

THE DEATH OF SCIENCE

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A COMPANION STUDY TO MARTÍN LÓPEZ CORREDOIRA'S
THE TWILIGHT OF THE SCIENTIFIC AGE

ANDREW HOLSTER



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*The Death of Science: A Companion Study to Martín López Corredoira's
The Twilight of the Scientific Age*

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INTRODUCTION

“In the temple of science are many mansions, ... and various indeed are they that dwell therein and the motives that have led them there. Many take to science out of a joyful sense of superior intellectual power; science is their own special sport to which they look for vivid experience and the satisfaction of ambition; many others are to be found in the temple who have offered the products of their brains on this altar for purely utilitarian purposes. Were an angel of the Lord to come and drive all the people belonging to these two categories out of the temple, it would be noticeably emptier but there would still be some men of past and present times left inside... If the types we have just expelled were the only types there were, the temple would never have existed any more than one can have a wood consisting of nothing but creepers.” Albert Einstein, 1918. Address for Max Planck’s 60th Birthday.

Modern science is in a state of unprecedented crisis. It is suffering from a chronic illness that has been advancing steadily since 1960’s, finally accelerating to fatal proportions in the last decade. While technology runs rampant today, transforming our physical and social worlds beyond recognition, the creative vocation of *scientist* and the institutions of *science* that originally produced the platforms for this technology are in a death-spiral. This is testified by a growing flood of criticism from leading scientists in recent years, about the failures of scientific institutions, and their corruption by larger ideologies of power and wealth and bureaucracy that have come to rule our world. Martín López Corredoira’s *The Twilight of the Scientific Age* (2013, Brown Walker) is a particularly striking critique, giving a vivid and scathing analysis of the state of modern science. López Corredoira is both a serious scientist and a philosopher, and it is this combination that gives his account a depth and resonance beyond the more conventional critiques of ordinary scientists simply lamenting their working conditions. I take López Corredoira’s text as the starting point of this book, and explore key themes in greater detail, following his style of putting forward frank criticism, informed by personal examples. The result is a grim prognosis for the survival of science in its present institutionalised structures. These are not structures suited to science, but forced on it by the larger bureaucratised organisation of a state-controlled capitalist society. Science is fatally corrupted by the forces that flourish in this mode of organisation: ambition, greed, power politics, mass propaganda and intellectual mediocrity. López Corredoira concludes that science, in this modern institutionalised form, is on its death-bed. Here I analyse the process of its death. In the remainder of this Introduction I briefly recapitulate key themes and conclusions.

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López Corredoira's account is part sociology, part history and part philosophy. He recounts a breakdown in scientific culture, seen through examples of cultural syndromes at one level (mediocrity, bureaucracy, greed, competition); but also considered as the inevitable passage of a stage of civilisation in the larger panorama of history. He suggests that the most meaningful scientific research has now been completed in many core sciences, and the bulk of 'new research' being undertaken is largely derivative, a waste of time, and increasingly expensive. He sees a lack of scientific imagination, and a lack of scientific leadership, with the executive decisions of science ruled by bureaucratic mediocrity. He sees a conformist senior scientific community, and a powerful influence of scientific censorship and propaganda, working for the exclusion of heterodox or challenging or original ideas. He laments the flood of useless information drowning out wisdom or philosophy, and thinks science as we know it is in its twilight.

This will surely conflict with populist perceptions of the success of science. Most people no doubt think science today is strong, mainly because they see new technology – shiny new computerised machinery and production systems, spawned on a vast scale. These are systems locking us into dependency on global networks of industry, finance, communications, energy, transport, food production, medicine; and harnessing our human lives to goals imposed by wealth and power elites. But while this technology looks like advanced science to outsiders, it is not science at all: it is merely the crude beginnings of an era of robotic automation. The *scientific* revolutions and discoveries that enabled this technology occurred some decades ago: it has just taken industry these decades to develop the machinery these discoveries make possible. Science itself is forgotten, and our scientific institutions are now converted to industrial-bureaucratic corporates, dominated by swarms of technologists and managers of the most mediocre scientific ability. In the meantime, the real scientists, the rare creative talents intent on science as a form of intellectual discovery, have left the building.

There is both an intellectual and a pragmatic dimension to this crisis. Intellectually, we see the corruption of the ideals of science, the exile of its most gifted personalities, and a fatally diminished intellectual culture. This may appear an abstract concern to most people, but it is a tragedy for the tiny minority of intellectuals who find themselves excluded from their natural vocation. And without the contribution of this tiny minority of creative genius, science as an intellectual and idealistic pursuit dies. This book, like López Corredoira's, is in fundamental support of these intellectuals and ideals.

This corruption of ideals is also entwined with pragmatic failures of science. The question we must ask is this: can we afford to let the *intellectual* spirit of science die so soon after spawning such vast technological power? Our technologies are far from sustainable: they are still crude and transitional, and dependence on them in their current fragile state will be disastrous. The

corporatisation of science transfers power over the scientific endeavour to a corporate management elite, with the vision of engaging a vast work-force of standardised, interchangeable scientific technicians in a ‘science factory’, controlled by prescribed rules and processes. But this excludes the *scientific intellect*, the critical role of the creative intellectual. Without the ongoing application of real *scientific intellect*, we are trapped in a half-built building that will eventually collapse on our heads.

More generally, it should be stressed that technological power does not solve any of the serious problems we face, unless used intelligently and benevolently. Our present system delivers tools of vast power, produced by the efforts of our rarest intellectuals, into the hands of spoilt children: the domineering personalities who rule business, politics and bureaucracy, egocentrically obsessed with their personal success, trapped in their sense of their own importance, ruled by simplistic visions of competition and superiority. Without *intelligent* guidance, advanced technology is more dangerous than helpful. The death of the scientific intellect recounted here leaves us without the critical intellectual function, in either scientific or public or corporate institutions, to address our real problems. These are real and urgent problems for the very survival of our civilisation entering a period of unprecedented globalisation and cultural turmoil.

The immediate source of failure is evident to scientists themselves: *the bureaucratic-corporate-capitalist system is a failure when applied to the creative intellectual domain of science*. Recent years have seen a growing flood of criticism from leading figures within science – including many aging Nobel laureates of the past, who can see how dramatically science has declined in quality in their own life-times. Science today is variously criticised from within its own ranks as being obsessively bureaucratised and institutionalised; commercialised and corrupted by greed; drowning in mediocrity; exhausted in imagination; trapped in authoritarian dogmas; bigoted and exclusive of heterodoxy; and failing to meet multiple challenges of our time. These are not exaggerations.

On the philosophical side, science is a system of thought that is meant to help us make sense of our lives as human beings, to help us to understand the natural world and our place in it. This was its explicit aim when it originated as *natural philosophy*, in the 17th – 19th centuries, before it became compartmentalised into the specialised technical silos of today. But here modern science has also become a dismal failure. The ‘scientific philosophy’ that gained dominance over science institutions in the C20th, propagandised by leading Establishment figures as the ‘scientific world view’, has long appeared empty of meaning or wisdom. This modern ‘scientific philosophy’ is an incoherent kludge of Positivist-Materialist-Empiricist doctrines, long abandoned by serious philosophers themselves. But it remains a distinct integument of the scientific culture, providing a powerful ideological function, ensuring conformity and a sense of superiority and solidarity. It is an intractable intellectual failure of our time, and has offered nothing useful to real

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philosophy or real science for many decades. Although in the 1920-30's 'scientific philosophy' originally sparked valuable developments in logic and technical analysis, it soon became bogged down in scientific dogmas. Transplanted from Europe to America, the second wave of 20th Positivism emerged as a doctrinal worship of scientific authority, and a contempt for any other systems of thought.

The *philosophy of science* proper, the academic forum where such questions are meant to be discussed, has now become an archaic tea ceremony; a specialist self-referring field that makes little contact with real philosophy or real science or real life. It is fixated on abstract dogmas (called "my position" by philosophers), and bogged down in trivialities. It primarily reflects a dismal failure to solve mid-20th Century problems of semantics. As a populist ideology, 'scientific philosophy' is now strongly associated with atheist attacks on religions (militant atheists falsely claiming Science in their cause), and with technocratic contempt for traditional moral, social or religious philosophy. Within science, this official 'philosophy' represents a powerful force for conformity, legitimating hostility to heterodox ideas and original thinkers within science, and ridicule of challenging subjects on the borders of science.

The crisis in science itself stems intellectually, I believe, from the separation of the *philosophy* of science and the *philosophy* of specific sciences to a specialist subject outside the sciences themselves – starting in the late 19th, when Natural Philosophy was replaced by scientific specialisations. (Lord Kelvin, the great polymath 19th scientist, and incidentally a religious man, was *Professor of Natural Philosophy* through his long career, up to the end of the century: the last of his era.) Subsequently, science has been compartmentalised on an industrial model, akin to a factory production line, with little integration between sciences, and a huge rift between sciences and humanities. Natural scientists today do not think they need any understanding of the philosophy and history of their own subject, and are socialised in their training to be deeply contemptuous of it.

This is analogous to a police force being contemptuous of psychology and morality and human understanding, believing their job is simply to apply brute force to enforce their goals. This arrogance leads to mistrust and eventually hatred of the police in the general community, and they end up in the role of a paramilitary force trying to dominate a hostile civilian population. The prominent scientific leaders of today – the propagandists for the scientific ideology – similarly believe that they have the brute 'scientific force' to override philosophical concerns, having no need to consider conceptual subtleties or heterodox theories or recognise a diversity of ideas. ("When I hear of Schrodinger's cat," says arch-Positivist Stephen Hawking, "I reach for my gun", echoing a notorious Nazi propagandist.)

But the conditioning role of philosophical paradigms in science does not disappear just because it is ignored and suppressed from conscious recognition: it is merely unconsciously replaced by simplistic dogmas, acting as

doctrines of faith. Principles of *conceptual analysis, semantics and epistemology* that are routinely taught in core physical sciences of physics and chemistry as *scientific philosophy*, and saturate the subtext of science textbooks, are based on a startling ignorance of real philosophy. They represent a hopelessly incoherent kludge of the Positivist-Empiricist-Materialist ideology long discredited by serious philosophers. These are presented as *foundational doctrines*. Critical discussion of philosophical principles and issues is generally out of bounds in university science courses.

On the other hand, it is also quite understandable why scientists have become contemptuous of academic philosophy. The separation of ‘scientific philosophy’ from the scientific disciplines has equally led to its degradation, and it has now become an intellectual fantasy world. Intellectual standards in philosophy, it may be fairly said, are generally dismal. Academic ‘philosophers of science’ rarely have any working experience or competence as scientists. What they teach appears of no practical use to real scientists. As well as being scientifically incompetent, they also fail to address social issues of science, disdaining life outside their offices in the ivory tower. What do we pay them for? Serious scientists, whatever philosophical naivety they may have, are still generally hard-working teachers and researchers, and rightly contemptuous of such academic drones.

López Corredoira thinks the academic philosophy of science is so futile it should be abandoned. I sympathise, but we should recognise that there are *some* modern philosophers of great ability, and the philosophy of science and of specific sciences has achieved some results of fundamental importance. They are merely buried in the vast academic dross of philosophy. I think philosophy should be *transferred back into the sciences proper*. Science departments *should teach philosophy of science and the philosophy of their own science* as part of their core curriculum. Indeed, I think this is the *only* way academic sciences will be restored to health. But this is unlikely to happen. There is no longer any tradition of philosophy in the natural sciences, and simply no competent academics for such roles. For example, in my central area of interest, there is probably not a single competent *philosopher of physics* in NZ, in either philosophy or physics departments, across half a dozen traditional universities. And then what about the philosophy of biology, evolution, chemistry, information sciences, social sciences, etc? Where would you find people competent to teach the philosophy of all these subjects in science departments? Such people simply don’t exist – certainly not in my country. Anyway, most science professors would strongly oppose this idea. For any realistic course must lead to science students questioning the naïve philosophies of their professors. Far from establishing the vacuum of philosophy in science as a problem, the scientific establishment is intent on *destroying philosophy*, in an act of intellectual genocide.

But I believe that a philosophical dimension of thought, including analysis of fundamental concepts, is critical to *doing science* – especially to discovery

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and creation and evaluation of new theories. If you cannot embrace conceptual novelty, you can only become a technician working within a fixed paradigm. This is what the core Science Establishment is now dedicated to. This is a profound change in the culture of science since the heyday of Lorentz, Plank, Curie, Einstein, Bohr, Schrodinger, Dirac, and their colleagues who created modern physics in the early C20th.

Science also has a critical role in reflecting back on philosophy – including social, metaphysical and ethical beliefs. A number of sciences profoundly influence our world-view: in particular, the sciences of physics and chemistry, geology and astronomy, biology and evolution, psychology and consciousness, information theory and semantics. Pragmatists and utilitarians may see science as merely a technology factory, producing product technologies, and not care about the ‘ultimate truth’ of scientific theories. They may care only about the practical use of science to make us richer, more powerful and more comfortable. For them, that is the only reality. But there is far more to it than this. Modern sciences profoundly inform our *metaphysical views* whether we know it or not. These are our beliefs about fundamental nature of the world and our selves, our meaning and purpose, our origins and fate. Here of course we have the classic modern ‘War of World Views’. The ‘scientific philosophy’ is claimed (by the Scientific Atheists and anti-philosophers) to prove Materialist Reductionism, to deny the existence of a spiritual identity, to make human life an essentially meaningless accident, and morality a subjective delusion. This contradicts traditional religious and philosophical views, which embrace a transcendental reality of spirit or personal identity, and affirms meaning, purpose and morality as intrinsic and real aspects of existence. This has become a bitter divide between the science culture and the humanities.

However (although apparently unbeknownst to most scientists), *all the major programs in C20th ‘scientific philosophy’ have dismally failed – and failed to prove any of their metaphysical doctrines – Materialism, Positivism, Reductionism, etc.* The characteristic view of the scientific philosophers is that *science is true*. Or, since scientific theories sometimes change, that *science is usually true, and when it is false it corrects itself, and leads to true theories*. But there has always been a chasm between reality and ideology here. After a century of work trying to *prove that science is true*, the scientific philosophers have failed to prove any such thing. In fact, it became very evident a long time ago that *there is no guarantee, nor indeed even much likelihood, that any general scientific theories of our era are true, and certainly none are complete!* This applies particularly to very general and abstract theories, like fundamental theories of physics.

This may seem strange: almost everyone who is open to science recognises that science makes *progress* – and what can this progress be except progress towards *truth*? What can progress mean except finding *true theories*? And yet, most scientific theories in the past have proved to be *false*, and have been abandoned and replaced at a fundamental level. But despite this series of *false* theories, scientific understanding has clearly progressed. Indeed, many *false*

theories – e.g. Newtonian mechanics and gravity – represent decisive advances in scientific knowledge. But if they are ultimately false, what do they really tell us about the nature of reality?

The first part of this book addresses this classic conundrum in the philosophy of science, an issue that also underpins López Corredoira's account. The answer given here is that science really progresses in giving *robust explanations*. They are robust precisely when they are robust against future theory change. But there is no reason at all to think that our current theories provide us with anything resembling the *ultimate truth about the metaphysics of the natural world*. This contradicts the claims of scientific propagandists that science has now irrevocably established the fundamental nature of the world: e.g. that quantum mechanics and General Relativity truly identify the fundamental nature of space and time and matter, with no reasonable doubt possible. This attitude is dismissed here as arrogance, and almost certainly false.

But in this attitude we see two powerful destructive drives within modern science. On one hand, the belief that science has *reached the ultimate truth about fundamental questions* provides the rationale for suppression of heterodox thinkers – those who would question fundamental paradigms of present science (like quantum mechanics or relativity theory or materialist reductionism), who typically have their work suppressed and their careers destroyed by powerful establishment scientists, for the heresy of *questioning the truth of science, or scientific authority*. And the other hand, we see an insistence by the same establishment scientists – acting as philosophical interpreters of science – on drawing vast metaphysical certainties from shaky scientific theories and superficial reasoning – and treating sceptics about their metaphysical fantasies as anti-scientific heretics. These are two powerful negative syndromes characterising the social and philosophical dimension of modern science. The scientific community cannot blame *this* on outsiders: it is a form of intellectual fascism engendered from within science.

The discussion goes on to consider the wider social context of science. Although 'science' now saturates our culture at many levels, it is in a most peculiar position, as it has been throughout its brief history: it is almost entirely dependant on public funding for its existence. It produces no saleable products. Its only significant commercial product is *science education*, but that too is dependant on public funding - and on a public education system that forces its consumers (mainly school children) to take science courses. Most purchasers of science textbooks are not willing consumers. Barely one percent of adults takes any interest in science – only a small fraction of one percent become 'professional scientists', and most of these are no more than technicians, not research scientists. Science is deeply esoteric to the general public, and completely uninteresting to outsiders in its detail – including scientists from other fields.

Of course people do like to see 'science headlines' like the discovery of a new planet, or a new cancer drug, or a new species of hominid – but this is

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not an interest in *science as such*, it is an interest in strange and wonderful facts, or in technology that may be personally useful. The shallowness of public interest in science is seen by comparing with other cultural fields. While people today can typically name dozens or *hundreds* of musicians, actors, writers, artists, sports stars, politicians, and even business personalities, probably few could name more than *one* modern scientist off the top of their head – Super-Scientist Albert Einstein – with perhaps Stephen Hawking or David Attenborough as the other two widely recognised modern scientists (in the Anglo world at least, where they are TV celebrities).¹

Science in its detail is *very* esoteric to ordinary people. I think academic scientists do not realise how esoteric it really is. Few adults understand what a single equation in physics means – not even Pythagoras' theorem, although they learned it in school. ' $E = mc^2$ ' may be widely quoted, but it rolls off most tongues only as a noise: few people have any idea what it means. Few people can cross the abstract divide from *arithmetic* to *algebra*, where numbers are replaced by variables – even though everyone is supposed to learn this in high school too.

There is a good reason: science is actually a very *unnatural*, very *uninstinctive* mode of thought. It is not simply an extension of 'common sense', as Bronowski² and other science popularisers have tried to portray. On the contrary, it is distinctly tangential to 'common sense'. It is very abstract, and requires a peculiar discipline of thought: the discipline of *formulating explanatory hypotheses and refining explanatory judgements*, as well as the peculiar hobby of *inventing theoretical entities*, and the peculiar behaviour of *suppressing emotive reactions to beliefs*. Science is a distinctive and peculiar *cultural invention*, the most recent major cultural institution to develop in Western civilisation.

¹ An internet site lists 'the 50 most influential living scientists' as follows. How many have you heard of? What have they done? I know the work of barely a third of these myself – mainly the physicists and computer scientists. What if it was a list of the 50 most influential living musicians/sports stars/politicians instead? The list is:

Alain Aspect, David Baltimore, Allen Bard, Timothy Berners-Lee, John Tyler Bonner, Dennis Bray, Sydney Brenner, Pierre Chambon, Simon Conway Morris, Mildred Dresselhaus, Gerald M. Edelman, Ronald Evans, Anthony Fauci, Anthony Fire, Jean Fréchet, Margaret Geller, Jane Goodall, Alan Guth, Lene Vestergaard Hau, Stephen Hawking, Peter Higgs, Leroy Hood, Eric Kandel, Andrew Knoll, Charles Kao, Martin Karplus, Donald Knuth, Robert Marks II, Craig Mello, Luc Montagnier, Gordon Moore, Kary Mullis, C. Nüsslein-Vollhard, Seiji Ogawa, Jeremiah Ostriker, Roger Penrose, Stanley Prusiner, Henry F. Schaefer III, Thomas Südhof, Jack Szostak, James Tour, Charles Townes, Harold Varmus, Craig Venter, James Watson, Steven Weinberg, George Whitesides, Edward Wilson, Edward Witten, Shinya Yamanaka. See: <http://www.thebestschools.org/features/50-influential-scientists-world-today/> For people complaining that Mr. Spock from Star Trek is missing, sadly he died before the list was compiled.

² Bronowski (1978) is an interesting book however, much better than modern versions by the crop of recent scientific propagandists.

People are interested in *results* of science – in ‘scientific facts’ and discoveries – which is to say, in *implications* of science. But this is quite different to scientific enquiry itself, which means an interest in the nitty-gritty of *scientific explanations and evidence*. It is like being interested in the content of a program on TV – ‘*The News*’ say - without any interest in how the TV works – or how *The News* is produced. And why should we be interested in how the TV works? Most of us are never going to try fix one, or look inside one ourselves. The vast majority of people are likewise never going to *do any science themselves*. They are never going to *use science methods or enquiry to investigate anything*. They are never realistically going to *exercise independent scientific judgement* to evaluate anything. Nonetheless it is important, in a world of propaganda and half-truths, to understand something about how science is produced – just as it is important to understand how *The News* is produced.

I think people are really interested in *philosophy* rather than science – and science has its human interest only because it informs our philosophical outlook. By philosophy I mean a natural curiosity about the nature of the world; a desire to understand ourselves, our meanings and purposes; extending to an interest in theoretical ideas, and to rational processes behind our beliefs. The natural intellectual genius of the human race is really for the great smorgasbord of *philosophy*, not the thin gruel of science. It is driven by our need to self-consciously rationalise our own belief systems. We have complex beliefs systems, fraught with fallacies, incomplete knowledge, contradictions, change and instability. We are *self-conscious* of our own rational processes and beliefs, and there is a huge mental churn required to keep this in order. Although much of this rationalising work no doubt takes place unconsciously, and in dreams, we also consciously obsess about it. People constantly *philosophise* about their beliefs, discussing judgements of behaviour and morality, puzzling over implications of facts, trying to make sense of discordant information, and so forth. We are trying to understand the *meanings* of things.

This process is partly centred around an intuitive sense of *explanation* – we want to know why things happen as they do, what their meanings and implications are. But this is not *scientific explanation*. It is far more intuitive and psychological, calling on agencies and propensities, referring to symbolic meanings and motives and values, making intuitive observations of patterns, triggering off emotive reactions, and so on. The step from this to abstract philosophy, as a systematic rationalisation of ideas, developed independently in many cultures, long before Western Philosophy evolved a branch called ‘natural philosophy’. The latter is based on a specific mode of *causal explanation* that eventually became ‘modern science’, but it forms only a small part of philosophy as a whole. This ‘scientific mode of rationality’ cannot possibly replace our general capacity to think philosophically.

In this respect, ordinary people are much more philosophically thoughtful and sophisticated than academics typically realise. People are constantly philosophising about the meanings and explanations of things. Not in an

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academic mode, but in an intuitive way. The radio talk-back host, mulling over topical questions and inviting responses from the public, is philosophising. The worker discussing frustrations of dealing with management, and trying to decide how to respond to the system, is philosophising. Academic philosophy, at the level of mediocrity generally taught to undergraduates, destroys rather than enhances people's intuitive abilities to think about meaningful philosophical questions.

On the other hand, people are much less *scientific* than scientists expect – including most academics and professionals. Very few people, *including few science graduates*, can make meaningful independent scientific judgements on their own. It is not because of a lack of intelligence: it is because science is counter-intuitive, it draws on a very complex web of background beliefs, and it requires a very specific mental discipline. As a result, 'scientific belief' – among science students as much as ordinary people – is overwhelmingly based on *authority*, not on *evidence* (as claimed by scientific propagandists). Indeed, the most valuable talent in a world awash with false information and propaganda is to be able to identify the reliability of sources of information – and modern science is now full of propaganda to convince us that *science is the only reliable source*. This is rationalised by the idea that *scientists themselves base their beliefs directly on explicit evidence*, but this is entirely a myth. Scientists base their beliefs overwhelmingly on what they read in textbooks – trusting that the textbook is based on evidence somewhere down the line. When the line breaks down, as it has today, science too is degraded to dogma. We are urged to trust science, but when there is a scientific controversy, *whose science* do we trust? The 'science' with the best propaganda. Science is a *faith-based discipline*, embodying *faith in the (Text) Book and the High Priest ('expert opinion')*. Exercising your own independent judgement in a scientific discipline will get you in big trouble if it conflicts with Scientific Authority.

The meaningful aspect of science does not lie in its empirical data as such, but in its power to inform our personal systems of beliefs, or philosophy. The modern scientific propagandists, preaching a Materialist-Atheistic ideology, exploit this philosophical dimension of interest in the same way as religious demagogues, just with a different aim: the aim of *destroying* belief in meaning. In fact, most individual sciences *per se*, as specialised enquiries, have no intrinsic human interest at all. This reflects the very peculiar position of science as *the subject almost no one is actually interested in*.

Music, literature, drama and art are all creative intellectual activities too: but they can all support themselves, at least partially, in a capitalist world, by selling their products. This is because people *like them*. Pure science cannot support itself commercially from its products at all. Its products are *scientific theories, observational data, and explanations* – and there is no popular or commercial market *at all* for scientific theories, for scientific knowledge, as such. (Just try to sell a scientific theory to someone! "How would you like to buy my theory that: $T = 2\hbar^2/m_e m_p^2 Gc$? Isn't that lovely? No? Not even a dollar? Oh

why not? You don't have any *use* for it?") There is no market outside the circles of other scientists – and scientists cannot pay for science simply by buying it off each other in a circular economy.

Iconic modern science projects – like the LHC, the Hubble telescope, the Apollo missions – are of course vastly too expensive to be possible except as large national or international projects. But even small-scale, routine laboratory-type science has become an expensive activity, and the cost of pure science in most fields today is beyond anyone not funded by governments or corporates. 'Independent scientists' who typically work as consultants generally make their incomes from routine commercial science – gathering and analysing information of specific commercial interest to some business. Such work uses scientific technology and methods, but it is usually of no scientific interest as such: only of short-term practical interest, as specific information. (In fact, if you do discover something of genuine scientific interest in the course of such work, it is unlikely your employer will have any interest in it. It is more likely to make the project manager angry that you have gone 'off task': for they are only interested in what they have commissioned you to report on.) Thus *pure science* is in a very awkward position in our society economically, and it has no natural place among more traditional activities and professions.

Professional science as we know it is a very recent – by far the most recent generic profession. There have been doctors and lawyers, engineers and architects, mathematicians and accountants, bureaucrats and planners, merchants and bankers, philosophers and priests, soldiers and sailors, artists and musicians, prostitutes and tax collectors, across many millennia and many civilisations. But natural science has barely existed for 400 years in the West, and is only about a hundred years old as a professional career path for significant numbers of people. It appeared only sporadically in other cultures before that – and only as an anomaly, an expression of a certain rare and eccentric personality. It remains the *natural vocation* of only a rare type of personality.

Until the later C19th, science was very much a self-appointed *vocation*, largely restricted to hobbyists with independent means, and a few independent researchers who could find wealthy patrons. The modern organisation of specialist sciences in professionally-taught university faculties only emerged in the later C19th. For the first few decades of the C20th, science was limited in scope, and survived on a relative pittance compared to the vast budgets of today. It was really only when physics became a critical prop for military technology, with the nuclear arms race, and subsequently a nationalist competition in the cold-war space race, that science started getting the huge levels of public funding it enjoys today. In the same era, politicians began to recognise the value of science as the foundation for advanced technology, and realised that public investment in science would pay off economically down the line – although it might be ten or twenty or thirty years later. Commercial econom-

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ics has no place for projects of such long-term value – it is based on short-term values, trading of goods with immediate demand.

So science does not fit within the natural categories of the commercial world, or capitalist economics, where *profit from sales of products and services* is the driving value for an enterprise. Yet it has been forced to fit, because capitalist economics is the overwhelming principle of modern social organisation. But the true value of pure scientific knowledge is impossible to measure economically. It is both ephemeral, and uncertain, and largely belongs to the future.

A symptom of this is an artificial construct of *value and productivity* within modern science. ‘Scientific productivity’ is measured by a surrogate: *numbers of peer-reviewed papers published*. Science has consequently become a competition to publish as many papers as possible (with something like one and a half *million* peer reviewed papers published per year – and presently doubling about every 15 years – which implies some ten million unpublished papers *submitted* per year, to about 25,000 officially indexed peer-reviewed journals – a number also steadily expanding³). Yet most published papers have no apparent value – about 90% are never referenced again – while a tiny number have a large impact, with hundreds of citations⁴. This *peer-reviewed-paper-productivity* measure, despite its huge distortions of scientific *value*, has been the fundamental organising principle for the scientific-academic bureaucracy for decades now. It has led to a serious crisis of quality and to manipulative power-politics.

The failure of peer review is now recognised as a major crisis in science, and a lot of recent material has appeared on this issue. López Corredoira also has an interesting discussion of this. In Part 2, I put forward a series of examples from my own work, from some 15 years ago, that illustrates the severe lack of objectivity and the abuse of peer reviews in the game of academic power politics. These examples are also chosen to illustrate the themes addressed in the Part 1: the powerful role of metaphysical paradigms in science, projected as ideological contests. The examples I give here concern the metaphysics of time in modern physics, and attempts to suppress realism about *time flow*. Following López Corredoira, I also propose a reformation of the system of journal publications, to address the problem of bias and manipulation by reviewers.

Another major feature of modern science is the pressure on *pure science* (producing knowledge of intangible value, with no capitalist measure) to become *technology science* (producing tangible products). Today, corporates as well as governments fund extensive ‘scientific research and development’, primarily aimed at *product technology*. Of course there must be a domain for this kind of applied science. But nowadays, ‘pure science research’ is rarely done without also being motivated by potential product opportunities. As such, this

³ E.g. see Morrison *at alia* (2014).

⁴ And many that have no immediate impact must have a high real value, in terms of quality and originality, but are lost in a swamp of mediocrity and trivia.

research activity loses the primary intellectual values that drive pure science. The spirit of science dies. My own country, a second-world scientific nation, provides a dismal example of this corruption of science to profit-making commercialism, with the conversion of public scientific institutes to business enterprises, under the spell of a neo-liberal capitalist ideology. Pure science research institutes in New Zealand were converted in the 1990s to ‘CRIs’ – crown research institutes – specifically tasked with making profits. The scientific value of their subsequent work appears to have diminished to practically zero. In fact, I think they now have a negative value, stifling private competition from outside the Government sector, and suppressing the function of providing public-good science, in favour of trying to establish their own competitive advantage. Their performance is so poor that senior academics and independent scientists now repeatedly call for various CRIs to be disbanded. The ongoing *pretence* of having scientific institutions is more harmful than having nothing, as well as more expensive. These institutions have proved impossible to reform. If we want a science sector in NZ, it must be started again from scratch.

Science of course has now become a key Public Institution in our society, with huge public funding and infrastructure. It has developed a mythological status, being treated as a kind of god: an official *Oracle* that society calls on to answer certain kinds of questions. “*Scientists say that ...*” is the stock phrase in news bulletins when reassurance of objective knowledge is needed. But there is increasing popular doubt about its reliability, effectiveness and value. One telling sign is that where science in the past had this largely unchallenged role of *Oracle*, of representing scientific *conformity*, of answering controversial questions with authoritative evidence, we now see conformity breaking down, and science impotent to resolve numerous controversies. It now provides little intellectual leadership on difficult topics. This is an inevitable result of its degradation into mediocrity.

The authority of *Science as Oracle* has diminished most among the most highly educated classes, with well-informed people today routinely sceptical and cynical of ‘scientific experts’. They appear as just more talking heads on TV, with a message to sell from their respective institutions. We know now that ‘scientific facts’ frequently change, just like ‘legal facts’, and ‘scientific conclusions’ depend on who the scientists are – which side of a debate they are on, which industry they work for. There are also many people today, well-informed without being scientists, with intense personal interests in niche subjects – ranging from health to energy to farming and genetic engineering to UFOs and parapsychology – who have grown contemptuous of the views of the ‘Scientific Establishment’ in their own areas of special interest.

Such ‘amateurs’ who question scientific orthodoxy are dismissed as cranks by academic scientists; but their weight of numbers grows; and ‘professional science’ is often proved incompetent in such areas – and prone to corruption when commercial profit is involved. What should be even more

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alarming to the Scientific Establishment, many of the best creative and original professional scientists *feel the same way about their scientific colleagues too*. The best heterodox scientists often see the Establishment scientists (who typically attack their new ideas) as dull, mediocre, conformist and dogmatic. The best creative scientists do not trust the bastions of modern science either! There is no doubt that thousands of the most creative young students, who would have become the premier scientists in an earlier age, have withdrawn from science in recent decades, because they find its culture so stifling and conformist. Thus we see the authority and prestige of science under threat on multiple fronts.

Science – or a scientific methodology – is also supposed to be applied within the business functions of corporates and bureaucracies – tasked as they are with critical planning and research functions. This is a joke. And not the funny kind of joke. The death of science is nowhere more evident than in the research, analysis and planning functions of government departments. Here we find ‘science’ reduced to its utterly lowest quality – where it is no longer recognisable as science at all. In Part 3 I illustrate this, again with examples from personal experience. In the NZ Ministry of Education I observed ‘education research’ reduced to a state of farce, a farce perpetuated decade after decade. There is nothing unique about this example: this failure is universal across government bureaucracies.

These also act as public *Oracles*, controlling official information and peddling government propaganda, as well as controlling state funding of wider research communities. They dominate every sector of society – education, justice, health, science, environment, welfare, finance, business, transport, housing, farming, security, defence; every major institution in every developed country is under the control of such monolithic government departments. Their *scientific capability* can only be described as farcical. Here we find the death sentence on science completed. If the future success and survival of our society and civilisation is dependent on the scientific competence of government institutions, we are doomed.

I also try to relate these syndromes to the socio-psycho dynamics of these institutions. Why are such bureaucracies such dismal failures? It is not just one or two, but *all of them, practically without exception*. It is not just a phenomenon in New Zealand: similar complaints about incompetence, malevolence, and invasive encroachment of public bureaucracies on personal lives seem to be heard from most developed countries. And it is not just government departments: large corporate bureaucracies may not be quite as *hopelessly* incompetent as government departments, but they are similarly fraught with bureaucracy and ham-strung by intellectual mediocrity. The banking and finance sector, for example, is an intellectual vacuum at the highest executive level, and completely incapable of addressing the systemic problems of the global financial system. Of course its executives don’t care as long as they continue to make vast fortunes.

I attempt to identify some core mechanisms at work here. One is to relate the hierarchical power structures that define these organisations as *cultural ecologies*, to the characteristic adaptive behaviours of their members. The power-roles defining the power hierarchies are the definitive common feature of all such organisations. I argue that these power structures are instinctively exploited by power cliques of management, working for their own ends. The dynamics of competition in the environment they have designed for themselves inevitably leads to the degradation of these organisations, through a severe degradation of talent. They are doomed to failure by the *mediocrity and exploitative attitudes* of their management.

A second theme is the dominance of a specific cultural paradigm, reflecting a certain kind of shared *social metaphysics* characterising our age. This is an intense drive to a *rule-based* model of social behaviour. This *rule-based* mentality is not new: it is seen throughout the long history of institutional tyranny, from the Spanish Inquisition to Nazi Germany. It is a characteristic of a distinctively fascist vision of morality that many people seem preconditioned to adopt. It has always been the dream of politicians, moralists and bureaucrats to have centralised control of people's behaviour in total detail; the world of Orwell's *1984*. In the past this was prevented by natural technological limitations; but it has taken on a new virulence today, empowered by the use of computerised information-and-decision-making technology, to exhaustively encode rules of behaviour, and to monitor and control behaviour, and administer punishments. I note that the same *rule-based* metaphysics underpins a number of distinctive modern scientific paradigms: those that characterise the new tyrannies within science.

Scientific institutions have been overtaken by the same general syndrome as public bureaucracies – forced on them by the bureaucratic masters who fund and control them. They are obsessed with 'management processes' and 'business models' and 'methodological rules' and neo-liberal commercial reforms – obsessions destructive of the pursuit of science. The *creative individual* at the heart of the scientific enterprise has been trampled to death in this managerial scrum. "But *Modern Business Science* shows that this is the only rational way to organise large-scale enterprises!" the neo-liberal management scientist tells us. "We must control and measure our *Inputs* and *Outputs* and use our economic theory to *Optimise Outcomes!*" In their vision, scientists are "Inputs" to an industrial machine, just as factory workers are "Inputs" to an industrial machine – a raw resource just like other material resources. Human capital is interchangeable and replaceable, productivity has a one-dimensional measure, value is reduced to money, and the System runs by pre-defined Rules imposed by executive decision-makers.

The first thing these neo-liberal business executives fail to recognise is that they themselves and their peers – the managerial elite and the 'business scientist' gurus – are actually the most mediocre and incompetent, relative to their roles, among *all the worker hierarchies*, and setting *themselves* in charge of

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such organisations dooms them to failure from the start. In any case, although this industrial-type business model succeeds up to a point in mass-production factories (albeit denigrating the conditions of the enslaved human work force), it simply does not work at all in science. Science has no paint-by-numbers *rule-based methodology*. It cannot be *automated by business process*. It cannot be done by people who *do not have a creative scientific intellectual drive*. The institutionalised model of science cannot identify genuine scientific talent, cannot give it the creative freedom to work, and cannot retain it.

This raises the question of whether there is a practical prospect of rejuvenating science in its current forms. Should we try to save the failing institutions of modern science? Of course the Establishment assumes that we must keep fiddling with reforms to preserve their System. The System is their God. They would be children lost in the wilderness without it. But I believe it is too late to save this bureaucratised incarnation of science, and futile to keep supporting its failed institutions. It should be allowed to die. I believe it is time to allow our corrupted science industry to collapse, as a bankrupt institution, and trust the scientific spirit – by which I mean the spirit of *natural philosophy* rather than that of *scientific technology* – rejuvenates real science anew. Science will one day be resurrected, at a grass-roots level, through the efforts of those with a natural vocation to be scientists. But the time has come when real scientists should now abandon our failed scientific institutions, cease supporting the bureaucratic tyranny that sweeps across our world, cease working as technology slaves for state-corporate management; and find new places to work, new roles to define themselves, and new ways to fulfil their natural vocation.

Creative scientists were once called *natural philosophers*, and sought a deeper understanding of nature and our place in it, in an integrated view combining the technical sciences and the social sciences, metaphysics and social morality. This quest for understanding has been destroyed in the modern era of science. I think it is time to reinvent that occupation, and for real scientists to return to that role once again. In the last part of this book I make some comments about the challenges for independent scientists, who wish to withdraw from the present system, and work instead for a future resurrection of science. However this book is not about the resurrection of science, but about its death.

The final part of this book is a set of Appendices, containing exhibits to illustrate certain key points. These contain technical detail that goes beyond the style of the main text. They correspond to specific points made in the main text. I briefly explain the rationale for these.

- Appendix 1 is an extract from a brilliant monograph of philosophical observations about physics by the great pioneering particle physicist, T.D. Lee, in 1988, made not in the tradition of academic philosophy of science,

but by applying his natural intuition. He makes many lucid observations. Relates to the example of *time reversal and time symmetry* in Part 2, and to the value of genuine philosophical reflection within science.

- Appendix 2 is an extract from an article by Einstein, in 1920, *'The Aether and Relativity'*. Einstein in his mature years took the concept of an Aether seriously, and even affirms its reality in a certain sense in the context of the General Theory of Relativity – contrary to popularist ridicule of the concept in physics. Relates to the example of the Ether in Part 1, and temporal metaphysics in Part 2.
- Appendix 3 gives some technical background to the issue of time reversibility of quantum mechanics, relating to the first peer review example in Part 2. Requires basic quantum mechanics.
- Appendix 4 illustrates what is meant by a *realist semantic interpretation*, illustrated first with the example of Pythagoras' theorem, and then with the metric equation of Special Relativity. This is for scientists who are mystified by what philosophers mean by 'semantic analysis'. Relates to the case in Part 1 for realist philosophical analysis to be taught in science.
- Appendix 5 goes a step further into logic, and presents an important proof in semantics, a *reductio ad absurdum* of the core Positivist principle of meaning. This is to illustrate that technical philosophy is a real subject, with analysis backed by formal techniques of proof.
- Appendix 6 goes another step again, and presents core concepts of *possible world semantics*, illustrating the real metaphysical dimension of debates over foundational concepts of science. Metaphysics is encapsulated in the construction of the *logical space*, required for the formal representation of concepts. Scientific theories implicitly postulate theories of the *logical space*.
- Appendix 7 presents various extracts on the Alvarez controversy, over the asteroid-impact theory of the extinction of dinosaurs. This is a classic illustration of how scientific debates are often fraught with controversy and spite. Relates to example of explanations in Part 1, illustrating that evidence for well-accepted explanations is not necessarily straightforward.
- Appendix 8 provides material on the evolution of peer review, illustrating the open review system, and giving a further example of conflicting peer reviews about an interesting heterodox theory in physics.
- Appendix 9 provides material on the recent phenomenon of 'predatory publishers', and issues about the commercial corruption of the scientific and academic journal industry.
- Appendix 10 provides further material on the evolution of the academic journal industry, and the trend to open access journals.
- Appendix 11 provides material on a new system or surveillance on researchers, imposed through a universal identification scheme called *ORCID*. This prevents independent researchers, without approved *institu-*

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tional affiliations (with academic, government or corporate institutions) from even *submitting* scientific papers.

- Appendix 12 is an extract from NZ writer Nicky Hager's 2002 book *Seeds of Distrust*, about a notorious incident of political manipulation of science in NZ. A model of investigative reporting into political corruption of science, containing many insightful observations.
- Appendix 13 presents arch-heretic Rupert Sheldrake's *Ten Dogmas of Science*, and the virulent personal attacks on him, started by Sir John Maddox, the arch-conservative editor of *Nature*, and continued by many other scientific propagandists from sceptic and debunker groups.

PART I. THE TWILIGHT OF SCIENTIFIC PHILOSOPHY

López Corredoira's perspective.

López Corredoira sees a corruption of science in a larger framework, as part of a more general degradation inherent in modern society: a loss of individuality and humanity to the gods of money and power, bureaucracy and institutionalisation. I begin with an extended quote that sets the general framework for his point of view.⁵

“In general one has the impression when reading about the history of civilization that human beings were behind the dynamics of the societies... Nowadays, however, one has the impression that individuals are just simple marionettes whose strings are pulled by some abstract and superior entity. I am not talking about the Christian god but about that almighty god of modern capitalist times: money. Money is the great boss of our society. It governs the decisions of individuals and has much more power than the different nation-states or other human organizations...

[I am talking about] the generation of structures in our society which have become automatic in some sense, and thus have become self-sustaining autonomous structures. Once implemented, they may work independently of the will of human individuals. The economy, our present

⁵ I quote extensively from López Corredoira's text, so that the reader may have the material in front of them, without having to constantly refer back to his book. This is no substitute for reading his book. I deal primarily with only the central third of his book, the critique of modern scientific institutions. The first third of his book tells the stories of the early historical development of some sciences he knows well, and these are very interesting – López Corredoira has a real empathy and detailed knowledge of the scientific subject matter and the cultural setting of the history he talks about, and this is of a much greater quality than the kind of conventional potted histories of science typical of most scientists who turn to presenting the history of their subjects – Hawking being a typical desultory example in physics. The last third of the book reviews some of López Corredoira's favourite 'classic philosophers', and I find this material fascinating, partly because these are philosophers rarely encountered in modern Anglo-American philosophy, and partly because López Corredoira's interpretation is fresh and original. His larger perspective on culture and philosophy is not adequately conveyed by the material I have selected here, and is not meant to be. I also note that I have not included all López Corredoira's references in the references to this paper, and where he makes references, I give the author's name and date, but not page and chapter numbers, so to trace these references the reader must go to his text. Thanks go to Martín López Corredoira for permission to quote from his material.