, aged eighty-six, in 2005.

offspring for crime or to let them starve for their imbecility, society can prevent those who are manifestly unfit from continuing their crime.”<sup>8</sup>

And then there’s the War on Cancer. Launched by Richard Nixon in 1971, this national campaign encouraged, among other things, a lot of rather dubious loose-wire projects (“Well, they say this had some beneficial effects on a few children, so let’s give them double the dose and see what happens”) and, after more than forty-five years and the expenditure of countless billions of dollars, for all the significant improvements in knowledge, diagnosis, and treatment of some cancers, has resulted in a disappointingly small change in overall mortality rates for the disease. Its single greatest achievement so far (an important victory) has been to convince a lot of people to stop smoking. Maybe science sometimes has to go on long detours like this to discover the short way home, but the exorbitant cost has always had a distinctly political whiff (and it’s not as if there have not been many other less glamorous research priorities, like, say, diabetes or multiple sclerosis, that would have welcomed a share of those government funds). Meanwhile, on other fronts we have the pharmaceutical industry and careless or complicit regulators and physicians to thank for our very own opiate wars and various alliances between large corporations, governments, and the universities, vowing (not very reassuringly) to keep scientific research dynamic and disinterested, always mindful of the public good.

One area where our understanding of nature has been, in the past century, a veritable wild west show, with good science, bad science, quasi-science, folk traditions, and fads riding the range as rival gangs constantly sniping and snipping at each other, has been the treatment of psychiatric disorders. We have witnessed the astonishing rise and subsequent fall (though not the demise) of psychoanalysis (a protean green-goblin procedure if ever there was one), a bewildering menu of alternative mental wellness therapies (often based on complex mystical interpretations of the universe), an extraordinary rise in the popularity of legal psychotropic drugs of questionable efficacy (a cornucopia now serving over 55 million Americans), and a flourishing market for traditional folk remedies (St John’s Wort, ginseng, saffron, and others), not to mention various brutally invasive surgical treatments and all sorts of illicit possibilities. So far the new science, now legally empowered to rule on the efficacy of different options, has, in spite of a considerable effort, been unable to chart a reliable course through the therapeutic battle royal, let alone to come up with an agreed-upon understanding of or cure for even the most common mental illnesses (for instance, depression). In the past century and a half, no area of modern science has had so many hyperbolically heralded

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<sup>8</sup>See Anne Harington, *Mind Fixers*, p. 53. The Supreme Court case was cited in 1933 by the Nazi government in Germany as justification for its proposed “Law for the Prevention of Hereditarily Diseased Offspring.”

and lavishly funded “breakthroughs” followed a few years later by rueful admissions of failure.<sup>9</sup>

I unwittingly became personally acquainted with these range wars in the late 1980’s when I had myself checked into the psychiatric ward at our city hospital at the insistence of my wife, a Registered Nurse with professional clinical experience of psychiatric medicine, who recognized an acute state of suicidal depression when she saw one. In my first consultation with the resident psychiatrist, a Scottish physician whose incisive intelligence was soon evident, she asked me if I would like a behavioural or a chemical explanation for my condition. After a moment’s pause, I observed that she was asking me to choose between sin and Fate. “Aye,” she said. “I am.” I told her that, as a devout Homerophile, I believed in Fate, not sin, so that I would much prefer the chemical option. “Good,” she replied, “I agree.”

I later learned that my residence in that hospital ward occurred at the height of a revolution in which the biological treatment of mental disorders—launched originally by Thorazine (1954), Miltown (1955), and Valium (1963) and recently popularized by Nancy Andreasen’s best-selling *The Broken Brain* (1984)—was in the ascendant and psychoanalytic therapy in rapid decline and that my doctor was a faithful acolyte of the new orthodoxy. The therapists in the hospital were displeased when I failed to show up for their sessions, but they could not override the physician. So I took the pills diligently, wandered around the ward listening to Neil Diamond (the consensus choice of the resident patients), and after several weeks was discharged. When the illness struck again (and again), I immediately resorted to what had worked before, the antidepressants and sleeping pills. As I grew older the duration of the episodes increased and the time between bouts shortened considerably (my Scottish doctor had warned me that would happen, if I was successful in resisting the impulse to kill myself), and, in spite of many exhortations from friends and relatives and social workers to try various therapies or “natural” alternative medicines, I stuck with the familiar therapeutic cocktail.

I also did considerable internet research and now realize that, in spite of all the dreary months I have spent in the past thirty years dealing with this miserable illness, I have been in some respects relatively lucky, because successful treatment seems to require a

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<sup>9</sup>For example, the following: “I spent 13 years at NIMH [National Institute of Mental Health] really pushing on the neuroscience and genetics of mental disorders, and when I look back on that I realize that while I think I succeeded at getting lots of really cool papers published by cool scientists at fairly large costs—I think \$20 billion—I don’t think we moved the needle in reducing suicide, reducing hospitalizations, [or] improving recovery for tens of millions of people who have mental illness. I hold myself accountable for that.” (Tom Insel, Director of the National Institute of Mental Health, in 2015, qu. in Anne Harrington, *Mind Fixers*.)

judicious balance of certain pills and dosages and routine consultation, a combination unique to a particular individual, something that one can only discover for oneself through trial and error. By visiting internet chat rooms, I soon learned that many people suffer very badly in their (sometimes futile) search for the right combination, with stories of side effects and withdrawal symptoms so alarming that one is almost persuaded to abandon antidepressants altogether. I have been fortunate (so far) to avoid that contingency and have managed to trudge grimly through each attack to its eventual conclusion months later.

Of course, as many people have observed, a number of the most pressing scientific questions about psychotropic medicine are moot because of the well-known and little understood placebo effect: the most effective treatments may well be those that help to make patients believe they are on the road to recovery (whatever the proven scientific efficacy of the treatment). I know that my own cure requires a firm routine of particular pills rather than others and regular consultations, to satisfy my obsessive feeling that if I punctiliously follow every instruction to the letter every day, I am on the correct path (even though I am aware that there is little scientific evidence that the medications are all that effective). So I rely on my family doctor, who is very sympathetic and level headed: she carefully reviews the options and the routine and then wisely hands the responsibility to me: "This isn't your first rodeo," she tells me. "You know what to do. See me next week."