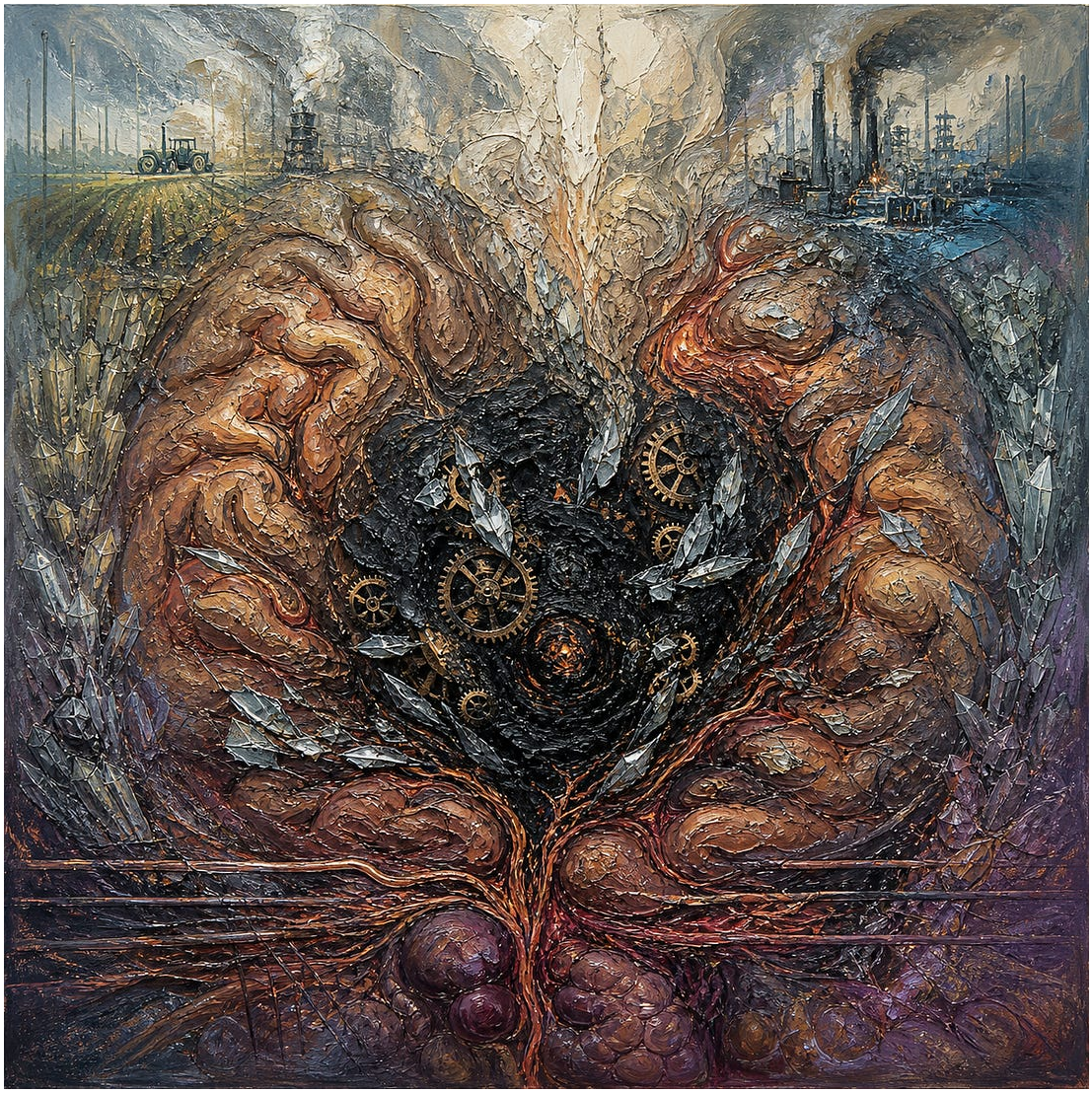
What Is Parkinson’s?

An Essay on the Disease Medicine Calls Idiopathic and the Chemistry It Has Already Named

UNBEKOMING

MAY 02, 2026



The Sentence the Field Has Spent Thirty-Six Years Ignoring

In 1990, Anthony Schapira and his colleagues at the Royal Free Hospital in London published a paper in the *Journal of Neurochemistry*. They had measured the activity of the mitochondrial electron transport chain in the substantia nigra of patients who had died with Parkinson's disease. One specific component — Complex I, the enzyme that begins the chain by accepting electrons from NADH — was significantly reduced. Other components were normal. The defect was specific, anatomical, reproducible.

What they wrote next is the sentence the field has spent the last thirty-six years declining to act upon:

> "This biochemical defect is the same as that produced in animal models of parkinsonism by 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP) and adds further support to the proposition that an environmental toxin may have a role in the pathogenesis of the disease."[1]

Schapira is not a fringe figure. He is one of the most cited researchers in mitochondrial neurology. The journal is mainstream. The peer review was standard. The sentence is plain English. The biochemical lesion that defines Parkinson's disease is the same lesion produced by a known chemical poison. *Environmental toxin*, his words, *may have a role in the pathogenesis*.

Thirty-six years later the disease is still officially classified as idiopathic. The word means cause unknown.

This is not a small thing. It is the entire problem. The establishment's foundational biochemistry, in its own peer-reviewed literature, named the mechanism and the cause-class in 1990. Parkinson's continues to be presented to patients, families, doctors, and the public as a mysterious

neurodegenerative condition of unknown origin requiring lifelong symptomatic management with a drug regimen that does not address the disease. Research investment focuses on genetics, on protein aggregation, and on monoclonal antibodies designed to clear the aggregated proteins from the brain — none of which has produced a disease-modifying therapy in sixty years of trying.[2]

What follows is an attempt to read the establishment's own files honestly, to identify what the medical literature has been saying about Parkinson's, and to name what the word *idiopathic* is doing.

Support This Work

This work remains free because paid subscribers make it possible. If you find value here, consider joining them.

Paid subscribers get access to all books — including The DMSO Book, The Kitchen Remedies Guide, Chlorine Dioxide, The PSA Trap, Breast Cancer, and more — with 1-2 new books added each month. Plus the Deep Dive Audio Library: 180+ in-depth audio book summaries and discussions.

I do this work independently, outside the institutions these books so often describe. No foundation grants, no academic approval, no editorial gatekeepers deciding what's acceptable to publish. Your subscription makes that independence possible.

Pricing Update: The annual subscription moves from $50 AUD to $50 USD on May 7 (now extended from May 1) — the first change in five years. Current paid subscribers keep their existing rate. Free subscribers can lock in the current price by upgrading before May 7.

Give a gift subscription

Frozen in San Jose

In the summer of 1982, hospital emergency rooms in the San Francisco Bay Area began admitting young drug users in a state that had no clinical precedent. They were conscious. They could not move. They could not speak. They had been frozen — not in catatonia, not in coma, but in a Parkinsonian rigidity so absolute that one of the first patients was described as "frozen like a statue in a bent twisted position".[3]

The neurologist who became the central figure was J. William Langston. He recognised the picture as advanced Parkinson's disease. He gave one of his patients levodopa. The patient began to move. Toxicology determined that the patients had injected a contaminated batch of synthetic heroin. The contaminant was 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine — MPTP.

Within days of injection, healthy adults in their twenties and thirties had developed the full clinical syndrome of advanced Parkinson's disease.[4] The condition was permanent. An earlier solitary case from 1979, an undergraduate chemist named Barry Kidston who had self-synthesised the contaminated drug, had been written up in *Psychiatry Research*. His autopsy showed loss of dopaminergic cells in the substantia nigra — the same anatomical lesion seen in idiopathic Parkinson's.[5]

The mechanism was worked out quickly. MPTP itself is biologically inert. It crosses the blood-brain barrier and is converted by monoamine oxidase B in glial cells to its active form, MPP+, the 1-methyl-4-phenylpyridinium ion. MPP+ is selectively concentrated in dopaminergic neurons by the dopamine transporter. It accumulates in mitochondria. It binds to Complex I of the electron transport chain and shuts it down.[6]

ATP collapses. Oxidative stress floods the cell. The dopaminergic neurons of the substantia nigra die.

This is the chemical pathway Schapira's 1990 paper identified in idiopathic Parkinson's brains. Same enzyme. Same defect. Same anatomical specificity. The clinical syndrome MPTP produces is, in the consensus language of the field, indistinguishable from Parkinson's disease.[7]

The reconciliation the field has chosen is curious. MPTP became the standard chemical model for Parkinson's research. Laboratory animals are dosed with it routinely to produce the disease for study. Langston himself wrote, looking back: "MPTP was like really a bracing tonic — suddenly, we had ways to study why cells die in Parkinson's disease."[8] The chemical that produces Parkinson's is the standard tool for studying Parkinson's. The disease is officially of unknown cause.

There is a further detail worth pausing on. MPP+, the active metabolite — the actual molecule that destroys the substantia nigra — was sold commercially in the 1970s by Gulf Oil Chemical Co. as the herbicide cyperquat, used to control nutsedge in crops.[9] It is not an analogue of an agricultural chemical. It is an agricultural chemical. The substance that produced full Parkinson's disease in young drug users in California was being sprayed on American farmland in the same decade.

And it is a structural cousin of paraquat — a herbicide that remains licensed and in use across millions of acres of American crops today.[10]

The Mechanism Mark Purdey Worked Out, Standing in a Field

To understand what is happening to the substantia nigra, we have to leave the neurology department for a moment and walk into a Somerset

dairy farm.

Mark Purdey was an organic farmer. In 1982 the British Ministry of Agriculture mandated that all farmers apply phosmet, a systemic organophosphate pesticide, along the spines of their cattle to control warble fly. The dose was 20 mg/kg of body weight, applied twice yearly, at concentrations used nowhere else in the world. Purdey refused. He took the Ministry to court. He won.[11]

Animal Pharm: One Man's Struggle to Discover the Truth about Mad Cow Disease and Variant CJD

UNBEKOMING · JUNE 20, 2025

Read full story

His cattle did not develop bovine spongiform encephalopathy. The cattle of his neighbours, who had complied, did. Across the United Kingdom, no case of BSE was ever recorded in cattle born and raised on fully converted organic farms — despite those animals having access to the meat-and-bone meal feed officially blamed for the epidemic.[12]

Purdey spent the rest of his life working out why. The framework he produced is one of the most important pieces of independent scientific work of the late twentieth century. It has been almost completely buried.

The framework has three parts.

First, organophosphates and certain other industrial chemicals chelate copper. They bind to copper atoms and pull them out of biological tissue. The prion protein in cattle brains, like a great many other proteins in mammalian neurochemistry, requires copper at specific binding sites to fold correctly and do its job. When copper is depleted, the binding sites are vacant.

Prions and Deer

UNBEKOMING • FEB 9

Read full story

Second, vacant binding sites do not stay vacant. They are filled by whatever metal is available locally. In the British countryside of the 1980s, that meant manganese — abundant in the soil, abundant in atmospheric deposition from industrial sources, abundant in the diet of grazing cattle. Manganese substitutes for copper at the binding site. The protein, now bound to the wrong metal, misfolds.

Third, the substituted protein develops piezoelectric properties. It converts mechanical and acoustic energy into electrical discharge. When exposed to low-frequency sonic shock — military jets, explosions, heavy industrial activity — the misfolded protein becomes a tiny electrical generator inside the neuron. The discharges burn the surrounding tissue. The brain develops the characteristic spongiform holes.[13]

The misfolded protein, in this model, is not the cause of disease. It is the downstream signature of an environmental insult that began with copper depletion and ended with electrical injury to neural tissue.

Purdey extended this framework explicitly to Parkinson's disease, Alzheimer's disease, and multiple sclerosis. He travelled the world documenting disease clusters in Iceland, Slovakia, Sardinia, Guam, Colorado, and Australia. In every cluster he found the same environmental signature: elevated levels of manganese, barium, strontium, or silver in soil and vegetation; deficiencies of copper, zinc, and selenium; proximity to industrial contamination, mining operations, or military activity providing acoustic shock exposure. The pattern held across continents, cultures, species, and disease labels.[14]

Purdey was harassed, defunded, denied peer-reviewed channels, and watched his research library destroyed in a suspicious wall collapse. He

died of brain cancer in 2006, his work unfinished. The controlled experiments that would have settled the question were never funded.[15]

What he left behind is the unifying framework that the establishment's data on Parkinson's now visibly conforms to. Copper-dependent enzyme systems disrupted by environmental chemistry. Toxic metals occupying binding sites where copper should have been. Downstream protein aggregation and oxidative damage. Cellular destruction in the brain region most metabolically dependent on the affected chemistry.

In Parkinson's, that brain region is the substantia nigra.

Why the Substantia Nigra

The substantia nigra is a small structure in the midbrain. Its name means *dark substance* — it appears black to the naked eye because its neurons are densely pigmented with neuromelanin. There are roughly 400,000 to 500,000 of these dopamine-producing cells on each side of the brain, and they initiate and modulate voluntary movement throughout the body.[16]

These neurons are unusually vulnerable. The Frontiers in Cellular Neuroscience review by Ni and Ernst makes the establishment position explicit: substantia nigra dopaminergic neurons are more vulnerable to oxidative stress than other brain cell types because they have a higher baseline ATP requirement, and a higher baseline ATP requirement means a selective vulnerability to anything that impairs Complex I of the electron transport chain.[17]

The dopamine these cells produce is itself oxidatively reactive. Its synthesis requires copper-dependent enzymes — tyrosine hydroxylase converts tyrosine to L-DOPA, dopamine β-hydroxylase converts dopamine to noradrenaline downstream. Disrupt the copper supply,

disrupt the chemistry. The cells generate hydrogen peroxide as a byproduct of normal dopamine handling, which means they run constantly near the edge of oxidative collapse.

Then there is neuromelanin itself. Neuromelanin is a metal-chelating pigment. Under normal conditions it binds excess iron and other metals, sequestering them safely. When the metals are physiological, this is protective. When the metals are toxic — aluminium, manganese, mercury — the same chelation that protects against iron becomes destructive. The metal-bound neuromelanin promotes lipid peroxidation, generates free radicals, and triggers chronic microglial activation that kills the host neuron.[18]

This is the substantia nigra's particular tragedy. It is the brain region most metabolically dependent on Complex I (the enzyme MPTP, rotenone, and the iron-loaded neuromelanin chemistry all converge to inhibit). It is the region most dependent on copper-bound enzymes (which organophosphates and other chelators disrupt). It is the region with the highest density of metal-binding pigment (which concentrates whatever toxic metal happens to be in circulation). It is the region with the highest baseline oxidative load (which means the smallest cumulative insult will cross the symptom threshold).

If you wanted to design a brain region that would fail first under cumulative toxic burden, you could not improve on the substantia nigra. It is exquisitely vulnerable in every direction Purdey's framework predicts vulnerability.

The Aluminium Evidence

Begin with what has been imaged.

In 1992, Good, Olanow and Perl used laser microprobe mass analysis — a technique that vaporises a microscopic spot of tissue and identifies its elemental composition — to examine the neuromelanin granules in the substantia nigra of Parkinson's patients. They found iron. They found aluminium. In the same brain region of age-matched controls, they found no metal.[19]

Christopher Exley spent thirty years at Keele University developing fluorescence microscopy methods to visualise aluminium directly in human tissue. His work on Alzheimer's disease, autism, and multiple sclerosis is published in peer-reviewed journals.[20] His work on Parkinson's was nearing publication in 2021 when he was removed from academia. His collaborator Matt Mold lost his position at the same time.

Exley has since released the unpublished Parkinson's images on Substack, with the autofluorescence controls that confirm what is being seen. The pattern is consistent. Aluminium-positive fluorescence in Purkinje cells of the cerebellum, co-localised with amyloid that is most likely alpha-synuclein. Aluminium in pyramidal neurones of the hippocampal CA1 region. Aluminium in the frontal cortex co-localised with neurofibrillary tangles. Aluminium in the parietal cortex co-localised with senile plaques and with cells in the walls of brain blood vessels.[21]

The peer-reviewed literature predicted what Exley would find. Wenk and Stemmer demonstrated in 1981 — forty-five years ago — that ingested aluminium reduces dopamine in the rat brain.[22] Erazi and colleagues showed in 2011 that chronic dietary aluminium reduces tyrosine hydroxylase expression in the rat substantia nigra and impairs motor function. The rat develops the chemistry of Parkinson's disease.[23] Meglio and Oteiza demonstrated that aluminium enhances melanin-induced lipid peroxidation, providing the mechanism by which aluminium-bound neuromelanin destroys the cell that contains it.[24]

The route by which aluminium reaches the substantia nigra in modern populations is a matter of pharmacokinetics, and the pharmacokinetics differ by exposure route. Aluminium in food is largely handled by the gut and excreted; absorption is in the order of 0.3%. Aluminium injected intramuscularly — as in the aluminium adjuvants used in many vaccines — is engulfed by macrophages at the injection site and distributed throughout the body over months and years. Romain Gherardi's group at Créteil documented persistent aluminium hydroxide in deltoid muscle biopsies a decade or more after vaccination.[25] Khan and Combadière demonstrated, in 2013, slow CCL2-dependent translocation of aluminium adjuvant particles from muscle to brain in mice.[26] Crépeaux and colleagues showed in 2017 that the dose-response relationship is non-linear: lower doses produce more neurotoxicity than higher doses, because higher doses form granulomas at the injection site that wall off the metal, while lower doses translocate more readily.[27]

The implication is uncomfortable but it is what the data say. Aluminium reaches the brain. It accumulates in regions rich in metal-binding pigment. The substantia nigra is one of those regions. Once there, it does what aluminium does to neuromelanin: it generates oxidative damage and microglial inflammation, killing dopaminergic neurons in a self-perpetuating cascade until the neuron population falls below symptomatic threshold.

This is one route into Purdey's mechanism. There are others.

The Mercury Axis

Mercury was the first heavy metal whose effects on the brain were systematically described. The hat-making industry of the eighteenth and nineteenth centuries used mercury salts to felt rabbit fur. Workers in the trade absorbed mercury vapour daily. The clinical picture they developed — tremor, irritability, depression, insomnia, social withdrawal,

cognitive decline — was given a name, *erethism mercurialis*, and entered the language as the phrase "mad as a hatter".[28]

The condition was understood. The cause was understood. When the occupational source was removed from the trade, the condition was largely forgotten. Modern medicine no longer looks for it.

The case for mercury as a primary driver of conditions currently labelled idiopathic — Parkinson's, Alzheimer's, ALS, multiple sclerosis — was made most systematically by Andrew Hall Cutler, a chemist with a PhD and fifteen years in pharmacokinetics research, whose own neurological decline began in 1992 after two amalgam fillings were placed below the gum line. Cutler spent the rest of his life working out the chemistry of chronic mercury accumulation and the protocol for removing it. His work, completed by Rebecca Lee in *The Mercury Detoxification Manual*, lays out the case directly: many of the diseases of unknown origin "can 'just be mercury'", and the patients now being told they have idiopathic Parkinson's are, in a substantial proportion of cases, carrying decades of mercury in tissues their physicians have never thought to test.[29]

Amalgam Illness: Diagnosis and Treatment: What You Can Do to Get Better, How Your Doctor Can Help You (1999)

UNBEKOMING • MARCH 27, 2025

Read full story

Interview with Rebecca Lee

UNBEKOMING • JAN 24

Read full story

Mercury preferentially binds to thiol sulphur groups, which are densely concentrated in the brain, the liver, the thyroid, the adrenal glands, and the cells of the immune system.[30] The dopaminergic neurons of the substantia nigra are thiol-rich and metabolically active. Mercury accumulates there for the same reasons aluminium does — a metal-

binding affinity in a region that handles a great deal of redox chemistry under heavy metabolic load.

The intention tremor of chronic mercury accumulation is, in Lee and Cutler's clinical description, the same tremor a Parkinson's diagnosis names. Deteriorating handwriting. Difficulty using utensils. Lip tremor affecting speech. Eventual whole-body involvement. Patients present with this constellation, are tested for blood and urine mercury, are told their levels are normal, and are told they have idiopathic Parkinson's disease. The testing is the problem. Mercury leaves blood and urine within months of acute exposure. A patient with decades of cumulative mercury accumulation in brain tissue will test negative on the panel their physician ordered. The panels are designed to detect the wrong thing.[31]

Cutler illustrated the diagnostic gap with his own case. He was a trained chemist who had just received fresh amalgam fillings. His treating physician, an MD with biochemistry training, asked once whether he worked with mercury, accepted the no, and moved on. The dental work two weeks earlier was not considered. If a chemist with documented exposure is missed by a scientifically literate doctor, the rate at which ordinary patients with progressive neurological symptoms are being missed is implied without further argument.[32]

The dominant population-level chronic mercury exposure remains dental amalgam, which is fifty per cent mercury by weight and releases mercury vapour with chewing, brushing, and the heat of hot drinks.[33] Thimerosal, a mercury-based preservative, was nominally removed from most paediatric vaccines in the United States after 2003 but remains in multi-dose influenza vaccines and in many adult and international vaccines. Methylmercury accumulates in large predatory fish through the marine food chain.

A patient who has carried amalgam fillings for forty years, eaten tuna twice a week, received decades of seasonal flu shots, and presents at sixty-five with progressive tremor and bradykinesia is the median

Parkinson's patient. Their mercury exposure history is invisible to standard testing. The diagnostic language calls their condition idiopathic.

The Pesticide Cohort

The most comprehensive epidemiological work on Parkinson's and pesticides has been done by Caroline Tanner and colleagues at the Parkinson's Institute, working within the Agricultural Health Study — a prospective cohort of nearly 85,000 licensed pesticide applicators and their spouses recruited in Iowa and North Carolina.

Tanner's 2011 paper in *Environmental Health Perspectives* found that those who had used paraquat or rotenone were 2.5 times more likely to develop Parkinson's disease than those who had not.[34] The interpretation written by the authors is direct: "Our findings, considered together with earlier results, suggest that paraquat use plays a role in human PD. Because paraquat remains one of the most widely used herbicides worldwide… this finding potentially has great public health significance."

The detail in that paper that should have ended the *idiopathic* designation reads as follows: "Cases who did or did not use rotenone, paraquat, or groups of pesticides with similar mechanisms were generally similar, suggesting that PD associated with these agents is clinically typical and indirectly supporting a role for pesticide exposure in the etiology of typical PD."

The clinical syndrome of pesticide-caused Parkinson's is indistinguishable from idiopathic Parkinson's. Establishment authors, in a peer-reviewed journal, said so directly. The disease pesticides cause is the disease the field calls idiopathic. The two cannot be separated on

clinical grounds. The *idiopathic* label is doing the work of erasing the cause.

The UCLA group led by Beate Ritz examined residential exposure rather than occupational exposure. Their 2009 paper in the *American Journal of Epidemiology* found that residents of California's Central Valley living within 500 metres of fields sprayed with paraquat and maneb between 1974 and 1999 had a 75 per cent greater risk of Parkinson's. For those who developed the disease before age sixty, the risk was elevated four- to six-fold.[35] Combined exposure to ziram, maneb, and paraquat at workplaces tripled the risk.[36]

Rotenone's mechanism makes the convergence with MPTP visible. Both inhibit Complex I of the electron transport chain directly. Greenamyre's group at Pittsburgh demonstrated that chronic systemic rotenone exposure in rats reproduces the full picture of Parkinson's disease — selective nigrostriatal dopaminergic degeneration, motor symptoms, and the characteristic alpha-synuclein-positive cytoplasmic inclusions known as Lewy bodies.[37] The pesticide produces the entire pathology, including the protein aggregation. The aggregation is downstream of the toxic insult, exactly as Purdey's framework predicts.

Paraquat reaches the same lesion by a different chemical route. Rather than binding Complex I directly, it undergoes redox cycling within the cell, generating reactive oxygen species that damage mitochondrial function and produce oxidative injury to the same neurons.[38] Different molecular handle, same outcome.

The structural similarity between MPP+ and paraquat is not coincidence. Both are bipyridyl pyridinium cations. Both are taken up into dopaminergic neurons. Both produce Complex I dysfunction in the substantia nigra. Paraquat was banned in the European Union in 2007, in China in 2017, in Brazil in 2020, and in over sixty-five countries in total. It remains licensed in the United States, where its use has roughly

doubled since 2014.[39] The EPA's own product label states *one sip can kill*. There is no antidote.

Solvents complete the picture. Trichloroethylene — TCE — has been used for a century in industrial degreasing, dry cleaning, and the decaffeination of coffee. It is one of the most common organic groundwater contaminants in the United States. Goldman and colleagues, in a discordant-twin study published in *Annals of Neurology* in 2012, found that twins exposed to TCE through occupation or hobby were six times more likely to develop Parkinson's than their unexposed siblings.[40] Perchloroethylene and carbon tetrachloride showed similar trends.

In 2023 the Goldman group examined the population at Marine Corps Base Camp Lejeune, where the on-base water supply was contaminated with TCE at concentrations more than seventy times the EPA limit between 1953 and 1987, along with perchloroethylene, benzene, and vinyl chloride. The cohort included 340,489 service members. Those stationed at Lejeune had a 70 per cent higher risk of Parkinson's than service members at an equivalent uncontaminated base.[41] The Department of Veterans Affairs added Parkinson's disease to its list of presumptive service-connected conditions for Lejeune veterans in 2017. The federal government acknowledges, in the form of monthly disability payments, that solvent exposure causes Parkinson's. The medical literature continues to call the disease idiopathic.

The 1837 Couper Case

Twenty years before James Parkinson published his essay on the shaking palsy, a Glasgow physician named John Couper described two workers at the Charles Tennant chlorine bleach manufactory.[42] They had been exposed for years to manganese oxide dust. They developed paraplegia, festinating gait, hypophonia, masked facies — the full

picture Parkinson would later name. Couper called the condition the shaking palsy. He attributed it, correctly, to chronic manganese exposure.

This is the first clinical description of Parkinsonian disease in the medical literature, and it is a description of chemical injury. The disease was identified as a poisoning at the moment of its first appearance in print. The medical establishment has spent the subsequent 188 years declining to remember.

Manganese exposure as a cause of Parkinsonism has continued to surface throughout the modern era wherever industrial manganese is encountered. The most consistent recent work has been done by Brad Racette at Washington University in St Louis, examining welders exposed to manganese-containing fumes.

Racette's 2017 study of 886 welders found that more than 15 per cent met clinical criteria for Parkinsonism, and that the more they were exposed to manganese fumes, the faster their symptoms progressed.[43] Symptoms appeared at exposure concentrations as low as 0.14 mg per cubic metre — nearly thirty-five times below the legal OSHA threshold of 5 mg per cubic metre. The regulatory limit was set thirty-five times too high to protect workers from clinical disease.[44]

PET imaging in this cohort showed dopaminergic deficits in the substantia nigra and striatum that were, in Racette's published language, indistinguishable from those seen in idiopathic Parkinson's. The clinical syndrome, the imaging findings, and the underlying chemistry all converge on the same lesion. Manganism and idiopathic Parkinson's are the same disease produced by partially overlapping chemical pathways.

This brings the metal axis back to Purdey. Manganese substitution at copper-binding sites is the second step of his framework. The welders are not developing a different disease from the farmers who used paraquat, the Marines who drank Lejeune water, the patients carrying

decades of dental amalgam, or the elderly receiving annual aluminium-adjuvanted vaccines. They are developing the same lesion through different chemical entry points.

The Encephalitis That Became Parkinson's

Between 1916 and 1930, a wave of acute brain inflammation swept through Europe, North America, and beyond. It was named encephalitis lethargica or von Economo encephalitis, after the Viennese neurologist Constantin von Economo who first described it. Estimates of the toll vary widely. Somewhere between one and five million people were affected, with several hundred thousand deaths and a comparable number left chronically disabled.[45]

A characteristic feature of survivors was the development, sometimes years later, of a Parkinsonian syndrome — post-encephalitic Parkinsonism. Oliver Sacks documented these patients at Beth Abraham Hospital in the Bronx. His 1973 book *Awakenings* records what happened when he gave them L-DOPA in 1969. Patients who had been frozen in catatonia for decades returned briefly to animated life. The animation was not durable. Within months most had developed dyskinesias, on-off oscillations, psychiatric complications, and many slid back into a state worse than the one from which they had been temporarily released.[46]

The official cause of encephalitis lethargica has never been identified. The 1918 influenza was suspected, but modern PCR studies of preserved tissue have failed to recover influenza RNA, and the case for influenza causation has been substantially weakened.[47] Other candidates — enteroviruses, autoimmune mechanisms, streptococcal infection — remain unproven.

The chemical and environmental context of the period is rarely included in the official story. The decade was characterised by the largest

expansion of industrial organic chemistry in human history: chlorine and phosgene as wartime gases and post-war industrial solvents, the first widespread agricultural use of arsenic and lead pesticides such as Paris Green and lead arsenate, the pharmaceutical mass production of barbiturates, the rise of coal-tar derivatives, the deployment of mercury in pulp paper manufacturing, and the global distribution of munitions waste from the First World War. The geographic spread of encephalitis lethargica tracked troop movements and industrial intensification.

The clinical pattern of post-encephalitic Parkinsonism — initial response to L-DOPA, then dyskinesias and on-off complications, then progressive loss of efficacy — is identical to the trajectory of idiopathic Parkinson's on chronic L-DOPA. The two are not separate conditions. They are the same lesion arising from different upstream insults. The failure to identify a single infectious agent for encephalitis lethargica is consistent with what one would expect if the upstream insult were chemical and environmental rather than microbial.

The encephalitis disappeared in the early 1930s as suddenly as it had arrived. The chemistry of the period continued to evolve. The Parkinson's it produced has been with us ever since.

The Drug Story Hidden Inside the Drug Cabinet

If chemicals cause Parkinson's, then we should expect to see Parkinsonism produced by drugs that act on the same chemistry. We do.

Drug-induced Parkinsonism is recognised in the medical literature as a separate clinical entity. The list of agents is long. Antipsychotics — haloperidol, risperidone, olanzapine, the older phenothiazines — block dopamine D2 receptors in the brain. Antiemetics that cross the blood-

brain barrier — metoclopramide, prochlorperazine — do the same. Calcium channel blockers used in some countries for vertigo and migraine, particularly flunarizine and cinnarizine, bind dopamine receptors and reduce presynaptic dopamine availability. Valproate, used widely for epilepsy and bipolar disorder, produces mitochondrial dysfunction and oxidative stress. Lithium has multiple mechanisms. Reserpine and tetrabenazine deplete monoamine vesicles directly.[48]

About 80 per cent of patients on first-generation antipsychotics develop at least one extrapyramidal side effect. Roughly five per cent of long-term valproate users develop frank drug-induced Parkinsonism.[49] Drug-induced Parkinsonism accounts for an estimated 15 to 20 per cent of all secondary Parkinsonism cases in modern reviews. Metoclopramide alone accounts for nearly a third of all drug-induced movement disorders.

The official line is that drug-induced Parkinsonism resolves within six to twelve months of withdrawal of the offending drug. The reality is messier. A substantial proportion of cases do not resolve. Calzetti and Negrotti reported in 2025 that 13 of 30 patients with flunarizine- or cinnarizine-induced Parkinsonism required L-DOPA treatment despite cessation of the drug, indicating persistent damage rather than transient receptor blockade.[50] A Mayo Clinic historical cohort study found that drug-induced Parkinsonism doubles the long-term risk of subsequent *idiopathic* Parkinson's diagnosis.[51]

This last finding deserves attention. Patients who developed Parkinsonism on a drug, were withdrawn from the drug, partially recovered, and then years later developed apparent idiopathic Parkinson's are being counted twice. Their Parkinsonism is first attributed to the drug, then re-diagnosed as idiopathic when the drug history fades from the chart. The *idiopathic* category is absorbing patients whose disease has a documented chemical origin. The label is doing its work of erasure even within the clinical record.

What Begins Decades Before the Tremor

Heiko Braak's 2003 paper in *Neurobiology of Aging* proposed that Parkinson's disease begins not in the brain but in the gut and the olfactory bulb.[52] Alpha-synuclein aggregates appear first in the enteric nervous system and the olfactory regions; from there they ascend, retrograde, through the dorsal motor nucleus of the vagus into the brainstem, and only late in the disease reach the substantia nigra. The clinical Parkinson's diagnosis is given at the point of motor symptom onset — which is the end of a decades-long process, not its beginning.

Braak's paper used the language of "an unknown pathogen — virus or bacterium — in the gut" as the initiating cause. The framework is equally consistent with an environmental toxin entering the body through the gut and the nasal mucosa. The route of entry is what matters. The identity of the pathogen Braak's paper left open.

The Danish national registry provides the natural experiment. Svensson and colleagues, in *Annals of Neurology* in 2015, examined the long-term Parkinson's incidence in patients who had undergone surgical vagotomy — severance of the vagus nerve, historically performed for peptic ulcer disease.[53] Full truncal vagotomy was associated with a substantial reduction in Parkinson's risk, with the protective effect strongest at more than twenty years of follow-up. Liu and colleagues replicated the finding in the Swedish registry.[54]

If the vagus nerve is the conduit by which a gut-originating insult reaches the brain, severing the conduit should reduce the disease. It does. The data are consistent with a peripheral entry route for whatever is driving the central pathology.

The prodromal symptoms support the same picture. Constipation precedes motor symptoms in Parkinson's by an average of more than two decades.[55] Loss of sense of smell precedes motor symptoms by a

similar interval. Sleep disturbance, particularly REM sleep behaviour disorder, precedes motor symptoms by years. Each is a sign of injury to a neural system that handles autonomic, olfactory, or brainstem function. Each is consistent with a disease process that begins peripherally and ascends slowly over decades.

The microbiome work extends the gut argument further. Sampson and colleagues, in *Cell* in 2016, demonstrated that germ-free mice engineered to overexpress alpha-synuclein did not develop motor deficits. Colonisation with faecal microbiota from Parkinson's patients was sufficient to produce the disease.[56] The microbiome is necessary for the alpha-synuclein-driven pathology to manifest. What disturbs the microbiome of Parkinson's patients in the first instance is, of course, exactly the dietary and environmental chemistry the rest of this essay has been describing — pesticide-laden food, glyphosate residues, antibiotics, heavy metal exposures from amalgams and water supply, processed food additives, and the cumulative chemical burden of modern industrial life.

The disease begins in the gut. The substantia nigra is where it ends.

The Aggregation Story, and Why It Has Failed

The dominant mechanistic model in mainstream Parkinson's research is the alpha-synuclein hypothesis. Two papers in 1997 launched it. Polymeropoulos and colleagues identified a mutation in the SNCA gene — which codes for alpha-synuclein — in several families with inherited Parkinson's disease.[57] Spillantini and colleagues showed that alpha-synuclein is the major component of Lewy bodies, the cellular inclusions that pathologists have used since 1912 as the defining histological marker of the disease.[58] The two findings together produced a research

programme: the protein is the cause; clearing the protein from the brain should slow or stop the disease.

The clinical trials of that hypothesis have collapsed. Roche's prasinezumab failed its primary endpoint in the PASADENA trial, published in *NEJM* in 2022.[59] Biogen's cinpanemab failed in the SPARK trial, published in the same issue, and Biogen abandoned the programme.[60] Lundbeck's Lu AF82422 failed in multiple system atrophy in 2024. Roche's follow-up PADOVA trial of prasinezumab failed its primary endpoint in 2024. Four trials, four failures, against a hypothesis the field has been pursuing for nearly thirty years.

The interpretation offered by the field is that the antibodies were given too late, that the dosing was wrong, that the trial designs were inadequate. The interpretation the data permit, and which a smaller dissenting literature has been arguing for years, is that alpha-synuclein aggregation is downstream of the disease process rather than its cause. Heat shock protein and autophagy research has consistently shown that protein aggregation is the cell's response to oxidative, mitochondrial, and ER stress — sequestration of damaged protein into inclusions when capacity for clearance is exceeded.[61] The aggregates are the cellular signature of an injury that began upstream. Removing the aggregates does not reverse the injury, because the injury was never the aggregates.

This is exactly Purdey's argument applied to a different protein. In bovine spongiform encephalopathy, the misfolded prion protein was treated as the cause; Purdey showed it was the downstream marker of organophosphate-induced copper depletion and manganese substitution. In Parkinson's disease, alpha-synuclein aggregation has been treated as the cause; the failed antibody trials and the upstream oxidative-stress literature suggest it too is downstream of an environmental injury.

The structural parallel matters. The misfolded-protein framework, in both cases, has functioned to redirect attention away from external chemicals — regulable, litigable, withdrawable from the market — and toward internal protein chemistry, which is targetable only by proprietary monoclonal antibodies that have not, in either case, halted the disease.

The same template is now being deployed against deer through Chronic Wasting Disease. The same template against poultry through avian influenza. The same template against pork through African Swine Fever. The same template, scaled to the human brain, in Parkinson's disease.[62]

L-DOPA, and What It Is Actually Doing

L-DOPA was introduced in the late 1960s. It crosses the blood-brain barrier and is converted to dopamine by aromatic L-amino acid decarboxylase. In a brain whose dopaminergic neurons are dying, it provides the substrate the dying cells can no longer produce. It restores movement. For the first three to five years it does so reliably, and for many patients spectacularly. The clinical literature names the period: the honeymoon.

After the honeymoon, the picture changes. L-DOPA-induced dyskinesias — involuntary writhing movements that the drug itself causes — emerge in around 30 per cent of patients by five years of treatment, and in the majority by ten to fifteen years. Estimates vary by cohort and definition; the AJMC review puts the figure at roughly 90 per cent by nine to fifteen years, while the cleanest prospective study to date (the CamPaIGN cohort, thirteen-year follow-up) found 55.7 per cent at ten years.[63] Whatever the precise number, the long-term reality is the same: most patients on chronic L-DOPA will develop dyskinesias, and the drug that gave them their lives back will, in time, take a different kind of bodily control away from them.

Motor fluctuations emerge alongside the dyskinesias: the on-off phenomenon, where patients oscillate between rigid immobility and sudden hyperkinetic states as drug levels rise and fall in the bloodstream. Impulse control disorders — pathological gambling, hypersexuality, compulsive shopping, binge eating — affect between 17 and 51 per cent of patients on dopamine agonists, which are added to L-DOPA when the latter alone is no longer enough.[64]

The honest establishment statement is in the LEAP trial, published in *NEJM* in 2019. The investigators conducted a delayed-start randomised trial to determine whether early L-DOPA treatment slowed disease progression. It did not. The published conclusion: "This finding of no significant between-group difference at week 80 implies that levodopa had no disease-modifying effect."[65] The American Academy of Neurology's 2021 practice guideline states the matter plainly: "There are no current disease-modifying pharmacologic treatments for PD; current PD pharmacologic therapy is symptomatic only."[66]

After sixty years of pharmacology, the establishment offers no drug that alters the underlying lesion. Every available therapy is palliation of dopamine deficiency in a brain that continues to lose dopaminergic neurons, while the chemistry that has been killing them goes unaddressed.

What L-DOPA does, in the framework this essay has been building, is replace what the damaged cells can no longer make. It does nothing about the toxic burden that damaged them. The disease progresses. The drug's effect on the cells that remain becomes increasingly chaotic as their numbers fall. The drug is symptomatic management of an ongoing poisoning.

How to Explain All This to a Six-Year-Old

There is a small black part of your brain. It is called the substantia nigra. It looks black because it is full of a special dark stuff called neuromelanin. The black part makes a chemical called dopamine. Dopamine helps you move.

The black part is very busy. It works hard every minute of your life. Because it works so hard, it gets tired easily, and when it gets hurt, it does not always heal well.

Now imagine that little black part is like a very fancy clock. The clock has tiny copper wheels inside it. Copper is the right metal for the wheels. The wheels need to be copper for the clock to keep good time.

People put bad metals into their bodies without meaning to. Aluminium from some shots. Mercury from old grey fillings in their teeth. Manganese from welding fumes. Lead from old pipes. The bad metals find the little black part of the brain because that part has special pigment that grabs onto metals.

When the bad metals get inside the clock, they push the copper out and take the copper's place. But the bad metals are the wrong shape. The clock starts to run badly. It makes loud cracking noises. The cracking damages the room around the clock.

Some chemicals do not bring bad metals — they steal the copper. Sprays that farmers put on plants. Cleaning chemicals in factories. These chemicals grab the copper and pull it out of the clock.

Either way, the clock loses its copper. The wheels stop working. The clock breaks.

When enough clocks break, the black part of the brain stops making enough dopamine. The person cannot move properly. Their hand shakes. They cannot write. They cannot button their shirt.

Doctors call this Parkinson's disease. They say nobody knows what causes it. But scientists have known for a long time. They have written it down in their books. The bad metals and the copper-stealing chemicals are causing the disease. Doctors give a medicine called L-DOPA that helps the broken clocks make a little more dopamine. The medicine helps for a while. The medicine does not fix the clocks. The bad metals are still there. More clocks keep breaking.

If the bad metals stopped being put into bodies, fewer people would get sick. If the doctors looked for the bad metals and helped people get them out, some people might get a little better.

But the bad metals come from big companies. The companies do not want to stop. So the doctors say nobody knows what causes Parkinson's disease. And the people keep getting sick.

That is what Parkinson's disease really is.

The Idiopathic Word

Read the establishment's own files in the order this essay has presented them and the picture is stable.

The biochemical defect that defines Parkinson's disease — Complex I dysfunction in the substantia nigra — is the same defect produced by MPTP, paraquat, rotenone, and trichloroethylene. Schapira said so in 1990.

The clinical syndrome MPTP produces is indistinguishable from idiopathic Parkinson's. Langston and Ballard said so in 1985.

Pesticide-caused Parkinson's is clinically typical of idiopathic Parkinson's. Tanner and the Agricultural Health Study group said so in 2011.

Solvent-exposed Parkinson's is the same clinical disease. Goldman and the discordant-twin group said so in 2012.

The dopaminergic deficits in welders exposed to manganese are indistinguishable from those in idiopathic Parkinson's. Racette said so in 2017.

The aluminium accumulation in Parkinson's neuromelanin is documented. Good, Olanow and Perl said so in 1992. Exley confirmed it with contemporary methods.

The mercury accumulation in chronically exposed populations produces Parkinsonian tremor. The hatters demonstrated it in the nineteenth century.

The Parkinson's that emerges from drug exposure is indistinguishable from idiopathic Parkinson's. Multiple peer-reviewed sources say so.

Camp Lejeune Marines have a 70 per cent elevated Parkinson's incidence from drinking solvent-contaminated water. The Department of Veterans Affairs pays them disability for it.

Levodopa is symptomatic only. The American Academy of Neurology says so.

After all of this, the disease is officially of unknown cause.

The word *idiopathic* is doing the work it has been deployed to do. It absorbs everything we have just listed and emits, on the other side, a category whose causal openness justifies indefinite expansion of testing, screening, and pharmaceutical intervention while shielding the upstream chemistry from regulation, withdrawal, and litigation. The label is not a finding. It is a classification choice. And the classification choice protects the producers of the chemistry that is making people sick.

This is the same pattern that has been documented in BSE — where Mark Purdey's organophosphate hypothesis was defunded while the prion-as-cause framework justified the destruction of millions of cattle. In CWD — where the prion testing apparatus is now being deployed against American deer hunters and the toxicological questions are not being asked. In autism — where injected aluminium adjuvants and cumulative environmental load are reframed as genetic. In dyslexia — where industrial neurotoxicants documented in *Lancet Neurology* are kept out of the discipline that names the condition.[67]

The substantia nigra is one of the most metabolically vulnerable structures in the human body. We have spent a century intensifying the chemical pressure on it — through agriculture, through dentistry, through pharmaceuticals, through industrial pollution, through occupational exposure, through the injection schedule, through solvents in groundwater, through manganese in welder fumes, through mercury in fish, through paraquat in food, through aluminium in everything from cookware to vaccine adjuvants. The disease that has emerged is the disease the chemistry predicts.

What is Parkinson's? It is the substantia nigra failing under cumulative chemical injury. It is the predictable consequence of decades of exposure to compounds the establishment's own literature has identified, in its own words, as causes. It is a chemical poisoning that medicine has chosen to call idiopathic.

It is, in the precise sense Schapira used in 1990, what an environmental toxin does to the brain.

References

1. Schapira AHV, Mann VM, Cooper JM, Dexter D, Daniel SE, Jenner P, Clark JB, Marsden CD. "Anatomic and disease specificity of NADH

CoQ1 reductase (complex I) deficiency in Parkinson's disease." *Journal of Neurochemistry* 1990; 55(6): 2142–2145.

2. Verschuur CVM, Suwijn SR, Boel JA, Post B, Bloem BR, van Hilten JJ, et al. "Randomized Delayed-Start Trial of Levodopa in Parkinson's Disease." *New England Journal of Medicine* 2019; 380: 315–324; Pringsheim T et al. American Academy of Neurology Practice Guideline. *Neurology* 2021.
3. Langston JW, Palfreman J. *The Case of the Frozen Addicts*. New York: Pantheon Books, 1995.
4. Langston JW, Ballard P, Tetrud JW, Irwin I. "Chronic Parkinsonism in humans due to a product of meperidine-analog synthesis." *Science* 1983; 219(4587): 979–980.
5. Davis GC, Williams AC, Markey SP, Ebert MH, Caine ED, Reichert CM, Kopin IJ. "Chronic Parkinsonism secondary to intravenous injection of meperidine analogues." *Psychiatry Research* 1979; 1: 249–254.
6. Ballard PA, Tetrud JW, Langston JW. "Permanent human parkinsonism due to 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP): seven cases." *Neurology* 1985; 35(7): 949–956.
7. Langston JW. "The MPTP Story." *Journal of Parkinson's Disease* 2017; 7(s1): S11–S19.
8. Langston JW, ibid.
9. Borah TJ. "The Pesticide Connection." *Chemical & Engineering News* 2013; 91(47): 31–34. Cyperquat (MPP+ chloride) was developed by Gulf Oil Chemical Co. in the 1970s as a herbicide for nutsedge control.
10. US Environmental Protection Agency, Pesticide Use Reports; California Department of Pesticide Regulation Annual Reports, 2014–2024.
11. Purdey M. "The UK epidemic of BSE: slow virus or chronic pesticide-initiated modification of the prion protein?" *Medical*

Hypotheses 1996; 46(5): 445–454.

12. Purdey M. *Animal Pharm: One Man's Struggle to Discover the Truth about Mad Cow Disease and Variant CJD.* Edinburgh: Clairview Books, 2007.
13. Purdey M. "Ecosystems supporting clusters of sporadic TSEs demonstrate excesses of the radical-generating divalent cation manganese and deficiencies of antioxidant co factors Cu, Se, Fe, Zn." *Medical Hypotheses* 2000; 54(2): 278–306.
14. Purdey, *Animal Pharm*, op. cit.
15. Whatley S. Research on phosmet as BSE trigger, London Institute of Psychiatry, privately funded; subsequent government funding denied. Documented in Purdey, *Animal Pharm*.
16. Ni A, Ernst C. "Evidence That Substantia Nigra Pars Compacta Dopaminergic Neurons Are Selectively Vulnerable to Oxidative Stress Because They Are Highly Metabolically Active." *Frontiers in Cellular Neuroscience* 2022; 16: 826193.
17. Ni and Ernst, ibid.
18. Zucca FA, Segura-Aguilar J, Ferrari E, Muñoz P, Paris I, Sulzer D, Sarna T, Casella L, Zecca L. "Interactions of iron, dopamine and neuromelanin pathways in brain aging and Parkinson's disease." *Progress in Neurobiology* 2017; Zhang W, Zecca L, Wilson B et al. "Human neuromelanin: an endogenous microglial activator for dopaminergic neuron death." *Frontiers in Bioscience (Elite ed.)* 2013; 5: 1–11.
19. Good PF, Olanow CW, Perl DP. "Neuromelanin-containing neurons of the substantia nigra accumulate iron and aluminum in Parkinson's disease: a LAMMA study." *Brain Research* 1992; 593(2): 343–346.
20. Mirza A, King A, Troakes C, Exley C. "Aluminium in brain tissue in familial Alzheimer's disease." *Journal of Trace Elements in Medicine and Biology* 2017; 40: 30–36; Mold M, Umar D, King A, Exley C.

"Aluminium in brain tissue in autism." *Journal of Trace Elements in Medicine and Biology* 2018; 46: 76–82.

21. Exley C. "Parkinson's Disease and Aluminium" (parts I, II, and III). *Dr's Newsletter* (Substack), December 2024 to January 2026. Unpublished microscopy from the Exley/Mold laboratory, released after removal from academia in 2021.
22. Wenk GL, Stemmer KL. "The influence of ingested aluminum upon norepinephrine and dopamine levels in the rat brain." *Neurotoxicology* 1981; 2(2): 347–353.
23. Erazi H, Ahboucha S, Gamrani H. "Chronic exposure to aluminum reduces tyrosine hydroxylase expression in the substantia nigra and locomotor performance in rats." *Neuroscience Letters* 2011; 487(1): 8–11.
24. Meglio L, Oteiza PI. "Aluminum enhances melanin-induced lipid peroxidation." *Neurochemistry Research* 1999; 24(8): 1001–1008.
25. Gherardi RK, Coquet M et al. "Macrophagic myofasciitis lesions assess long-term persistence of vaccine-derived aluminium hydroxide in muscle." *Brain* 2001; 124(Pt 9): 1821–1831.
26. Khan Z, Combadière C et al. "Slow CCL2-dependent translocation of biopersistent particles from muscle to brain." *BMC Medicine* 2013; 11: 99.
27. Crépeaux G et al. "Non-linear dose-response of aluminium hydroxide adjuvant particles: Selective low dose neurotoxicity." *Toxicology* 2017; 375: 48–57.
28. Waldron HA. "Did the Mad Hatter have mercury poisoning?" *British Medical Journal* 1983; 287: 1961.
29. Cutler AH. *Amalgam Illness: Diagnosis and Treatment*. Self-published, 1999; Lee R, Cutler AH. *The Mercury Detoxification Manual: A Guide to Mercury Chelation*. Self-published, 2018. Andrew Hall Cutler was an industrial chemist (PhD, Princeton; fifteen years in pharmacokinetics research) whose own neurological decline began

in 1992 following placement of two amalgam fillings below the gum line; Rebecca Lee co-authored and completed the *Manual* after his death.

30. Lee and Cutler, *Mercury Detoxification Manual*, op. cit., section 6.2; Andreoli V, Sprovieri F. "Genetic Aspects of Susceptibility to Mercury Toxicity: An Overview." *International Journal of Environmental Research and Public Health* 2017; 14(1): 93.
31. Lee and Cutler, op. cit., chapter 4 ("Testing").
32. Lee and Cutler, op. cit., preface to section 2 (Cutler's account of his own missed diagnosis).
33. World Health Organization. *Exposure to Mercury: A Major Public Health Concern.* Geneva: WHO, 2007.
34. Tanner CM, Kamel F, Ross GW, Hoppin JA, Goldman SM, et al. "Rotenone, paraquat, and Parkinson's disease." *Environmental Health Perspectives* 2011; 119(6): 866–872.
35. Costello S, Cockburn M, Bronstein J, Zhang X, Ritz B. "Parkinson's disease and residential exposure to maneb and paraquat from agricultural applications in the Central Valley of California." *American Journal of Epidemiology* 2009; 169(8): 919–926.
36. Wang A, Costello S, Cockburn M, Zhang X, Bronstein J, Ritz B. "Parkinson's disease risk from ambient exposure to pesticides." *European Journal of Epidemiology* 2011; 26(7): 547–555.
37. Betarbet R, Sherer TB, MacKenzie G, Garcia-Osuna M, Panov AV, Greenamyre JT. "Chronic systemic pesticide exposure reproduces features of Parkinson's disease." *Nature Neuroscience* 2000; 3(12): 1301–1306.
38. Greenamyre JT, in Borah, "The Pesticide Connection," *Chemical & Engineering News* 2013; paraquat damages Complex I indirectly via redox cycling rather than by direct binding.
39. US EPA paraquat registration documents and Pesticide Use Reports; Pesticide Action Network International, "Highly Hazardous

Pesticides" registry.

40. Goldman SM, Quinlan PJ, Ross GW, Marras C, Meng C, et al. "Solvent exposures and Parkinson disease risk in twins." *Annals of Neurology* 2012; 71(6): 776–784.
41. Goldman SM, Weaver FM, Stroupe KT, Cao L, Gonzalez B, Colletta K, Brown EG, Tanner CM. "Risk of Parkinson Disease Among Service Members at Marine Corps Base Camp Lejeune." *JAMA Neurology* 2023; 80(7): 673–681; US Department of Veterans Affairs presumptive service connection rule, 2017.
42. Couper J. "On the effects of black oxide of manganese when inhaled into the lungs." *British Annals of Medicine, Pharmacy, Vital Statistics, and General Science* 1837; 1: 41–42.
43. Racette BA, Searles Nielsen S, Criswell SR, Sheppard L, Seixas N, Warden MN, Checkoway H. "Dose-dependent progression of parkinsonism in manganese-exposed welders." *Neurology* 2017; 88(4): 344–351.
44. Racette BA. "Manganism in the 21st Century: The Hanninen Lecture." *NeuroToxicology* 2014.
45. Berger JR, Vilensky JA. "Encephalitis lethargica (von Economo's encephalitis)." *Handbook of Clinical Neurology* 2014; 123: 745–761.
46. Sacks O. *Awakenings*. London: Duckworth, 1973 (revised editions 1976, 1982, 1990).
47. McCall S, Vilensky JA, Gilman S, Taubenberger JK. "The relationship between encephalitis lethargica and influenza: a critical analysis." *Journal of Neurovirology* 2008; 14(3): 177–185.
48. Bohlega SA, Al-Foghom NB. "Drug-induced Parkinson's disease: A clinical review." *Neurosciences (Riyadh)* 2013; 18(3): 215–221; Shin H-W, Chung SJ. "Drug-induced parkinsonism." *Journal of Clinical Neurology* 2012; 8(1): 15–21.
49. Armon C, Shin C, Miller P et al. "Reversible parkinsonism and cognitive impairment with chronic valproate use." *Neurology* 1996;

47: 626–635.

50. Calzetti S, Negrotti A. “Persistent parkinsonism in patients exposed to flunarizine and cinnarizine.” *Annals of Pharmacotherapy* 2025; 59(3): 289–293.

51. Chabolla DR, Maraganore DM, Ahlskog JE, O’Brien PC, Rocca WA. “Drug-induced parkinsonism as a risk factor for Parkinson’s disease: a historical cohort study in Olmsted County, Minnesota.” *Mayo Clinic Proceedings* 1998; 73: 724–727.

52. Braak H, Del Tredici K, Rüb U, de Vos RAI, Jansen Steur ENH, Braak E. “Staging of brain pathology related to sporadic Parkinson’s disease.” *Neurobiology of Aging* 2003; 24(2): 197–211.

53. Svensson E, Horváth-Puhó E, Thomsen RW, Djurhuus JC, Pedersen L, Borghammer P, Sørensen HT. “Vagotomy and subsequent risk of Parkinson’s disease.” *Annals of Neurology* 2015; 78(4): 522–529.

54. Liu B, Fang F, Pedersen NL, Tillander A, Ludvigsson JF, Ekbom A, Svenningsson P, Chen H, Wirdefeldt K. “Vagotomy and Parkinson disease: A Swedish register-based matched-cohort study.” *Neurology* 2017; 88(21): 1996–2002.

55. Savica R, Carlin JM, Grossardt BR, Bower JH, Ahlskog JE, Maraganore DM, Bharucha AE, Rocca WA. “Medical records documentation of constipation preceding Parkinson disease: A case-control study.” *Neurology* 2009; 73(21): 1752–1758.

56. Sampson TR, Debelius JW, Thron T, Janssen S, Shastri GG, et al. “Gut Microbiota Regulate Motor Deficits and Neuroinflammation in a Model of Parkinson’s Disease.” *Cell* 2016; 167(6): 1469–1480.e12.

57. Polymeropoulos MH, Lavedan C, Leroy E, Ide SE, Dehejia A, et al. “Mutation in the alpha-synuclein gene identified in families with Parkinson’s disease.” *Science* 1997; 276(5321): 2045–2047.

58. Spillantini MG, Schmidt ML, Lee VM-Y, Trojanowski JQ, Jakes R, Goedert M. “Alpha-synuclein in Lewy bodies.” *Nature* 1997; 388(6645): 839–840.

59. Pagano G, Taylor KI, Anzures-Cabrera J, Marchesi M, Simuni T, et al. “Trial of Prasinezumab in Early-Stage Parkinson’s Disease.” *New England Journal of Medicine* 2022; 387(5): 421–432.

60. Lang AE, Siderowf AD, Macklin EA, Poewe W, Brooks DJ, Fernandez HH, et al. “Trial of Cinpanemab in Early Parkinson’s Disease.” *New England Journal of Medicine* 2022; 387(5): 408–420.

61. Höllerhage M et al. “Multiple molecular pathways stimulating macroautophagy protect from alpha-synuclein-induced toxicity in human neurons.” *Neuropharmacology* 2019; 149: 13–26; Fussi N et al. “Exosomal secretion of alpha-synuclein as protective mechanism after upstream blockage of macroautophagy.” *Cell Death and Disease* 2018; 9: 757.

62. Unbekoming. “Prions and Deer: How Unproven Science Is Deploying Chronic Wasting Disease Against American Deer.” *Lies are Unbekoming* (Substack), February 2026; Unbekoming. “Animal Pharm: 50 Q&As.” *Lies are Unbekoming* (Substack), June 2025.

63. Aviles-Olmos I, Limousin P, Lees A, Foltynie T. “Understanding and Prevention of ‘Therapy-’ Induced Dyskinesias.” *Parkinson’s Disease* 2012; “The Need for Enhanced Strategies to Manage Levodopa-Induced Dyskinesia in Parkinson’s Disease.” *American Journal of Managed Care* 2025; Scott NW et al. “Motor complications in Parkinson’s disease: 13-year follow-up of the CamPaIGN cohort.” *Movement Disorders* 2020.

64. Weiss D et al. “Changing Gears – DBS For Dopaminergic Desensitization in Parkinson’s Disease?” *Annals of Neurology* 2021.

65. Verschuur et al., op. cit.

66. Pringsheim T et al., op. cit.

67. Unbekoming. “What Is Dyslexia?” *Lies are Unbekoming* (Substack), with reference to Grandjean P, Landrigan PJ. “Neurobehavioural effects of developmental toxicity.” *Lancet Neurology* 2014; 13(3): 330–338.