Chapter 20: Ignominious Ends: 1980-1981[1]

1. Handler's Pangs

BY THE LATE 1970S, Philip Handler had begun to show evidence he sensed something essential was slipping away. The historical deference toward science was no longer secure. Science still possessed prestige, still commanded money, still spoke from lecterns draped in authority, but the atmosphere had changed. Environmental controversy had multiplied. Nuclear power had become a public issue. Biomedical promises had grown grander as their results grew less persuasive. And, perhaps most galling of all to Handler, criticism no longer came merely from the scientifically illiterate, it came from within — scientists themselves had begun to speak in tones of warning, dissent, and moral unease. To Handler, this was not merely disagreement, it was apostasy, renunciation of the hierarchy he had spent a lifetime helping to construct. In that atmosphere, Handler made a revealing choice of the basis on which to defend the existing order of science and account for what he called "the pangs of science." He did not base his defense on grand successes, budgets, institutions, laboratories, or committees. In a series of speeches before prominent audiences, he based it on the fable of Prometheus and Pandora.

Prometheus stole fire from Mount Olympus and gave it to humans, which allowed them to stay warm, cook food, and develop technology and the arts. Zeus was furious, and sent to earth the first woman, Pandora, who had been given a jar by other gods which she was strictly forbidden to open. But her curiosity was too great: she opened the lid and all the world's miseries —sickness, death, envy, and toil—flew out to plague humanity. Horrified, Pandora slammed the lid shut, but only one thing remained trapped at the bottom — hope. Between Prometheus and Pandora lay the story Handler sought to capture.

Handler wanted the public to see science as civilizational gift — Prometheus, criticism as fixation on its unintended consequences — Pandora, and modern society as a people who had ceased to appreciate the gift because they had become obsessed with its side-effects. The fable furnished Handler with a language large enough to glorify science and explain its harm, but that was not the deeper significance of his metaphor. What animated Handler was not merely concern over the fate of science, but his own mounting distress as the world became less willing to take his version of science on faith. Handler regarded science as "the most reliable way of knowing," and experienced the pangs when he saw the claim had ceased to command automatic assent. The pangs he referred to in his speeches actually were his: pangs of resentment and recoil, pangs induced by discrediting events and the visible failure of cherished assumptions, and pangs from the rise of internal dissent and emergence of the concept of science as swollen and distorted.

Handler spoke as though the waning respect for science had been brought about by reckless critics and a culture newly susceptible to anxiety. But the more plausible explanation lay in the record of scientific leadership itself, and few men had done more to shape that record than Handler. For decades he had occupied commanding institutional positions from which he presided, advised, administered, testified, and lobbied, speaking not from the margins but from

[1] 1This is a preprint of a manuscript that will undergo proof-reading and copy-editing prior to publication .

the center. Handler had helped persuade Congress to place enormous faith in biomedical research, especially in reductionist programs that promised far more than they delivered. Cancer was the greatest example; billions were spent, grand confidence was projected, but the decisive triumphs long implied by the rhetoric did not occur.

When favored lines of inquiry failed, the failure was not treated as a reason to rethink first principles. It became, instead, a reason to defend those principles more stubbornly and to cast suspicion on lines of investigation that threatened to implicate anthropogenic causes lying beyond the explanatory and political comfort of Handler's preferred worldview. This was the context in which public and government confidence in science faltered. The trouble was not that a few dissenting scientists had spoken too forcefully. It was that Handler and other leaders of science had for years claimed authority on the strength of promises they could not fulfill. Handler responded to the failure not with self-scrutiny, but with rebuke. His recurring grievance — that science was being unfairly judged for the consequences associated with technology and public policy — thus rested on a deliberate refusal to consider how much of that judgment was deserved. The public had not suddenly become irrational. It had watched institutions promise cures, mastery, and clarity, then deliver uncertainty, delay, and evasion.

One of the most persistent sources of Handler's distress was the reality that dissenting scientists had become visible, effective, and increasingly difficult to dismiss.
The pangs he complained about arose from scientists who did not remain inside the narrow rhetorical channels he deemed proper, but instead spoke in public about danger, failure, policy, value, and harm. That development upset and angered Handler because it threatened one of the central rhetorical tactics of his career — the conversion of disagreement into misconduct. Again and again he suggested that a "few scientists" had strayed beyond their role, had imported politics into scientific controversy, had excited public alarm, and had thereby confused both the citizen and the state. This maneuver made dissidents into culprits so that his leadership could remain appearing innocent. It transformed criticism into indiscipline so that institutional failure need not be identified. Handler's rebukes were especially cynical coming from a man whose own experience as a working scientist had long since receded into the past, and whose greatest professional gifts lay not in experimental discovery or interpretation but in administration, speech, influence, and defense of the existing order. He reserved a special sharpness for those scientists whose public standing and substantive achievement exceeded his own, for they threatened not merely his arguments but his authority to pronounce upon the meaning of science itself. His pangs, in that sense, were as much social and psychological as intellectual.
They were the pains of a ruler confronted by subjects who no longer accepted the old arrangement. Set against this reaction stood the emergence of alternative scientific frameworks—notably Rober Becker's—whose proponents did not merely dissent, but redefined the terms of inquiry, expanding biological explanation beyond the molecular confines Handler treated as authoritative.

Handler's public method of criticizing scientists had a recurring defect.
He accused them broadly, loftily, and with unmistakable confidence, but he almost never paused to furnish the kind of careful written substantiation his accusations required. He would suggest they had become partisans, allowed political belief to cloud scientific judgment, spoke

irresponsibly, raised public alarm on insufficient evidence, but the charges remained atmospheric — names were blurred, particulars withheld, demonstrations absent. Handler's rhetoric replaced proof; he expected the authority of office to carry what his argument did not. That pattern gave Handler's speeches their distinctive quality. They were not analyses in the strict sense, but rather performances of judgment that gave the impression of mastery while declining the discipline of specification. Even the story he repeated most often — a scientist who becomes an advocate, then a partisan and, in the end, a selective manipulator of fact — was offered more as moral tableau than as demonstrated case. It was a verbal device that allowed Handler to cast suspicion over his opponents without submitting his claims to scrutiny. The result was that others were rebuked for insufficient rigor, while his assertions floated free of the evidentiary burden he so piously imposed on them. Handler spoke mellifluously but only proclaimed and never proved.

Among Handler's most misleading practices was his use of the word *science*. He spoke as though science were the progenitor of technology and was now being asked to answer for the undisciplined uses of its offspring — a formulation that was false. Technology, in the practical sense relevant to modern life, did not arise from science in the lofty, disciplinary form Handler habitually meant. It began in antiquity, before there was science as Handler used the term, and arose from engineering, fabrication, design, institutional learning, and the arduous translation of learned principles into durable systems that worked in the real world. Technology blossomed after science — in the form of the laws of physics — was discovered beginning in the 17th century. By subsuming all this under the title of science, Handler brought anything that produced power, utility, or prestige into what he called "the cathedral of scientific knowledge." Whatever required blame could be pushed outward as technology, or else brought back in only to be redeemed by the claim that science was also the means of criticism and repair. Strategizing this way, Handler inflated science to mean civilization, and defended science as if he were defending all human knowledge.
The inflation itself was part of Handler's penchant for hero-worship of science.
It obscured the actual disciplines by which the world is built, managed, corrected, and governed, while preserving for science the aura of originating majesty.

From this inflation followed one of Handler's most misleading claims — that science, blamed as the progenitor of harmful technologies, also provided the means by which those harms could be detected and managed. The claim — which was the origin of his boast that science was not only the parent of technology but also its conscience — had rhetorical force but actually was only another instance of Handler's evidence-deficient, rhetoric. In reality, the actual work of detecting, characterizing, mitigating, and governing technological harms did not belong to science alone, and certainly not to science as Handler used the term. It belonged to engineers, clinicians, epidemiologists, industrial hygienists, exposure analysts, public-health practitioners, social scientists, lawmakers, and administrators. It belonged to institutions of governance and enforcement no less than to institutions of inquiry.

By claiming this work for science, Handler gathered to the prestige center the very forms of practical knowledge that his own hierarchy had long treated as subordinate to value-free objective knowledge. In the process of defending science as indispensable both to the

production of technology and to the correction of its harms, Handler contradicted himself. In his stump speech, he had asserted that science was a cathedral of objective knowledge, but by claiming science also contained organized human judgment he conceded that science operated across domains that were irreducibly practical and value-laden. What disappeared was the credibility of Handler's claim that science, as he had narrowly conceived it, was the decisive instrument in decision-making. What appeared was a recognition that organized human judgment operating across domains — many of them irreducibly practical and value-laden — was at least as essential as science, if not more. Handler sought to cast those domains as tributaries flowing toward the great central river of science, when in truth they were often democratic, independent, value-based places where responsibility, rather than prestige, actually resided.

Handler's ideological pangs were especially revealing in his recurring remarks about cancer. He dwelt on uncertainty, the fragmentary character of evidence, the inconsistency of animal studies, the difficulty — impossibility, in the preponderant number of cases — of identifying specific environmental causes, and the danger of public alarm exceeding scientific evidence. His approach to the problem of environmentally-induced cancer was based on the premise that everything should be known before anything was done to protect the public against health risks.

Handler said, "For most environmental pollutants that have been brought to attention, we are concerned with potential but as yet undemonstrated hazard. Statistically speaking, relatively few persons have actually been known to have been seriously damaged by man-made chemicals." To which he added that alarms raised by scientists had helped produce "a stream of regulations, each well intentioned, each indeed commendable. But In the absence of persuasive data concealing the magnitude of the risk, if any, to humans, the sum of such regulations can engender public cynicism, ensnarl life in the workplace, and slowly paralyze the economic life of the nation."

Handler continually stressed that very few persons were proven to have developed cancer from exposure to man-made chemicals, and repeatedly reduced the matter to what he called "a quite technical question," emphasizing that chemicals were only suspected carcinogens and that no quantitative method of assessing health risk existed. His repeated rhetoric of disinterested caution was a determined effort to cool inquiry because it threatened to become socially and politically dangerous. Handler did not merely point to the uncertainty, he arranged to make it the central fact by placing it in the foreground while leaving suffering, latency, exposure, susceptibility, and institutional delay in the background. The practical effect was to convert evidentiary incompleteness into a bloated argument for regulatory restraint. In this way uncertainty ceased to be a problem demanding prudence and inquiry, and became an instrument for discouraging alarm and lowering public concern. What Handler called rigor functioned, again and again, as a politics of delay. And because that delay was forcefully directed against inquiry into anthropogenic causation, it exposed Handler's motive — his conviction that society must move with geological leisureliness toward conclusions that would unsettle technology and slow the progress of science by slowing the progress of technology.

From the early days of his career — when he served as a spokesman for the cigarette industry and opposed recognition of a link between smoking and cancer — Handler

conceptualized cancer as a molecular problem involving genes, mutations, and biochemical pathways awaiting resolution through deeper biochemical insight.
Yet cancer's persistence, variability, and resistance to purely molecular explanation pointed to a broad failure of Handler's approach. Robert Becker's work pointed in a different direction — toward disruptions by anthropogenic agents of bioelectric control and system-level coordination of growth-control and regulation processes.
The contrast marked two fundamentally different ways of understanding cancer causation and two different paths for biomedical inquiry, but Handler credited only his approach and used his influence to ensure it was the only one followed,

Handler applied his policy of restraint to scientists studying the health risks of exposure to man-made agents, especially those linked to cancer. He insisted researchers not publicize findings "too soon," by which he meant they should refrain from publicly explaining their work until they had assembled a sufficiently coherent body of evidence to permit what he viewed as "rational discussion." Handler was motivated by his belief that individual announcement generated public alarm that could neither be justified nor assuaged. For this reason, early warning had become a vice and cautioning the public was a species of scientific misconduct. Such announcements were illegitimate in Handler's formulation because they had not been "put through a wringer." Until then, Handler asserted, reticence not urgency was the proper ethic, and did so even though he had no basis for his pretension of ethics.
He offered no developed philosophy of ethics or principled account of why his preference for delay should count as ethical while others' preference for warning should count as political. Even though Handler occupied the moral high ground, if only by declaration, he denounced scientists for importing politics into science, notwithstanding he himself did so. He demanded they conform to his preferred settlement between knowledge, disclosure, and power, indicating that it wasn't decent into politics that caused his pangs, it was the nature of the settlement. Handler sought to discipline scientists into silence until the results were conclusive.
Where he sought to delay articulation until uncertainty had been eliminated, approaches such as Robert Becker's permitted early recognition of systemic disturbance likely to result in adverse health consequences, thus treating incomplete evidence not as disqualifying noise but as meaningful biomedical evidence.

Handler believed that decision-making in science was an objective process in which scientists relied on the known facts and methodology that comprised his vaunted cathedral of knowledge . He acknowledged that public-health-related controversies occasionally involved values rather than science alone — nuclear power was his most prominent exception. Handler conceded that the acceptability of any given level of protection against its health risk was ultimately a political question because different people might weigh catastrophe, probability, security, centralization, and institutional trust differently. But he never offered a coherent principle for distinguishing whether a particular question was scientific or political — whether it necessitated an objective or subjective answer. He simply chose the answer in specific cases based on what choice provided the result he favored, which was the deeper hypocrisy. Handler had built his intellectual identity on the majesty of science as mankind's uniquely objective undertaking — a grand structure of knowledge rising above prejudice and opinion. Yet when questions arose that plainly could not be settled by objective reductionist experiments, nuclear

power for example, he did not revise his creed, he created exceptions. Science would govern where it could preserve authority, but values would enter where his preferred policies required shelter from the standard he had proclaimed everywhere else. This contradiction was not incidental but rather was a constitutive element of Handler's ideology. He could not admit that values saturated every human problem, including those touched by science, because such an admission would diminish the sovereign purity of the cathedral he had spent a lifetime defending.

The same contradiction haunted biomedicine. There, too, the promise concerning what science could provide humanity had been extravagant — fund basic research, honor the hierarchy of knowledge, trust the reductionist order, and the great diseases would yield — and the results had failed to vindicate Handler's rhetoric.

The problem was not merely that progress had been slower than he promised, it was that the promise itself had been misconceived. Mitigation of human disease was never going to be achieved by Handler's version of science alone, because human disease did not submit itself to a single mode of knowing. It required engineering, clinical judgment, environmental understanding, public-health practice, institutional design, social science, and law. It required forms of intelligence that Handler's rhetoric habitually subordinated. In this light, the futility of Handler's continual appeal for support of further Handlerian reductionistic biomedical research becomes vividly clear

The appeals were not simply acts of ignorance, they were miserably inadequate attempts to preserve faith in a model that had not earned the faith he demanded of it.

The residue left after Handler's great promises had been tested was not the saving result he imagined. Nevertheless, he soldered on. He insisted that his outworn old formula still governed, that what had failed repeatedly might yet be redeemed by still more reverence, still more funding, still more delay in acknowledging that something more than science, as he understood it, was required. Handler's version of biomedical science had never been the hope at the bottom of Pandora's jar. It was one of the illusions released from it.

Handler's speeches on the condition of science were more than meditations, they were unprecedented acts of self-revelation. Their subject was ostensibly the distress of a civilization no longer certain how to regard science. Their deeper subject was Handler's own distress at seeing authority questioned by those he believed ought to remain within rank. He revealed his instinctive defense of institutions already losing moral credit, and a pattern of annexing to his concept of science all forms of knowledge and practical intelligence that conferred prestige, while assigning blame elsewhere whenever consequences became politically inconvenient. He also revealed his suspicion of early warning, his reflexive preference for delay, and his recurring effort to present his own political preferences as ethical discipline. He further revealed a cast of mind that accused readily, specified rarely, and relied on office, cadence, and tone to carry arguments that were habitually left unproved. Above all, Handler showed himself as a man for whom criticism from within science was intolerable because it struck at more than propositions, it struck at the order and hierarchy he built.

In Handler's eyes, such criticism assaulted the arrangement by which science, as he imagined it, spoke downward to the public and sideways to the state, but was not spoken back to by its own

dissidents in a language of challenge. In that sense his speeches were not diagnoses of science's suffering. They were disclosures of Handlerism in its purest late form: defensive, accusatory, grandiose, selective, and wounded. They did not describe the pangs of science. They described the pangs of Philip Handler.

Hander's Prometheus–Pandora analogy was illuminating not only because it revealed his thought process, but also because it exposed its disorder. He shifted the symbolic roles as he spoke—science as Prometheus, as hope within Pandora's jar, and as the progenitor of technology — without reconciling how these positions could simultaneously hold. The analogy expanded to absorb each rhetorical need, but in doing so lost the coherence required to explain the problem it was meant to illuminate.

Handler wanted a myth large enough to sanctify science, excuse technology, and rebuke dissent, but the symbolic roles would not hold steady. The result was a rhetorical performance in which science became at once benefactor, victim, father, conscience, and remnant of hope — an unstable inflation that disclosed an inability to rationally explain his ideology not only by pen but also by tongue.

Handler's use of the Prometheus–Pandora fable revealed both the structure he intended and the limits he could not overcome. He casted science as a civilizational gift from Prometheus, whose benefits had been jeopardized by the unintended consequences of Pandora's behavior, just as the maverick scientists had jeopardized science by criticizing its unintended consequences. But the analogy did not sustain the weight Handler placed upon it. The symbolic roles shifted as the argument proceeded — science as benefactor, as lingering hope, as the long-standing progenitor of technology — without any stable account of how these positions can coexist. The fable expanded to meet each rhetorical need, but in doing so lost the coherence required to explain the problem it invoked. More tellingly, it permitted him to claim credit for the benefits of technological power while deflecting responsibility for its consequences, even as he acknowledged that science itself had long justified its authority on precisely that association. The overall result was not a clarified argument, but a revealing one: a mode of reasoning in which assertion outran explanation, and in which the effort to defend a system began to expose the structure on which that defense depended.

That structure did not arise incidentally.

2. Handler's System of Control

HANDLER'S IDEOLOGY LED HIM not merely to a set of policy preferences but rather to a coherent system of control — one grounded in the conviction that science and democratic governance could coexist only so long as scientific authority retained primacy where the two intersected. In his belief system, the terms of the advice provided by scientists —and ultimately their conclusions—were determined objectively.

He did not present this as domination. He presented it as necessity. The process Handler envisioned — and subsequently developed — to enforce this necessity consisted of a set of distinct, recognizable, strategies for achieving control of institutions, language, method, meaning, and perception.

Handler surveilled science without specific instruments, using institutions to monitor developments and enforce punishment where needed. During his incubation as a leader in

science —at Duke University, national biochemical societies, the National Institutes of Health, the National Science Foundation, the Veterans Administration, and the National Academy of Sciences — Handler used the institution he served to monitor and control the direction of science in accordance with his precepts.

After the institutions adopted or promoted his policies, Handler could rely on institutional monitoring and enforcement. His numerous positions at the apex of science, especially his influence over federal funding channels, provided a functional equivalent of surveillance and policy enforcement. Federal funding of biomedical research initiatives that did not comport with his ideology was effectively barred.

Scientific research did not need to be observed continuously; it needed only to pass through institutional filters that he helped define and enforce. Researchers whose work aligned with reductionist, molecular frameworks found support, recognition, and advancement. Those who pursued alternative approaches — particularly emergent, systems-based, or environmentally oriented lines of inquiry — encountered obstacles that were rarely explicit but consistently effective. Funding was withheld. Committee representation was denied. Professional advancement slowed or stopped. In some cases, individuals were subjected to direct personal attack or exclusion from institutional recognition, including denial of voter-approved membership in the Academy. Handler launched vindictive, ad hominem attacks against scientists who particularly offended him because of their beliefs and actions — Robert Becker was only one of many examples.

Handler openly violated nominal Academy rules by appointing members to Academy committees that were thoroughly biassed, as could readily be determined from their public records. He manipulated Academy committees to ensure that their advice to Academy clients opposed or ignored non-Handlerian approaches to biomedical science. The result was not an open contest of ideas, but a managed environment in which deviation carried predictable consequences.

Handler did not need to observe every scientist, the system ensured that scientists would observe themselves.

Handler systematically constricted the language of biomedical science, eliminating discussion and consideration of conceptual alternatives to his ideologically based concept of biomedical research. Handlerian reductionism did not simply privilege molecular explanation; it rendered alternative vocabularies increasingly illegitimate. Terms such as *health risk*, *life*, *growth regulation*, *physiological stress*, and *chronic disease* — concepts central to clinical and systems-oriented thinking — were either redefined in molecular terms or treated as insufficiently precise to guide serious scientific inquiry. This was not a matter of terminological preference; it was a narrowing of the conceptual field. He systematically eliminated words that could be used to express dissent, rebellion, or important biomedical concepts that could not be expressed in a molecular-based language. If a phenomenon was not or could not be expressed within the accepted language of molecular biology, it became difficult to articulate, defend, earn grant support, or even recognize within the dominant scientific framework. Entire domains of inquiry were not disproven; they were eliminated linguistically. Examples included growth control, regeneration, cancer causation, somatic and neurogenic stress, memory, and health risks due to chronic exposure to anthropogenic factors. The effect was cumulative. As language

contracted, so too did the range of permissible thought. Questions that could not be formulated in the accepted idiom could not easily be pursued. Over time, this produced not only conformity of method, but conformity of imagination.

Handler enforced his method of reductionism as if it were the exclusive truth. His insistence that biomedical explanation must ultimately be molecular — "If you cannot explain it at the molecular level, you have not explained it at all" — was not merely a philosophical position. In many instances, it functioned as a rule of admissibility to the canon of biomedicine. Research designs that did not conform to this standard were treated by Handler-trained institutions as incomplete, provisional, or unworthy of serious institutional support. This position was reinforced through the advisory machinery of the Academy and through its interaction with federal funding agencies, particularly the National Science Foundation and the National Institutes of Medicine, two institutions Handler previously led. Academy committee recommendations shaped by his selection of the members, and committee mandates spawned by his ideology and transmitted to them by Handler's staff, reflected the same methodological commitments.

Funding priorities followed suit. Over time, reductionism ceased to be just one approach among many — it became the governing framework. Handler denied the coexistence of alternative explanatory systems based on their inconsistency with his ideology, not on evaluation of experimental evidence. Reductionism and emergentism were not treated as complementary perspectives operating at different levels of analysis. He treated them as mutually exclusive, with only reductionism retaining legitimacy. This was not a resolution of a scientific debate, but rather its closure.

Handler manipulated biomedical science by developing and enforcing reductionism as the basis of Academy committee advice, and by using his influence to ensure that federal science-funding agencies did not support non-reductive research designs.

At the theoretical level, Handler denied the possibility that reductionism and emergentism could be true at the same time, holding that reductionism was necessary and sufficient to explain all biomedical phenomena.

Handler changed the meaning of words as a means of advancing policies he favored. A particularly impactful case involved the meaning of *health risk.*

It had traditionally been regarded as a biomedical term referring to the probably of an adverse impact on human health due to exposure to an anthropogenic agent, and it was quantitatively estimated based on animal studies. Handler redefined health risk by placing dollar values on human life and on the benefits associated with accepting exposure to a specific level of pollution. His redefinition of *health risk* was a situation where death-dollars exceeded benefit-dollars, as calculated using a subjective computational method he called "risk-benefit analysis" for determining the safety level of an anthropogenic agent. Handler's change in the meaning of *health risk* introduced a layer of control by translating questions of human health into economic terms, thus resolving what he called "quite a technical question." Decisions about the safety of exposure to man-made factors in the environment were no longer grounded in precaution or ethical consideration, but in malleable calculations capable of justifying essentially any level of exposure that did not cause immediate acute harm.

Handler repeatedly presented science as a unified enterprise capable of speaking with one voice once proper procedures had been followed, and he required the Academy advisory committees he appointed to be "put through a wringer" to produce advice that conformed to his illusion. The appearance of unity was produced, and the implication was that disagreement had been resolved through rigorous evaluation. The truth, however, was that committee composition, mandate, and evidentiary standards shaped the range of acceptable outcomes. Dissenting perspectives, — particularly those outside the reductionist framework — were excluded at the outset. What emerged as consensus was therefore not the reconciliation of competing views, but the convergence of similarly structured ones.

The claim of unity served an important function — it transformed institutional agreement into epistemic authority. Science did not appear as a field of ongoing debate, but as a source of settled truth. Alternative views were not competing interpretations — they were errors. Thus, Handler manipulated biomedical science by defending, perpetuating, and enforcing ideological control over the basic methods by which it generated biomedical knowledge and transmitted it to the public. He instantiated Handlerian reductionism, opposed emergentism, and defended the fiction that science always spoke with one voice.

Taken together, these elements showed that the authority of the Academy was not based on knowledge but rather on a coherent system.

Scientific authority was concentrated institutionally, reinforced linguistically, enforced methodologically, extended through quantification, and presented as unified. Each component supported the others. Control of funding reinforced control of method.

Control of method reinforced control of language. Control of language reinforced control of thought. The result was not merely influence, but governance.

Handler did not describe this system in these terms. He described science as objective, authoritative, and necessary to guide society through complexity. Yet the structure he built — and the manner in which he operated within it — transformed those claims into instruments of control. What appeared as the neutral application of expertise was, in practice, the disciplined exercise of power. In this sense, the consolidation of scientific authority under Handler was not simply an intellectual development. It was an administrative and ideological achievement — one that defined not only how knowledge was produced, but how it was permitted to exist.

3. The Academy Reconstructed

PHILIP HANDLER DID NOT inherit a system and refine it. He reconstructed the National Academy of Sciences into an instrument of directed authority.

Handler converted a passive consultancy into a continuously operating policy enterprise that often spoke without being asked, and intervened in questions of public health, environmental exposure, and technological risk when he thought it appropriate to do so. The Academy moved from a traditional role — supporter of scientific inquiry and arbiter of scientific disputes —into direct involvement in public policy. This marked the moment when scientific authority becomes political authority — a prerequisite for everything Handler did thereafter. The transformation was not merely administrative. It was structural. Scientific judgment was translated into institutional authority, institutional authority into governmental legitimacy, and governmental legitimacy into a durable mechanism for shaping the terms on which knowledge could enter public life.

This transition brought prestige into political decision-making, but also exposed him and the Academy to scrutiny, criticism, and conflict. Government agencies relied on Academy reports not merely for content, but for legitimacy — described explicitly as paying for "imprimatur." Joshua Lederberg, a Nobel Prize winner in molecular biochemistry, told Handler, "I am more convinced than ever that the NAS cannot credibly take corporate responsibility for the *substance* of any Academy report. It can and should establish a *process* by which reputed scientists can enter their critical judgments about an imputed consensus, and do this pluralistically, and on a parity of timing and implied authoritativeness with the committee pronouncements."
Handler, however, ruled oppositely — that every Academy report, legally, was published under the aegis of the corporation, and that the rigor of the Academy process was far greater than that of a group of self-appointed scientists.

Under Handler's leadership, the Academy's authority functioned less as analysis and more as certification. Increasing demand occurred for NAS Advice in complex policy areas, and legislation increasingly mandated NAS input on issues such as environmental hazards, public health, and energy policy. Scientific advice thus became structurally embedded in governance, creating administrative bottlenecks controlled by the Academy's internal processes. Handler controlled not just timing and conclusions, but the seal that made them politically actionable. He justified this expansive authority by invoking the increasing complexity of modern society. Government, he maintained, required authoritative scientific guidance. But the question was not simply whether scientific guidance would be supplied.
The question was who would define the standards by which such guidance became authoritative, and what institutional mechanisms would determine which competing forms of knowledge could enter the process at all.

Yet what he constructed was not a neutral mechanism for producing that guidance. It was a system designed to determine, in advance, what forms of scientific judgment would be permitted to count. By the close of the 1970s, the Academy's prestige remained more or less intact, but its function had shifted. It no longer served primarily as a forum for independent scientific judgment. It operated as a structured process through which Handler's conception of science — reductionist, technocratic, and administratively controlled — was translated into policy authority. The system translated methodological preference into procedural normality, and procedural normality into institutional truth. This transformation was visible not only in the expansion of Academy contracts with federal agencies, but in the increasing regularity with which Academy reports aligned with agency expectations in areas of regulatory controversy.

Handler began exercising control where it was particularly effective — at the point of selecting committee members. He did not rely on open scientific debate to produce conclusions, but rather constructed committees that would produce those conclusions. Through his staff, Handler directed the identification and vetting of potential committee members. He explicitly restricted committee membership to what he called "technically trained people," displacing meaningful public representation and democratic accountability by technocratic exclusivity. Publication records, prior testimony, and public positions were examined to determine alignment with expected outcomes. Those whose work reflected reductionist

assumptions or who had demonstrated institutional reliability were advanced. Those whose work suggested alternative frameworks were excluded or minimized.

The committees convened under these conditions did not represent a balance of perspectives, they represented a prearranged convergence. The Sanguine–Seafarer studies provided a clear illustration. A committee chaired by Herman Schwan approached electromagnetic exposure within a framework emphasizing thermal and immediately measurable effects, while broader physiological concerns were excluded from central consideration . The subsequent Hastings Committee, convened to assess safety, operated within a similarly bounded evidentiary structure, producing a "no hazard" posture that reflected the constraints of its design and the limitation of the question it chose to consider. The convergence of conclusions across these committees was not coincidental; it was the product of controlled composition. The appearance of pluralistic scientific deliberation concealed a narrowing process that had already occurred before the committees met. The evidentiary horizons had been constrained in advance. Consensus was not discovered; it was structurally cultivated

A similar pattern appeared in environmental and chemical assessments, where scientists associated with systemic or long-term biological effects — particularly those influenced by ecological or physiological models—were underrepresented or absent.
The result was not overt suppression, but structured exclusion. The Academy's organization reinforced this process. The advisory enterprise was managed by a professional staff which controlled the function of the Academy's committees, almost all of whose members were not members of the Academy., but rather volunteers serving pro bono for the attendant prestige. The Academy thus had two forms: a body that conferred prestige and a system that produced reports. Handler claimed they were "free of value, except for adherence to the truth," but his claim was a rhetorical shield masking value-laden decisions as neutral conclusions.

Handler did not permit committees to define their own inquiries. He defined the questions at the contractual level, where studies were negotiated with sponsoring agencies. By shaping these agreements, Handler determined what would be examined and what would be excluded. In studies involving health risks from chronic exposure to anthropogenic factors, questions were structured to emphasize consideration of only acute biomedical consequences, while systemic or long-latency concerns were marginalized. The structure of inquiry thus limited consideration to health consequences explainable on the basis of reductionistic biomedical models. Once committees convened, Handler's staff guided how those questions would be pursued. Agendas, witness selection, and evidentiary sequencing followed patterns established in advance. Committees operated within a framework that limited the emergence of alternative interpretations. The answer did not need to be imposed. It had already been constrained.

Handler extended control into the evidentiary core of committee work.
His staff controlled the evidence that would be considered. They did not simply gather information, but also constructed the body of knowledge from which committees reasoned. Staff conducted literature reviews, selected studies, and presented synthesized findings. The selection and emphasis of this material shaped the intellectual environment of deliberation. When technical expertise was required, consultants were introduced through institutional channels. The process therefore did not merely organize evidence. It translated selected

evidence into institutional knowledge while diminishing the visibility and legitimacy of competing explanatory frameworks.

The Agent Orange study provided a revealing example. External expertise and data streams were mediated through staff processes, shaping both the scope and interpretation of available evidence. The committee's evidentiary base was not independently assembled; it was institutionally curated. Staff attended meetings, recorded discussions, and translated deliberations into draft reports that structured presentation of evidence and articulation of conclusions. Committees revised reports only infrequently, and within a framework already defined. In this way, Handler's system did not simply evaluate evidence, it determined what counted as evidence, how it would be interpreted, and how it would be expressed.

Handler had a strong grip on the content and conclusions in committee reports owing to his authority to require revisions, adjust language, or reject reports. After committees finalized draft reports, he asserted his control through a review conducted by a committee he appointed and a personal review of some reports, processes that functioned as a final alignment mechanism. The independence of committee conclusions was thus filtered through institutional review. Whenever they approached positions inconsistent with prior expectations, the reviews provided an opportunity for change. Reports were not just evaluated; they were brought into conformity.

Handler's authority extended to the release of reports, a power that afforded him a final control of meaning. This stage functioned as a throttle point, shaping interpretation as well as content. Reports could be delayed, reframed, or accompanied by commentary, affording Handler the ability to influence how conclusions would be understood. His staff produced bullet-pointed press releases of what he said, which were quoted nationally by editorial and news reporters. Controlling the context of a report's release thus allowed Handler to color its content when officially described in contemporaneous press articles, which was the first and typically only time the public read about the report. The Agent Orange report illustrated this function with particular clarity. His review committee rebelled and allowed the report's conclusions to diverge from Handler's expectations, and then released the report publicly prior to the Academy's official release — the only time Handler wasn't first in the news cycle. Handler subsequently sent a letter that explicitly challenged aspects of the Agent-Orange committee's findings. But the report did not reach policymakers as an unqualified statement of committee judgment. It arrived as a managed document, accompanied by Handler's interpretive guidance. Even where control over content weakened, control over meaning persisted.

Handler embedded these control mechanisms within an Academy structure that appeared distributed but functioned centrally. Numerous committees, various called commissions, assemblies, councils and panels, created the outward appearance of collective expertise. In practice, authority remained concentrated.

Handler controlled appointments, influenced contracts, directed staff, and oversaw review and release. The corporate board of directors — which Handler chaired — depended on administrative processes under his control and did not function as an independent counterweight. The Academy's advisory enterprise operated as a vertically integrated system. Committees performed analysis, but within constraints established at each stage of the process. The system's appearance of plurality masked its operational unity. Multiplicity was translated

into unanimity. The structure of control was centralized behind the appearance of distribution. The structure appeared diffuse but operated concentrically. Authority flowed downward through committees and review bodies, but converged upward to Handler. What appeared as collective scientific judgment was, in practice, an engineered process in which each stage reinforced the next. The structure did more than produce reports. It reproduced the assumptions embedded within its design, converting repetition into legitimacy and administrative continuity into apparent truth.

Handler's system operationalized a broader framework of control.
Institutional monitoring occurred through appointments and funding pathways.
Linguistic constraint followed from evidentiary selection, limiting the survival of concepts outside the dominant framework. Methodological enforcement ensured the primacy of reductionist approaches. Quantification translated complex human concerns into technical variables. The appearance of unity emerged as the final product.

Handler's system redefined the Academy's authority. It increasingly derived from the reliability of process rather than the independence of judgment. The Academy continued to influence policy, but its role shifted. It functioned less as an independent evaluator and more as a structured intermediary, translating scientific claims into forms aligned with institutional expectations and desires, including his own

The system required no overt coercion; it required only the disciplined exercise of authority, expressed with confidence and rarely challenged. It depended, however, on a level of centralized control that could not easily be sustained beyond the individual who created it. The Academy ceased functioning independently of Handler's ideology — he personified the centralization of organizational power. As the head of the entire business function of the Academy, he controlled the administrative staff, committee appointments, and creation and release of reports. As the head of the corporate Academy and its board of directors, he essentially answered to no one except himself

This was not influence — it was total system-level control. But the system could not sustain itself through procedure alone. It required continual rhetorical maintenance. The structure depended upon a style of authority capable of transforming preference into expertise, expertise into certainty, and certainty into institutional command.

The mechanisms of control required a public voice capable of translating ideology into legitimacy while preserving the appearance of objective scientific reason.

In 1980, by dint of Handler's management, the National Academy of Sciences stood at a crossroads not of policy, but of identity. The issue was not what advice the Academy would offer, but what kind of institution it had become in order to offer it.

Almost totally dependent on federal contracts, functionally driven by a permanent professional staff, and continuously engaged in the production of policy-relevant reports, the Academy had moved away from its traditional role as an independent, member-governed body that provided scientific judgment when asked by the government. In its place emerged an organization whose authority derived less from intellectual autonomy than from the reliability, predictability, and scale of its contractual activities and bureaucratic structure. This transformation was manifested concretely in the way committees were assembled, the manner in which questions were framed at the outset, the selection and presentation of evidence, and the layered processes of review

and release. Each stage, taken individually, appeared administrative. Taken together, they formed a system in which outcomes were increasingly conditioned by structure. The Academy's conclusions thus came to reflect not simply the deliberations of the members of a self-selecting honorary society of scientists — as envisioned when the Academy was created a century earlier — but rather a procedural environment within which temporarily appointed volunteer scientists opined under the watchful eye of the Academy staff, without remuneration except for the prestige of serving the Academy. What had once been occasional, member-driven inquiry evolved into a continuous, staff-mediated enterprise in which the boundaries of acceptable scientific judgment were established in advance and reinforced at each successive stage of analysis.

Under these conditions, the distinction between advising policy and constructing it narrowed almost to the point of invisibility.

The Academy did not overtly abandon its claim to independence, but its operational dependence — on contracts, on staff systems, on susceptibility to autocratic leadership, and on internally managed processes — rendered that independence progressively more formal than substantive. The appearance of disinterested scientific judgment was preserved, but it was increasingly produced within a framework that shaped both the questions asked and the answers deemed acceptable.

This convergence of structure and outcome was the crossroads — the identify choice for the Academy. The issue was not whether the Academy, under Handler's successor, would continue to advise government, but whether it would do so as an independent evaluator or as an institution whose procedures were themselves aligned with the needs and expectations of its clients — the policy system it served. At this point in the Academy's history, the nature of what Handler had done became unmistakable.

The management system that forced the choice did not assemble itself. Handler designed, implemented, and sustained it.

4. Basis of Handler's Authority

HANDLER'S PUBLIC POWER RESTED not simply on his position as head of the National Academy of Sciences, but on style — a fluent, confident, seemingly scientific mode of speech by which his ideological preferences could be made to sound like disciplined reasoning. His oral communications were marked by what admirers mistook for intellectual brilliance but which, on closer inspection, was more accurately describable as disciplined ideological fluency. This was the essence of what admirers called his "silver tongue." The institutional structure Handler built required continual rhetorical maintenance. Committees, procedures, review systems, evidentiary hierarchies, and administrative controls could not independently sustain public legitimacy.

They needed translation into a persuasive language of certainty, neutrality, and technical authority. Handler supplied that language personally.

He could make a conclusion sound proved merely by arranging it in the cadence of scientific reason. He would start a presentation with an ideological preference, drape it in technical vocabulary, add one or two selectively chosen illustrations, and present the result as though it were the compelled outcome of rigorous thought.

His performances were elegant but unsound, and often misleading because, characteristically, his discourse did not proceed from evidence to conclusion but rather from conviction to rationalization. He began with a conclusion — often a large, sweeping one — and then dressed it with illustrations, selective facts, and scientific vocabulary until it acquired the appearance of inevitability. Thus science became "mankind's greatest accomplishment," not as a conclusion earned by comparison with religion, art, law, philosophy, or democratic politics, but as an axiom announced with such confidence that disagreement could be made to seem unserious. Humanity was "healthier and happier than at any previous point in history," not after carefully considering war, industrial disease, alienation, environmental degradation, or social inequality, but by rhetorical insistence that material and technological gains were dispositive. Science was framed as "a method for producing objective knowledge" not because scientists had somehow escaped ambition, hierarchy, patronage, and institutional self-interest, but because the word objective served as the ceremonial shield behind which scientific authority could advance unchallenged. Chemicals that caused cancer in animals were "toxicologically insignificant" to humans at lower doses, not based on experimental evidence but because, in his judgement, small doses should be presumed safe until proven otherwise.

His speeches were formulaic: assertion first, then use of a favorable case as if it established a general principle, dismissal of contrary patterns as anecdotal or wrong-headed, and then presentation of the resulting judgment as though it had been compelled by evidence. He spoke in the rhythms of reason while avoiding its discipline; in this way his rhetoric did the work that evidence was supposed to do. His gift of rhetorical skill was manifested in his ability to make his reversal of judgement and evidence hard to detect. When disagreement persisted he answered institutionally by marginalizing, defunding, or excluding from consideration the lines of work that challenged his framework.

Handler treated biomedical science similarly.
He did not assemble facts and then ask what they required him to believe, he began with what he wished to affirm and then posited only research methods and results
that supported what he believed. For ideological reasons, Handler spoke of biochemistry not as one explanatory language among others in biomedical science, but as its sole legitimate tongue. According to Handler, whatever could not be translated into biochemical terms was incomplete, demoted in importance, and often dismissed.

Life itself was the premier example. He regarded the direct study of life or its phenomena as unscientific because they didn't exist at the biochemical level. Handler believed that biochemists would, one day, be able to mix chemicals in a beaker and create life, but that until then, its direct study was impossible because "it can't be studied in the laboratory." This perspective gave his reductionistic ideology extraordinary rhetorical utility, allowing him to convert a philosophical preference into a criterion for reality. Thus, in Handler's philosophy, since biochemistry was the only valid language of life, explanation of a biochemically-unexplained biomedical observation in another language was premature, suspect, or marginal. This was not an argument in the ordinary sense, it was an imperial addition to scientific discourse.
The narrowing of admissible knowledge was therefore simultaneously rhetorical, institutional, and linguistic. What could not be translated into Handler's preferred explanatory language could not easily acquire legitimacy within the structures he controlled.

Handler's treatment of environmental and technological health risks followed the same pattern. He asserted, like a statesman, that environmental exposure to low-levels of man-made chemicals or electromagnetic energy was safe, not because evidence justified the assertion but because of his ideological principle that low-levels of any such factor were biochemically incapable of triggering biomedical responses.

In this way safety was not demonstrated; it was manufactured rhetorically from an article of faith. Based on his reductionistic ideology, Handler defined safe exposure levels as those that prevented the occurrence of what he called "hazards," by which he meant harms that occurred immediately upon exposure. Thinking this way, he said that the restrictions on smoking, DDT, agent orange, cyclamates, food dyes, automobile exhaust, nuclear power, powerlines, and antennas were unnecessary and burdensome to industry. He reconceptualized the concept of safety as the absence of hazards, narrowed the admissibility of causal evidence, and proclaimed the absence of proof of a hazard was evidence that health risks didn't exist. Low-level technological and chemical exposures thus became — by assumption and definition — harmless unless proved otherwise under standards so demanding that contrary evidence could never appear. Handler's strategy was straightforward: first deprive inconvenient evidence of standing, then cite its absence as proof of safety

This habit of mind was strengthened by his use of anecdote — Handler was a cherry-picker of stories. He seized upon examples that supported his position and presented them as if they were representative, while discounting contrary cases as exceptional, emotional, methodologically weak, or ideologically contaminated.

A favorable report became emblematic in his speeches; an unfavorable pattern of reports became noise. He did not present comprehensive evidence but rather provided an explanation by presenting a prestigious example. A single such story was made to carry the authority of a principle. Handler was especially adept at using individual successes of modern science, technology, or medicine as inspirational representative proof that his broader worldview was correct.

Handler's storytelling adorned his ideology and revealed how he dealt with opposition. He did not answer his adversaries by entering the substance of their claims and following the evidence where it led. He answered by controlling the terms under which such evidence could count by invoking arbitrary standards that were impossible to meet, and irrelevant even if they could be met. Handler's critics did not respond to him directly for different reasons. He spoke from a bully pulpit, and was not adverse to using it to launch ad hominem attacks against his critics, who had no means to reply.

Handler was prone to act vindictively against scientists who criticized a decision he made, as he did toward Robert Becker who called the Sanguine Committee Handler appointed a "stacked deck" — Handler terminated Becker's research grants, forcing him into retirement. In most instances of disagreement, Handler's arguments were too flimsy or hollow to deserve a serious, detailed rebuttal. Because he routinely didn't rationalize the logical foundations of his arguments, there was nothing solid to analyze.

Handler's most consequential form of rebutting adversaries was not verbal but administrative — removing the material basis which dissent required to persist.

He marginalized lines of research, not by defeating them in open argument, but by depriving them of funds, prestige, committee representation, or institutional legitimacy. His rhetoric and institutional power were mutually reinforcing. Handler's silver tongue supplied the public language of reason; the apparatus of scientific administration supplied the means of enforcement. Speech translated institutional power into public legitimacy, while institutional power protected the assumptions embedded within the speech.

Handler's rhetorical skill had propelled him to leadership positions in every phase of his career: head of his university's biochemistry department, biochemical research societies, and federal science -funding agencies. He achieved the summit of institutional power at the Academy because of the efforts of his predecessor, Frederick Seitz, who recognized Handler's instrumental usefulness. He was in agreement with Handler in some areas of science policy. They both enthusiastically played a key role in helping the tobacco industry produce uncertainty concerning the health impacts of smoking, disputed the possibility that global warming was a serious threat, and generally promoted environmental skepticism. In other respects, however, Seitz was the polar opposite of Handler; he was a physicist, a famous scientist, an ineloquent orator, opposed to the use of the Academy as a personal platform, and respectful of its tradition of offering advice only when asked. But skilled oration was exactly the quality Seitz sought in a successor, and he saw it in Handler. Seitz believed science badly needed federal funds to develop further. After observing that Handler's rhetorical skills had enthralled congressional budget committees throughout the 1950s and 1960s, leading to large increases in funding for biomedical research, Seitz arranged for Handler's election as the next head of the Academy. His desire to recruit Handler was so great that he agreed to serve as the de facto head of the Academy during Handler's first year in office so that he could finish his four-year effort to write a book that he expected would change the world of biology and medicine.

During Handler's first three years in office, he completely reorganized the Academy, acquiring authority —directly or through committees he appointed — to control every significant managerial decision, and the freedom to do so in the absence of meaningful restraint. His autocratic authority ensured, with very few exceptions, that he answered to no one for what he said, wrote, or did. As permitted by the rules Handler installed, whatever reasoning or evidence prompted him to act remained undisclosed because neither Academy functionaries nor external authorities were empowered to probe the premises beneath his decisions. Handler routinely exploited this freedom he gave himself. He appointed biased committees, edited their reports, and interpreted them in letters that accompanied their release — actions governed only by his ideology. In this solipsistic environment, Handler's personal beliefs could harden into institutional fact, and his assertions could acquire the force of settled truth.

Handler's authority rested not on the accumulation of evidence followed by disciplined evaluation, but on a sustained fusion of ideology, rhetoric, and institutional power. He could sound analytical while remaining dogmatic, sound evidenced while proceeding selectively, and sound objective while defending a deeply interested and highly stratified conception of science. Handler was, in this sense, a virtuoso of scientific legitimation. His gift was the ability to convert preference into principle and principle into policy, while preserving the appearance of neutrality and reason.

Handler built his career by means of impressive orations at scientific meetings, congressional hearings, commencement addresses, and at functions sponsored by industry, government, and the Academy. His speeches were carefully shaped for influence, and his performances were delivered with the confidence of a man certain he would not be forced to account for the opinions he expressed, or to submit his assumptions to serious scrutiny. Handler did not write his authority into existence. He spoke it into acceptance. That distinction became increasingly important as Handler neared the end of his term in office. So long as speech operated within institutional settings structured by deference, time limits, and prestige, the weaknesses beneath the rhetoric remained partially concealed. Writing, in contrast, imposed different demands which rendered concealment of the true basis of a position unachievable — this was the problem Handler faced because he couldn't write.

Handler's public communications before Congress or other lay audiences, within the Academy, or at professional forums were characterized by clarity, confidence, and immediacy. He moved rapidly from premise to conclusion, often presenting complex scientific and policy questions as matters already resolved by technical understanding.
His arguments did not proceed through extended explanation but rather through assertion framed as conclusion. Handler spoke as though the boundaries of legitimate inquiry were already known. Science, in his formulation, was not a contested process but a completed structure, and he positioned himself as its interpreter. Questions that fell outside this structure were not debated; they were recast or dismissed.

Speech was an effective mode of communication in the settings where Handler appeared, which were venues where time was limited and authority was presumed.
It allowed Handler to present his positions as the natural outcome of scientific reasoning, even though underlying assumptions remained unexamined, the range of evidence considered was highly truncated, and the distinction between evidence and interpretation was similarly compressed. There was no critical feedback — either before or after he spoke —that could help Handler improve, clarify, and justify his message. Peer review — the universally acknowledged method in science for assessing the acceptability for publication of scientific manuscripts , the merit of proposed experimentation, or the reliability of analyses of published results — was completely absent in Handler's rhetoric. He stoutly defended the requirement of peer review, but only when the process was not applied to him. He said peer review was the "quality control" mechanism for scientific integrity, and a "necessary sieve" to filter out methodological errors and unsubstantiated claims. Handler spoke of peer review not just as a technical step, but as a moral duty for scientists to "give back" to their disciplines, calling it "the primary defense against the publication of junk science," and a vital tool for "maintaining the public's trust in the scientific enterprise." However, he neither permitted peer review of his speeches nor converted them into peer-reviewed publications, thereby preventing what he said from being examined by his peers to test the truthfulness, reliability , or credibility of his oratory. Similarly, there was no useful feedback after Handler spoke. There couldn't be because, typically, his audiences consisted of laymen or sycophantic scientists who mostly had no ability or reason, respectively, to question his speech. Some scientists had reasons, but Handler's rhetorical style left no room for motivation to do so because the foundations of his speeches— his claims, assertions, assumptions, and convictions — were unrationalized, poorly defined, and lacking in evidence, which obviated the possibility of serious, detailed rebuttal.

The major limitation of Handler's mode of communication was the absence of constructive criticism that could have helped him correct, clarify, and strengthen the positions he took on a panorama of scientific matters. But he was not challenged, so the quality and reliability of his oral communications never improved.

Oppositely, it worsened as he progressively restricted his analytical scope to molecular experimentation, which he did because results from that domain were in accordance with his ideology. Handler's ability to communicate was predicated exclusively on his rhetorical skill and a large staff that prepared his congressional testimonies and official intra-Academy and public documents that appeared under his name.

He habitually spoke as an authority in every area of science and technology, utterly unmindful that he surely would have been impeached as unqualified to so opine had he been required to undergo cross-examination — a constraint to which he was impervious. In sum, although Handler was an expert speechmaker, his rhetoric lacked peer review, substance, and credibility. Using his own language, there was no "quality control" mechanism for the scientific integrity of his speeches because the "necessary sieve" to filter out methodological errors and unsubstantiated claims was absent

Handler's "moral duty" to "give back" to science went unfulfilled because there was no "primary defense" against his publication of "junk science," even though that defense was essential for maintaining the "public's trust "in science.

Handler never demonstrated an ability to communicate valid and useful scientific information by means of the written word in peer-reviewed publications, at least not after the early 1950s, when he ceased producing and publishing results of reductionistic experiments because of his medical problems. What initially appeared to be an exception was his 1970 book, *Biology and the Future of Man* — a four-year, multi-million dollar project supported by several hundred consultants who answered to him — proved not to be so; the book never found an audience or gained traction with scientists or the public. It failed because Handler wrote as if he were an authority while repeatedly failing to satisfy the minimum requirements of disciplined scientific reasoning. Throughout the book, his claims about biochemistry were presented not as hypotheses to be tested or bounded by uncertainty, but as sweeping declarations of inevitability and truth unsupported by evidence proportional to their scope.

He repeatedly asserted that "all phenomena manifested by living things could be explained in terms of biochemistry," that biochemists had "no doubt that all the answers will be found in the near future," and that biochemistry alone furnished the "closest insight man has yet obtained of the nature of life." None of these statements was rationally defended — nor could be as subsequent scientific development soon established. They were ideological proclamations masquerading as scientific conclusions.

The book revealed a striking contrast between Handler's extraordinary rhetorical fluency and his inability to produce objective analytical prose.

As a speaker, Handler possessed what contemporaries regarded as a "silver tongue": the capacity to move rapidly, confidently, and persuasively from premise to conclusion, often overwhelming listeners through cadence, certainty, and institutional prestige.

In writing, however, the underlying weakness of his reasoning became visible. His arguments routinely depended on assertion rather than demonstration, emotional uplift rather than evidence, and rhetorical inflation rather than analytical precision.

The prose frequently drifted into quasi-religious exhortation, describing biochemical research in tones that resembled prophecy more than science. The text itself observed that the book possessed "the tone and tenor of a sacred writing." The transition from speech to writing exposed a structural weakness in Handler's authority. Oral performance permitted rapid movement across assumptions that written analysis forced him to justify. Once removed from the momentum of speech, the instability beneath the rhetoric became increasingly visible**.**

Most revealing was Handler's inability to distinguish scientific evidence from ideological conviction. Environmental carcinogenesis, pollution, DDT exposure, clinical medicine, economics, ecology, and even human behavior were all forced into the same reductive framework. Contrary evidence, alternative methodologies, and competing interpretations were systematically excluded. The result was not scientific synthesis, but intellectual closure presented in the language of objectivity.

Handler's writing lacked the disciplined uncertainty characteristic of serious scientific analysis because his conclusions had largely been reached before the analysis began. The voice speaking throughout the book was therefore not the voice of biology, but Handler's own ideological monologue projected through the institutional authority of the National Academy of Sciences. The book failed because Handler had nothing worthwhile to write about biology or medicine. When he stepped out of his role as a co-author of a textbook on biochemistry for first-year medical students, Handler's written word had no merit

A manuscript Handler wrote in 1979 further evidenced this limitation.
He severely criticized Robert Becker's research, not based on analysis of published results, but rather on pirated, specious courtroom testimony that Handler plagiarized from Herman Schwan, whose opinions concerning the health risks of anthropogenic electromagnetic energy perfectly matched Handler's ideological beliefs.
Handler's inability to write temperately and focus on peer-reviewed evidence was dramatically exposed in his poisonous manuscript[2] for which he unsuccessfully sought publication.

So long as Handler spoke from within the institutional architecture he controlled, rhetorical confidence could substitute for disciplined demonstration.
Committees, prestige, administrative authority, and the public language of scientific expertise combined to stabilize the appearance of certainty. But Handler's time at the Academy was ending, thus removing the structure that had long sustained his authority. His institutional voice would soon disappear, but he lacked a personal one sufficient to carry out the task he desired to undertake — retrospective explanation as opposed to public performance. Ten days before Handler term as head of the Academy ended, he wrote in his diary: "It is a difficult day, the day when I broke up my office at the Academy…Waiting, under these circumstances, in a room which I have dearly loved, set me to thinking that perhaps I was under obligation to commit some sort of summary of the last twelve years, some account of my stewardship. It is a tricky task that may border on the arrogant. And yet, not to do so is to fail to leave a record."
Handler's period of public performance was ending, leaving him with a problem he had never faced — production of rational, evidence-based, written retrospective explanation. And in that transition, Handler was confronted a with problem he had avoided throughout his career — how to explain himself.

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[2] Handler's Saturday Review Manuscript

5_ Oltmans-Handler Memoir

Soon after Handler's first term as Academy head commenced in 1969, he began dictating what he later entitled *A Twelve-Year Diary,* intending to use it as a basis for a memoir, but he did not systematically record entries or organize the effort. His managerial activities and work habits — designing and implementing a massive reorganization of the Academy's business structure and micromanaging its operation, often working till late in the night — contributed significantly to this neglect. Handler's health condition also contributed to his disinterest in systematically recording entries or organizing the effort. He suffered from ill health throughout his life. He was a child prodigy and incurred a sports-related head injury while trying to compete with his older university classmates. At Duke, he developed an immune disorder in the early 1950s that forced him to cease experimenting on animals. He disdained physicians because they lacked a scientific basis for the practice of medicine, and designed a medical-school curriculum in which students would spend two additional years studying biochemistry and then receive both an MD degree and a PhD in biochemistry.

The curriculum was rejected at Duke, and his effort at proselytizing nationally in its favor also failed, strengthening his contempt for the way medicine was practiced. He experienced a wide range of persistent symptoms but declined to consult physicians, preferring instead to treat himself. Over time, his duties and habits exacerbated his health condition, especially in later years. At the Academy he worked long hours designing and implementing a massive reorganization of its business structure and micromanaging its operation, and continued life-long habit of chain-smoking, all while coping with chronic health problems.

Handler's medical signs and symptoms became especially evident near the end of his career. In 1979, his health failed seriously, further reducing the time, stamina, and concentration required for a sustained autobiographical undertaking, and forcing him to seek medical advice. He was referred to cancer specialists, and in 1980 was diagnosed with a late-stage highly aggressive virulent type of immune-cell cancer, and immediate chemotherapy and radiation treatment was recommended. Handler postponed plans to return to his home in North Carolina when he left the Academy in 1981, and made plans, upon leaving Academy housing, to live in his summer home in Woods Hole to be near the Boston hospital where he was being treated .

He made only sporadic entries to his verbal diary, many of which were lost by either Handler himself or his secretaries. The challenge confronting Handler, however, was larger than record-keeping and the practical difficulty of finding time to write.

The deeper problem was that his career never depended on disciplined written analysis, and he never manifested that skill — his strength was oral persuasion, not writing. Handler possessed an extraordinary ability to speak rapidly, confidently, and authoritatively in institutional settings, converting assumptions into conclusions through cadence, certainty, prestige, and force of personality. In speech, ambiguities could be concealed by momentum, contradictions softened by tone, and unsupported assertions made to sound self-evident. Writing, in contrast, imposed entirely different demands. A memoir required continuity of argument, definition of pivotal words and concepts , and disciplined use of evidence. Above all, writing demanded an ability to sustain coherent explanatory structure over long stretches of prose.

Throughout his time at the Academy, the explanations Handler provided depended not on what he wrote personally, but upon the Academy's capacities: committees, prestige, staff preparation, and staff documents published under his name.

His impending departure from the Academy, however, threatened to abruptly remove all those supports simultaneously and, as his 1970 book revealed, Handler had profound weaknesses as a writer — he relied heavily on assertion, ideological conviction, and rhetorical inflation while largely avoiding contrary evidence, competing interpretations, or careful analytical limitation. During his years at the Academy, Handler produced remarkably little substantial writing of intellectual significance under his own pen. Instead, almost all of his public communication depended on speeches, ghostwritten congressional testimony, institutional reports, and proffered advice based on the Academy's authority. The difficulty that confronted Handler was not that his work burden and chronic illness shortened the time available to write a memoir, but rather that doing so required the very capacities he had failed to develop during his career: sustained introspection, unbiassed analysis of the literature, and coherent written explanation of his motives, assumptions, and actions. Handler could verbalize well in conversation, where immediacy and force carried the moment, but a memoir threatened to expose the shortcomings and instability that lurked beneath his rhetorical performances.

After a decade's delay, Handler abruptly commenced working on his memoir during his last few months at the Academy, but he was ill-suited for the task, which required continuity, self-examination and explicit justification — not his natural strengths. His career had been built differently: prepared congressional testimony drafted with staff assistance, speeches designed to achieve his ideological goals and advance his beliefs, opinion pieces shaped for influence, and oral performance delivered with the confidence of someone not subjected to adversarial scrutiny.

At the end of Handler's term in office, he faced the difficulty of writing what he wanted to be seen, understood, and appreciated — descriptions of the advances in science and science policy he believed he had brought about, and the steps toward modernization of the Academy he had taken — but he had to accomplish his goal without the help of a staff. He dictated reminiscences that when transcribed yielded about fifty pages, but was dissatisfied with the results. He could dominate discourse far more easily than he could question and justify what he did.

Handler's impending loss of the team of literary workers he had relied on, together with the limitation that he could not easily question himself, determined what form his written retrospective could and should assume. He needed another voice, an interlocutor who would invite rather than challenge, and thereby allow him to continue the mode of expression on which his authority had always depended.

Prompts in the form of a question or assertion, together with the fluid structure of conversation that allowed Handler to convert assertion into apparent explanation through rhetorical style, could then be used to communicate Handler legacy to posterity. The resulting memoir then would not depart from Handler's prior methods of communication, but rather preserve and capitalize on them. Conversation would allow ideology to continue appearing as explanation, and rhetorical fluency to continue substituting for sustained analytical demonstration.

In mid-June 1981, Handler was asked for an interview by Willem Oltmans, a Dutch journalist whom he had previously befriended. Handler respected Oltmans involvement in

international political and scientific issues, and his interviews of top scientists and governmental officials in the U.S., western Europe, and the USSR.

Handler saw the interview as an opportunity to explore whether he could base his memoir on a question-and-answer format, which was highly compatible with his style, and he agreed to the interview, which took place in Handler's apartment on 30 June 1981, his last day at the Academy. During their conversation — Oltmans later explained in one of the many diaries he published online — he realized it would be "a journalists dream to do a prolonged interview with this extraordinary man, review his life as a scientist, and compile it for future generations in a book." Oltmans recounted that at one point he interrupted Handler and suggested, "Dr. Handler, let's do an entire interview-book," and he immediately answered, "Alright." Thinking Handler had not fully understood the wide range of his proposal, Oltmans continued, "Maybe you do not understand. I would like to do an entire question-and-answer book with you based on your life as a scientist." Handler replied, "I already said yes" and suggested that Oltmans come to his summer home in Woods Hole, Massachusetts to carry out the project. The question-and-answer format that emerged with Oltmans was compatible with Handler's style, and was the only form of communication through which Handler could plausibly attempt to explain his work.

Between July and December 1981, Oltmans recorded six conversations that preserved Handler in an expansive, extemporaneous, and unusually unguarded condition, and resulted in a 214-page manuscript, *A Life of Science: Six Conversations with Dr. Philip Handler.*[3] Handler spoke without preparation, without revision, and without the moderating discipline of institutional review. The interviews were recorded partly at Woods Hole , Martha's Vineyard, and in a Boston hospital where Handler, who was seriously ill with lymphoma, was receiving intensive care; he died shortly after the last interview. The resulting manuscript, therefore, was not a polished testament but rather a terminal conversation.

The relationship between Oltmans and Handler shaped the tone from the beginning. Oltmans did not approach Handler as a skeptical examiner. He introduced him as an "extraordinary man," described the project as a journalist's dream, and presented his effort as a duty owed to "this fine mind and most wonderful man."

His admiration mattered. It seems to have invited Handler to speak not as a witness under pressure, but as a man accustomed to deference and pleased to receive it. He did not confine himself to direct answers. He generalized, defended, interpreted, and pronounced. The result

[3] The Oltmans interviews did not proceed as a sustained or orderly process. They moved irregularly across subjects, returned to earlier issues without warning, and often developed important themes in scattered fragments. For purposes of analysis here, the recurring topics were identified, assembled, and interpreted thematically. What follows here is not a reproduction of the original sequence of discussion, but a reconstruction of the underlying pattern of Handler's beliefs that emerged from it. Oltmans himself, in the Forward of the manuscript, warned that the six conversations were "relaxed, leisurely get-togethers between two friends," that Handler spoke "entirely from memory," and that the text was not a "scholarly treatise". Once the fragments were gathered and reorganized, they yielded a coherent structure of Handler's beliefs. Details attendant the creation of *A Life of Science* are provided in the Appendix. The manuscript never gained publication, but can be accessed at the Royal (National) Library of the Netherlands in The Hague.

was less a formal interview than an extended act of self-exposition. The structure of the conversations therefore reproduced, in miniature, the larger structure Handler had built at the Academy itself: authority operating within conditions that minimized adversarial scrutiny while maximizing interpretive control.

Read in sequence, the discussions could seem haphazard in the sense that a subject emerges, disappears, and then returns later in altered form. One conversation about war in Vietnam became an argument about democracy; one about science policy became a reflection on public ignorance; one about environmental controversy became a theory of truth. Yet once the recurring themes were gathered and reorganized, the disorder gave way to structure. The same assumptions recurred across different subjects with enough consistency to reveal something deeper than opinion. They revealed Handler's worldview. The scattered conversations therefore required reconstruction in much the same way Handler himself had reconstructed the Academy: dispersed fragments had to be gathered, ordered, translated, and made structurally intelligible before their underlying logic became visible. What emerged from that reconstruction was not late-life reconsideration. Handler did not test his premises against their consequences. He restated them. Across the conversations, the same hierarchy appeared repeatedly: molecular explanation stood at the top of knowledge; elite scientific institutions stood at the top of legitimate judgment; regulatory action was to be deferred until evidence reached a degree of completion tantamount to certainty. Those commitments shaped nearly everything Handler said.

One of the clearest recurring features of the conversations was Handler's conviction that science should stand above politics in the ordering of public life. He stated the proposition directly: "Science must provide the answers. Politics cannot be trusted to do so." The sentence mattered because it did not merely recommend scientific input, it subordinated democratic judgment to technical authority.

Politics, in Handler's formulation, was unstable, emotional, pressure-ridden, and simplificatory. Science, by contrast, was disciplined, cumulative, and entitled to precedence. That position did not remain abstract; Handler tied it to the largest dangers of his time. After twelve years at the Academy, when asked for his gravest concern he answered: "There are two coupled overall concerns. One is the arms race, which is about to get out of control." He added, "I cannot imagine an arms race, that does not end up in using the arms. I have this sense of a world gone mad." Elsewhere he described the strategic condition as "an utter horror." He also described the domestic consequences of defense spending as inflationary and economically destructive, saying that the United States was paying for "the production of nothing." These remarks conveyed genuine alarm, but they also revealed something larger: Handler felt entirely entitled to move from biochemistry into macroeconomics, military doctrine, national preparedness, and the ordering of global power. That overreach reflected a core assumption of Handler's worldview: scientific standing conferred a transferable authority of judgment far beyond one's disciplinary training. He had not been trained as a strategist, military historian, or constitutional theorist. Yet he spoke comfortably in all of those registers. That tendency was not mere conversational breadth — It was ideological. Handler did not treat science as one discipline among many. He treated it as a superior cognitive order whose members could legitimately interpret almost any serious public issue.

The point becomes sharper when set beside his remarks about Vietnam and the Defense Department. Handler said that one of the major "vices" of Vietnam had been the schism between the American scientific community and the Pentagon. Scientists, he said, had "run away" from the military, and in his role as head of the Academy, he looked "for mechanisms to rebuild the bridges." He denied wanting a "militaristic scientific community," yet he insisted that the scientific community had to understand that it was "one country with one government" and that the military had "legitimate needs." Scientists should remain "available and useful in case there should be a national emergency." This was not the language of separation of science and the government, but rather that of the integration science into the state.

Handler's analogy between science and religion further illuminated the same structure. He said that entering science was "much like entering the priesthood."

The comparison implied more than dedication, it also implied hierarchy, initiation, vocation, and access to truths not equally available to the general public. Scientists were not simply trained specialists in this image, they were a kind of secular clergy.

The phrase helps explain why Handler so readily treated scientific elites as the natural arbiters of public controversy. He did not imagine scientists as one constituency among others in a democratic order, but rather as a higher interpretive class that, because of their occupational specialization, had privileged access to truth.

This outlook shaped his understanding of the National Academy of Sciences.

He repeatedly defended the Academy as a site where arguments were placed on the table, where limitations were admitted, and where collective advice had been "scrutinized" and "put through a wringer." He contrasted that with politics, which, he said, "has to simplify issues and has to pretend that the complications are not there."

Elsewhere, he spoke of the Academy as removing "noise" and producing clarity.

Handler's formulas were revealing, not because they were wholly false, but because they suppressed a crucial distinction: advisory expertise and advisory neutrality are not the same thing. A person may be a Nobel Prize winner and yet deeply shaped by bias, as Handler well knew. He was deeply embarrassed when William Shockley, who shared the 1956 Nobel Prize in Physics, publicly asserted Black intellectual inferiority and repeatedly, but unsuccessfully, demanded Handler permit the Academy to investigate his view scientifically. Nevertheless, Handler repeatedly defended the intellectual superiority of scientists and maintained that bias, if it existed, had no serious consequences in the decisions of Academy committees. He rarely hinted at the problem. of bias and never meaningfully confronted it because he believed impactful bias and scientific knowledge could not exist in the same brain. He said that no one scientist, regardless of "what he believes about a given issue is likely to determine the outcome" of an Academy's decision. Handler's view was strikingly ironic because he himself occupied precisely such a location for much of his presidency. He also denied that he personally manipulated thousands of Academy appointments, and in a narrow administrative sense that was likely true, but he also conceded the larger point.

He admitted that he had consciously tried to create a climate more favorable to military assignments and industry relations, and that those around him knew "this was what I believed needed to be done." He further acknowledged that appointments may have become "friendlier towards industry." The result was not neutrality. It was institutional direction.

A second, still deeper feature of the Oltmans conversations was Handler's insistence that biological truth required molecular explanation. He stated the principle without qualification: "If you cannot explain it at the molecular level, you have not explained it at all." This was one of the most revealing sentences in the entire manuscript because it was not merely methodological — it was constitutional in an epistemic sense. This statement was a central expression of Handler's reductionist doctrine. It defined the terms on which evidence was allowed to become authoritative.

The force of the sentence laid in its exclusivity. It left no dignified resting place for levels of reality that were functional, clinical, physiological, ecological, or systemic but not reducible or not yet so.

Robert Becker asked a different question — not the biochemical basis of cancer, but what caused it. If the cause were known, identifying the biochemical basis would be akin to what Becker called "stamp-collecting" because if an anthropogenic factor caused cancer there had to be a biochemical involvement. It was knowledge of what caused cancer — not its biochemical basis — that primarily induced the public to sanction use of taxes for biomedical research. If the cause were known, cancer could be avoided by avoiding that cause. Naturally, the public cared more about knowing the cause than the molecular basis. Handler thought differently— that if the molecular events that mediated the disease were known, science would be enriched and society would ultimately benefit. A phenomenon might be visible, reproducible, consequential, and biologically coherent; yet if it could not be explained at the molecular level, Handler's formula deprived it of full explanatory standing. This was why Handler's dictum, "If you cannot explain it at the molecular level, you have not explained it at all," was not a harmless preference for precision, but rather a gatekeeping rule that demoted what did not submit. That explained Handler's recurring opposition to scientific approaches that dealt in emergence, distributed effects, system-level biophenomena, or complexity. He did not merely ask that such approaches produce better evidence, he repeatedly suggested that they lacked the finality needed for serious science. The absence of molecular closure became, in practice, a reason to delay recognition. Thus, clinical observation, organismic function, ecological pattern, or population-level evidence remained inferior until translated into the language of biochemical mechanism. In this way reductionism ceased to be an explanatory strategy and became an ordering principle. Handler treated ecological, clinical, or systems-level evidence as epistemically subordinate to molecular explanation.

The logic became especially visible when Handler turned to health risks and policy. In discussing nuclear technology, he said that the safety question concerning low-level ionizing electromagnetic energy turned on the dose-response curve and was therefore "quite a technical question." That formulation did more than identify scientific complexity, It relocated authority. Questions involving public risk, uncertainty, consent, burden distribution, and the acceptable terms of exposure were redescribed as technical issues. Once that happened, the relevance of public judgment shrank.

Mass voting on such questions was impossible, and the people must "turn over their authority" to representatives. The claim preserved the external language of democracy while hollowing out much of its practical substance. The people remained only as granters of trust. They were not treated as competent co-judges of complex public questions. Once an issue had been recoded as technical, substantive authority flowed upward to scientists.

This pattern became even more revealing when Handler's policy preferences surfaced. On the issue of nuclear fuel cycles, he said plainly: "I am in favor of reprocessing indeed." He spoke admiringly of breeder reactors and described the refusal to use spent fuel as close to criminal. He also said he had been "delighted" when Ronald Reagan lifted Jimmy Carter's ban.

The point was not merely that Handler held a view. The point was that the head of a body claiming the highest advisory seriousness openly aligned himself with one side of a disputed public issue. Once that was admitted, questions about committee formation, evidentiary framing, and advisory neutrality become unavoidable.

The larger issue was structural rather than personal. Human beings select within horizons of belief. Handler — who favored reprocessing, sought friendlier ties with industry and the military, and believed many technical questions lay beyond popular judgment — could not plausibly preside over a fully neutral advisory culture. His selections for Academy committees to offer advice regarding such questions carried his philosophy. The point did not require conspiracy; it required only institutions populated by persons whose priorities were already shaped. Handler's own admissions made that clear. He conceded using "high-handed methods" to slant Academy committees in favor of industry and the military, and acknowledged he tried to create a climate friendlier to military assignments, and to industry by making committee appointments that were "friendlier towards industry."

Reductionism thus defined what counted as knowledge, and its practical power became most visible where public controversy depended on forms of evidence that reductionism routinely treated as inferior. That was why Handler's handling of DDT and environmental risk occupied such a central place in the larger pattern. Handler's treatment of DDT provided one of the clearest longitudinal demonstrations of reductionism functioning as public doctrine. When discussion turned to Rachel Carson and the environmental movement, Handler sharply criticized what he took to be a desire to prove society and especially industry guilty. Handler referred to public episodes such as Love Canal as cases in which people wanted the circulating stories to be true. He then moved to Carson, and when Oltmans observed that "the dead birds were everywhere," Handler replied with the sentence that may best summarize his entire environmental epistemology: "The only place to find out the facts and the truth is in the laboratory." That sentence was central because it did not say the laboratory is one indispensable tool among others. It said the laboratory was *the* place where facts and truth were found. The real world — the dead birds, the ecology, the field evidence, the pattern of damage — became secondary until validated under controlled laboratory conditions. This was the move by which Handler's reductionism became, for him, a doctrine of public recognition. Observed anthropogenic side-effects were made epistemically subordinate to laboratory observations. The practical effect was obvious.

Environmental harms often emerged first through distributed evidence: wildlife decline, residue persistence, ecosystem disruption, reproductive abnormalities, clustered human illness — long chains of causation no laboratory could simulate.

Handler's framework gave investigators permission to withhold full acknowledgment of the implications of those signs because they had not yet passed through his preferred method for producing proof. Quantifiable real-world evidence became anecdotal,

and its pattern of development became nothing more than suggestive. The public had to wait until closure in biochemical laboratories arrived.
This was why DDT should be treated as a side issue that deserved no more than minor concern. The DDT issue revealed not only what Handler believed, but how he believed.
The laboratory did not merely refine truth for him — it monopolized it. That was why DDT became so important to the architecture of the message he sought to pass on by means of his conversations with Oltmans. It showed that Handler's reductionism was not confined to abstract questions of theory. It shaped what counted as real harm in the public sphere.

The same intellectual habit appeared in other domains. In debates regarding exposure to electromagnetic energy , Handler shifted attention to dose-response analysis and technical uncertainty. In chemical-risk arguments, he insisted on a level of proof so stringent that regulatory and public-health response could be postponed indefinitely. In each case, distributed ecological or epidemiological evidence and the results of laboratory gold-standard animal studies remained inferior until certified in biochemical laboratories. What changed from issue to issue was the object. What remained constant was the regime of recognition. Once evidence had been ordered in this way, the next step followed almost automatically: risk could be governed by delay, and delay could be justified as rigor.

A revealing irregularity in the conversations concerned the appearance of two letters: a public letter written by with Milton Friedman, who had won a Nobel Prize in Economics, and a private reply Handler wrote. In an open letter published by a national news magazine , Friedman argued that the National Science Foundation did not warrant federal support as an agency for funding scientific research. He asserted that publicly -funded basic research lacked sufficient accountability, produced uncertain or diffuse benefits, and displaced private initiative that might otherwise operate under more disciplined market conditions. In his view, the NSF represented not a neutral engine of knowledge, but an institutionalized source of money that could not be justified to the taxpayer. Handler's reply, which the magazine declined to publish, did not directly engage Friedman's economic argument, it shifted the ground of discussion. Rather than confronting the question of whether funding research with taxpayer money required stricter justification, Handler defended the authority and importance of organized science — its institutional competence, historical achievements, and centrality to national progress. In doing so, he treated the NSF less as a policy instrument open to evaluation, and more as an extension of a larger epistemic order that, in his view, did not require external validation.

Handler's response was consistent with the pattern of communication he evinced throughout the conversations — Handler did not meet Friedman's criticism by accepting its premises and testing them, he redefined the premises.
Where Friedman posed a question about economic justification, Handler answered with an assertion of scientific necessity. Where Friedman emphasized accountability and limits, Handler emphasized authority and achievement. The effect was not to resolve the disagreement, but to relocate it onto ground more favorable to Handler's position.

Handler's strategy was directly related to the themes of the conversations.
His defense of the NSF mirrored his defense of the Academy: both were treated as institutions whose legitimacy derived not from what they were accomplishing but from their place within a

hierarchy of expertise. The question of whether their accomplishments met standards of justification was displaced by the assertion that they were, by their nature, the proper arbiters of such standards. In this way, institutional authority became self-referential. Science, organized through elite structures, defined the terms on which it was to be judged.

Handler's decision to make his reply publicly available through Oltmans became necessary when he raised the Friedman issue: "Apparently Milton Friedman feels the NSF should be abolished, reading his Open Letter to you in *Newsweek*."
The magazine declined to print Handler's reply, probably because it was rhetorical, and only tangentially engaged the issue Friedman raised. But it was constructively in the memoir after Oltmans mentioned it, and Handler likely recognized a need to disclose his reply — although rejected in its original context, the reply provided a ready-made statement of Handler's position. By supplying it to Oltmans, Handler ensured that his defense of organized science would appear in his memoir — the retrospective account of his career — free from editorial constraint and without the need to meet the standards of relevance or precision of language imposed by the magazine. Thus the episode further illustrated Handler's broad pattern: when direct engagement failed or was curtailed , he did not abandon the argument, he relocated it. The memoir-like format of the conversation offered such a venue. Within it, previously unaccepted material could be reintroduced, insulated from challenge, and presented as part of a larger narrative that dealt with authority and achievement. The Friedman–Handler exchange was not an isolated event. It was an example of how Handler managed criticism — not by confrontation but by reframing it within a context favorable to his position.

Handler's approach to the issue of health risks stemming from exposure to anthropogenic factors was based on his binary classification scheme regarding the relevant scientific research — it was either dispositive or irrelevant.
His term for dispositive was "conclusive;" he consistently asserted the necessity of **"**conclusive evidence**"** before action to guard public health could be justified. The phrase functioned socially as a ratchet that raised the putative safe threshold for exposure to levels satisfactory to institutional stakeholders —usually industry, but sometimes the military, as in the case of safety to exposure to microwave electromagnetic energy. Evidence accumulated from epidemiological and animal studies, although often generally regarded as persuasive and predictive of human health risk, was never "conclusive" in the Handlerian reductionist sense because it provided no molecular basis for regulatory-agency action and hence was irrelevant for that purpose. Handler did not speak in the language of information accumulation, only in the language of finality. His demand — that actionable evidence had to be settled, complete, and finished — was a bar to agency action which could not be cleared in the real world, only in the world of theoretical biochemistry. And while biochemical proof was supposedly maturing, the technologies that created health risks remained deployed and their health risks remained in effect. And the America legal system being what it is, such use was grandfathered, there was no turning back, the risk remained forever. The costs of waiting for what could not happen were externalized onto those who were living with uncertain consequences of certain exposure. The delay in agency action brought about by Handler's system was not a side-effect of scientific rigor, it was a procedural consequence of his demand for unattainable rigor.

Even more broadly, Handler insisted that the judgements regarding what was conclusive or safe were not value judgements to be made democratically, they were highly technical determinations beyond the competence of democratic processes. In his mind, the technical decisions were purely objective, untainted by subjective considerations such as values. Handler said, in effect, that laymen could not reasonably judge such matters because they turned on technical considerations, thresholds, and professional interpretation. He spoke not of provisional action but of non-action pending the reality of an illusion —complete knowledge. Handler did not merely imply that public input on such questions was unavailing, he explicitly said it was "utterly stupid." He did not merely say that expertise was useful, but rather that the public had little choice but to "turn over" authority to scientists. These were not stray phrases. They showed that the demand for conclusive evidence was bound to a larger political arrangement in which technical complexity justified the retreat of public judgment.

Handler placed the burden of proof overwhelmingly on those who alleged harm or warned of danger — environmental researchers, clinicians, affected communities. Dissenting investigators were expected to produce far more than converging indications, they had to produce conclusive evidence at the molecular level.
Proponents of existing exposure patterns benefited from the absence of conclusive evidence, which in Handler's eyes entailed the presumption of safety. Maintenance of continuation of the status quo required nothing except the derogation of evidence provided in epidemiological and animal studies. Intervention and precautionary action, in contrast, required certainty. In Handler's ethical system, this meant that a false positive — an intervention later judged unnecessary — carried vastly more institutional weight in Handler's thought system than a false negative, in which harm continued while relevant evidence was still ripening. His ethical ordering was one of the most consequential features of his version of reductionism. It aligned rigor with delay and delay with the protection of established arrangements. At that point, the logic of evidence became inseparable from the logic of democracy in the sense that if only experts could judge when evidence was actionable, then public authority necessarily shrank and technical authority expanded.

Handler's ideology was manifested in almost every page of the *A Life of Science.* In discussing nuclear technology, Handler stated: "The question of safety turns around the dose-response curve for ionizing radiation at low levels, which is quite a technical question." This formulation did more than identify scientific complexity — It relocated authority. Questions involving public risk, uncertainty, consent, and acceptable exposure were redescribed as matters to be resolved within a narrow technical framework. Handler explicitly outlined the political implications: "Therefore, I do not see what else the people can do but turn over, for the moment, their authority to representatives whom they elect, and say: 'You can do this for us as long as we trust you.'" The statement linked scientific knowledge to governance.
The public was not treated as a participant in judgments regarding the consequences of uncertainty, but as a group that must defer when the question was framed by scientists as technical. Handler reinforced this position by rejecting broader democratic participation in such matters. He stated bluntly: "I do not understand why one insists upon uninformed people going

to the voting machines. That is utterly stupid. I would rather they don't vote at all." And elsewhere: "A small fraction of the population gives direction to the thought processes of the nation."Handler's remarks showed that his demand for "conclusive evidence" was not merely methodological, It was part of his larger view that technical questions — and many of the most consequential public questions — should be removed from ordinary democratic adjudication.

Handler's evidentiary standard was not neutral in operation — it played an important role in the political system. His framework required that claims of harm be supported by forms of proof that were complete, settled, and reducible to technical demonstration. This was consistent with and a consequence of with his broader assertion that biomedical explanation must ultimately be molecular: "If you cannot explain it at the molecular level, you have not explained it at all. "Within such a framework, according to Handler, evidence that was clinical, ecological, epidemiological, or based on animal studies —however suggestive or even compelling — remained insufficient until it achieved the level of Handlerian reduction. For Handler, this was a scientific requirement, and it simply did not matter to him that it was unattainable within the time course of public decision-making, if ever. The practical effect was that exposure continued more or less unabated pending the appearance of "conclusive evidence," which never came. Nevertheless, Handler's position never changed. His position remained aligned with his insistence that "the only place to find out the facts and the truth is in the laboratory." In Handler's eyes, neither statistical analysis of real-world biomedical consequences attributable to somatic factors in the environment nor biological effects in animals caused by controlled exposure to the factors, had decisional value because they were not validated at the molecular level in biochemical studies. His approach placed the burden of proof asymmetrically. Those alleging harm must meet a standard of "conclusive evidence;" those defending the status quo benefit from the absence of such evidence.

Handler's rhetoric reinforced this asymmetry. By defining the relevant questions as technical and the required answers as highly specific, he ensured that uncertainty operated in one direction. The absence of "conclusive evidence" fathered his skepticism toward precaution and became a justification for inaction. He showed far greater concern about acting without complete evidence than about delaying action in the presence of credible but incomplete indications of harm. Handler regarded acting too soon as a failure of rigor — an action tantamount to the rejection of the scientific method — whereas not acting while possible harm accumulated was only a temporary condition remediable by further study.

Handler's language repeatedly returned to the same organizing principle: reductionistic biochemical research as the basis of scientific legitimacy. He treated such evidence as necessary and sufficient to confer legitimacy, thereby blocking recognition of health risk because it could not be demonstrated in a reductionistic think system. Once the question of risk was defined in reductionistic terms, the evidence needed and the authority to interpret it became restricted. Institutional science governed what was known and when society was permitted to respond to risk.

Only certain forms of evidence were admissible, and only certain experts were qualified to interpret them. Governance of risk becomes inseparable from the structure of expertise itself. The health-risk issue was regarded into a problem susceptible of resolution by science, but only in theory because a reductionistic-based resolution of risk was an unrealizable abstraction.

No part of *A Life of Science* was more explicit politically than Handler's reflections on democracy. Oltmans provocatively suggested that democracy might be a "tragic farce," and although Handler did not fully embrace the phrase, his responses moved consistently in that direction. He stated plainly: "A small fraction of the population gives direction to the thought processes of the nation." The remark expressed a view of governance in which influence was inherently concentrated and, by implication, properly so. Handler's position became even more explicit when he directly addressed public participation. He stated: "I do not understand why one insists upon uninformed people going to the voting machines. That is utterly stupid. I would rather they don't vote at all." That was not a passing frustration. It was a direct rejection of the premise that broad democratic participation was legitimate when issues turned on values, even if the issues were complex. Handler's statement did not just question the quality of public judgment; it questioned the virtue of public participation in the context of technical uncertainty. This position was reinforced by his repeated characterization of major public issues as inherently technical. He argued, in substance and tone, that "the great questions of our time" were not amenable to popular decision-making because they require specialized knowledge. In earlier discussion, Handler had already framed safety and risk in these terms: "The question of safety…is quite a technical question." He simply ignored the decisive role of public values in resolving such questions. Once issues were defined in this way, the role of the public necessarily contracted. Judgment shifted from the electorate to those who possessed the requisite technical authority. Handler did not leave this implication unstated.

He made the transfer of authority explicit: "Therefore, I do not see what else the people can do but turn over, for the moment, their authority to representatives whom they elect, and say: 'You can do this for us as long as we trust you.'" The phrasing preserved the formal language of democratic consent, but the substance was different.

Authority was not exercised; it was delegated. Participation was not substantive; it was conditional.

Handler's treatment of referenda and direct public decision-making further clarified the point. He expressed open disdain for attempts to place technical or policy questions before the electorate, describing such practices as "stupid beyond belief."

Whether the issue involved fluoridation, taxation, or public spending, the underlying objection was the same: decisions of consequence should not be made by those lacking the technical competence to evaluate them. Taken together, these statements revealed a coherent position rather than a series of isolated remarks. Handler did not merely prefer expert input. He regarded expert judgment as a necessary substitute for broad democratic participation in a wide range of substantive matters.

The more a question could be framed as technical, the less appropriate it became, in his view, for public adjudication. The implications extended beyond political theory into institutional practice. If legitimacy depended on technical competence, and technical competence was concentrated within a relatively small class, then authority would tend to concentrate as well. Handler's earlier assertion — that "a small fraction of the population gives direction to the thought processes of the nation" — thus became not simply a description but a justification. Concentration of influence was not a defect to be corrected; it was an outcome to be accepted. In this way, the narrowing of admissible evidence he described earlier was mirrored by a narrowing of admissible judgment. Just as only certain forms of knowledge

qualified as legitimate, only certain people qualified as competent to decide. The structure was the same. Technical sufficiency governed both what may be known and who may decide.

Handler's remarks in the conversations with Oltmans presented science not as separate from government but structurally embedded within it. He described the relationship: "Science and government have grown up together in this century, and they are now inextricably intertwined." In Handler's account, scientific authority developed alongside political power and operated within it. When explaining what the government expected from the National Academy of Sciences, he returned to the same point: "What the government wants from us is not just advice, but advice it can use."

Handler conceded that the advice provided by Academy committees was not based solely on scientific principles, it was shaped for governmental purposes to ensure the advice was usable. The distinction was important because it placed ~~s~~cientific judgment within a framework of application rather than abstraction.

Handler emphasized that the Academy's function was to bring together expertise, evaluate competing claims, and provide guidance that had been "scrutinized" and **"**put through a wringer." He contrasted this process with politics, which he said, "has to simplify issues and has to pretend that the complications are not there." His point was clear: science refines; politics simplifies. But his claim rested on the assumption that the Academy's processes were unbiased, objective, and unaffected by external pressure. The statements he made undercut the credibility of the claim.

He acknowledged that the scientific enterprise had become deeply connected to government and industry, which he regarded as something good. Handler said he believed the future of science depended heavily on government and industry, and that he worked to reduce resistance to that relationship within the scientific community.

That revelation indicated the direction of the scientific endeavor was shaped, at least in part, by the sources of its support and the expectations attached to that support.

Handler's statements and efforts, taken together, outlined a consistent position. Science, as Handler described it, operated within a network of institutional relationships — governmental, industrial, and administrative — that influenced both the production of knowledge and the form in which that knowledge was presented.

At the same time, he continued to describe scientific output as uniquely authoritative and distinct from political influence. The tension between those two claims was not resolved within *A Life of Science*, but its existence was clear to see.On the one hand, Handler said science was "inextricably intertwined" with government and increasingly aligned with industry. On the other, he presented science as a source of refined, objective judgment capable of standing above political simplification. Their combination allowed Handler to operate the Academy within the power structure of government while retaining the appearance of independence.

Although Handler did not discuss specific cases of advisory practice in detail in the conversations, the pattern he described could be observed in contemporaneous institutional activity. During the controversy over the Navy's Sanguine-Seafarer system, the National Academy of Sciences organized its review through multiple committees, each addressing a different aspect of the problem — engineering feasibility, biological effects, and health risks. The structure of inquiry — how questions were defined, how committees were composed, and how

conclusions were framed — shaped the outcome as much as the evidence itself. The example illustrated Handler's account.
If, as he stated, science and government were "inextricably intertwined," and if scientific advice must be "usable," then the organization of that advice becomes a central factor in determining what conclusions can emerge. The appearance of neutral, collective judgment was preserved, but it was produced within a framework that reflected prior institutional commitments.

Handler expressed satisfaction with the impact he had on science; "we built structures that will endure," he said. From his perspective, he had defined and defended a way of knowing, and installed it institutionally. Committees, funding pathways, evidentiary expectations, advisory habits, and institutional prestige all carried forward the mechanisms and policies he devised. The importance of such structures laid in repetition. A report could be criticized, scandal could occur, policy could be revised, but a structure reproduces its assumptions without needing to continually restate them. Young scientists learn what questions are fundable, what methods impress gatekeepers, what counts as rigor, and which directions place careers at risk. In such settings, conformity does not necessarily feel coercive. It feels like normal science. That was one of the main ways reductionistic authority became self-sustaining.

Even seemingly procedural remarks reinforced Handler's point.
He described the nominating committee that selected Academy leadership — which he selected — as effectively sovereign regarding the act of choosing a candidate as a member of the committee. Oltmans joked that it sounded like an election in the Soviet Union and Handler replied that the committee was indeed absolute. Even in jest, the remark illuminated how readily self-reproducing the Academy had become.
Once Handler shaped the dominant intellectual order, his mechanisms carried that order forward.

Throughout the conversations, Handler never expressed doubt about any decisions he had made, policies he had enforced, or institutional changes he had initiated. He conceded he faced tactical difficulties, experienced administrative frustrations, and suffered some moral discomfort, but he never re-visited the basic architecture of his worldview. He did not ask whether his demand for molecular solutions to all biomedical problems may have been too extreme or at least excluded too much. He did not ask whether his evidentiary thresholds may have delayed recognition of harm. He did not ask whether expert authority may have narrowed democratic judgment too sharply. He remained, to the end, substantially untroubled by the systemic consequences of the order he had built, consolidated, and reinforced rhetorically.

Handler spoke in declarative and categorical modes: Science must; Politics cannot; The people should trust; The evidence is not yet there. He did not revisit the substance his foundational assumptions or the tenets of his ideology. He only restated them under the unusually relaxed conditions of conversations with an ardent supporter. That format mattered. Because Oltmans approached Handler admiringly rather than adversely, he was rarely driven into defensive caution.
Handler spoke as someone accustomed to being heard with seriousness.

The tone of certitude was itself part of the conversations, and was particularly prominent at the end of the conversations — a time when Handler was close to death.

The final portion of the text made the tone especially audible in Handler's own language. He said, "The country is pushed by a small fraction, that is the reality." He said that insisting on uninformed people voting was "utterly stupid." He said the public could only "turn over" authority in technical matters.
He said, of the arms race, "We are mad." He described the strategic condition as "an utter horror." These remarks not only ornamented his opinions, they confirmed his governing attitude: elitist, reductionist, and institutionally severe.

What Handler left behind was not simply a style of explanation, it was an institutional order. In that order, molecular reduction defined what could count as real knowledge; committee procedure defined who could speak with authority; funding defined which lines of inquiry would flourish; only conclusive evidence allowed society to respond to health risks. The crucial point was that none of these elements operated in isolation— each reinforced the others. The reductionist epistemology originated and promoted by Handler produced a reductionist hierarchy of expertise. The hierarchy shaped advisory bodies; those bodies shaped funding and prestige; the resulting institutions converted one and only one scientific worldview into the normal administrative logic of American biomedicine. This was Handler's deepest achievement and his deepest damage: not that he argued for a narrow science, but that he helped build a durable system in which narrowness acquired the force of procedure. The result was not simply a method of inquiry. It was a structure of authority. Handler's reductionism was never merely an intellectual preference. It became a governing ideology. It defined what could count as knowledge, who could count as a credible knower, and when society was allowed to act. Its deepest legacy lay not only in explanatory narrowing, but in the institutional durability of that narrowing, once it had been translated into committees, funding, prestige, and policy procedure. Handler faced death with an odd sense of contentment regarding what he had wrought.
He knew that nothing mankind did lasted forever, but he also knew that the time constant for disassembling the machinery he built would be long because there were many stakeholders who benefited from the present system.

Once the scattered conversations were reorganized by recurring subject, the pattern became clear. Handler's ideological beliefs rested on three linked dicta: scientific truth becomes authoritative only when reduced to the molecular level; the National Academy of Sciences is an elite scientific institution entitled to interpret complex public questions for the public; regulatory action concerning health risks requires conclusive evidence of harm. The dicta had institutional consequences.
Academy committees determined what counted as legitimate inquiry.
Federal funding for biomedical research reinforced that legitimacy. Public controversy was recoded as technical misunderstanding on the part of the public. Democratic participation narrowed under the claim that the central questions of the age were too technical for mass judgment. Precaution weakened. Delay lengthened. The burden of proof fell most heavily on those least able to bear it. Handler and the Academy thereby protected themselves not only by argument, but by procedure. The memoir ultimately revealed the same structure that had governed Handler's presidency. Evidentiary hierarchy narrowed what could count as legitimate knowledge. Institutional prestige determined whose judgments acquired authority.

Reductionistic assumptions translated uncertainty into delay and delay into procedural normality. What appeared throughout the conversations as personal opinion repeatedly resolved into institutional doctrine. The retrospective explanation therefore became something larger than autobiography. It became the final self-description of a governing ideology.

6. Academy Tribute & Mask

Philip Handler died in a Boston hospital on December 29, 1981, and the National Academy of Sciences organized a formal memorial tribute . The ceremony itself revealed much about both Handler and the institution he had dominated for twelve years. The speakers were chosen carefully. They represented the principal worlds through which Handler had moved and over which he had exercised influence: Academy administration, federal science policy, diplomacy, government, law, and elite scientific leadership. Frank Press, Handler's successor as President of the NAS, presided.

Frederick Seitz, Handler's predecessor, spoke as institutional elder and historian of the Academy presidency. George Keyworth appeared as President Reagan's science adviser. Lewis Branscomb represented the overlapping worlds of industrial science, federal advisory structures, and international scientific policy. Emil Smith alone spoke primarily as biochemist, colleague, and scientific collaborator. David Bazelon and Emilio Daddario appeared not as laboratory scientists but as figures from law and government — a federal judge and former congressman whose careers intersected with Handler's public role as spokesman, negotiator, and political actor. The composition of the speakers was itself revealing; four of the seven — Press, Seitz, Keyworth, and Branscomb — emerged from physics or physics-centered policy culture rather than from biology or medicine. Only one tribute, Smith, focused primarily upon Handler's direct scientific work as a biochemist. The imbalances reflected Handler's ideology, identity, and role. The physicists were reductionists by definition of their specialty; Handler idealized biochemistry as reductionistic, which by definition it was not. By the end of his time as head of the Academy, his persona as laboratory biochemist had long since been eclipsed by his function as administrator, statesman, institutional strategist, and public advocate for science. The ceremony therefore commemorated not primarily a biochemist, but a ruler of scientific institutions.

Even the inclusion of Bazelon and Daddario pointed in the same direction. Their presence testified that Handler's true sphere of action had become law, politics, diplomacy, public rhetoric, and governmental power rather than experimental biochemistry itself. The structure of the memorial quietly acknowledged what his career had become.

The music reinforced the ceremonial elevation of Handler into institutional symbol. Dvořák, Schubert, Haydn, and Bach framed the proceedings, and the program concluded with Ravel's Kaddish, identified explicitly as the Hebrew memorial prayer.

The effect was not merely commemorative but quasi-liturgical. The Academy was not simply remembering a former president; it was blessing continuity, dignity, and institutional inheritance. Use of the Kaddish carried particular significance because the prayer traditionally magnifies and sanctifies rather than mourns directly. The choice therefore subtly transformed Handler's memory into an affirmation of the institution itself. The ceremony became not only a farewell to Handler, but a public reaffirmation of the Academy order he had shaped.

Frank Press established the official tone. He described Handler as companion, adviser, eloquent speaker, defender of human rights, and builder of the Academy.
The language emphasized service, companionship, and institutional devotion.
Press spoke warmly of Handler's "eloquent speeches," "compelling prose," and "good battles." The emphasis concentrated overwhelmingly upon performance, persuasion, and leadership rather than upon substantive scientific accomplishment. The Academy appeared in Press's remarks less as a site of scientific dispute than as a moral and civic institution whose authority Handler had enlarged and defended. Questions concerning how that authority had been exercised, structured, or concentrated never surfaced.

George Keyworth's remarks were shorter but equally revealing. Speaking partly on behalf of President Reagan, he praised Handler's "integrity," "commitment to progress in science," and devotion to "truth and intellectual freedom." He also recounted an incident in which Handler restored order during a disruptive public meeting by reminding participants that they stood within a "house of science."
The anecdote was intended to illustrate dignity and leadership. Yet it also unintentionally illuminated one of Handler's deepest assumptions: science existed not merely as inquiry but as authority, and authority required disciplined boundaries.
The phrase "house of science" carried unmistakable ecclesiastical overtones.
Handler appeared not simply as participant in scientific discourse, but as custodian of the institution entitled to define the conditions under which discourse remained legitimate. David Bazelon delivered the most morally serious tribute.
He emphasized Handler's involvement in defending dissident Soviet scientists such as Sakharov and Scharansky, his anguish over the corruption of scientific exchange programs by politics, and his willingness ultimately to suspend scientific cooperation when moral compromise became intolerable. Bazelon portrayed Handler as a tragic moral actor — a man who loved scientific universality yet recognized limits beyond which silence became complicity. Particularly striking was Bazelon's repeated invocation of Handler's own language regarding "sin," drawn from Oppenheimer's reflections after Hiroshima. Handler appeared as a man painfully aware that scientific institutions could become implicated in moral catastrophe. Yet the tribute also generated an unmistakable irony. Bazelon praised Handler for recognizing coercion abroad while remaining silent regarding the forms of intellectual exclusion, institutional pressure, evidentiary narrowing, and administrative control that had characterized his own conduct within American science policy. The effect resembled, in muted form, the dramatic structure in Shakespeare's *Julius Caesar* in which praise gradually exposes contradiction. Bazelon did not consciously indict Handler. Indeed, the tribute was deeply affectionate. But the more sincerely Handler was celebrated as defender of intellectual freedom, the more conspicuous became the unresolved tension between that image and the institutional methods through which he exercised authority at home.

Frederick Seitz placed Handler within the historical lineage of Academy presidents and institutional builders. He described earlier Academy leaders who guided it through wars, political upheavals, and periods of uncertainty, ultimately presenting Handler as the man who preserved the institution during one of its most difficult eras.
The tribute repeatedly emphasized leadership, stability, and organizational survival.

Particularly revealing was Seitz's assertion that the period from 1969 onward "could easily have been a disastrous one for the Academy" and that Handler's "eloquence" and "deep appreciation of science" made "all the difference." The tribute thereby framed centralization itself as salvation. What appeared institutionally dangerous was not concentration of authority, but fragmentation, disagreement, and loss of unity. Seitz admired precisely those qualities that made Handler effective as institutional ruler: command, decisiveness, rhetorical force, and capacity to preserve coherence during periods of scientific and political turbulence. The tribute therefore revealed how fully the Academy establishment had come to identify institutional survival with managerial concentration of authority.

Emil Smith's tribute differed sharply in tone because it remembered the earlier Handler — the biochemist, collaborator, and teacher. Smith openly acknowledged his inability to remain objective and recalled decades of friendship, textbook collaboration, biochemical discovery, and intellectual companionship. His Handler was energetic, curious, exuberant, and deeply committed to science itself.

The tribute contained some of the ceremony's warmest and most human passages, particularly Smith's recollections of secluded writing retreats devoted to successive editions of *Principles of Biochemistry*. Yet Smith's account also unintentionally revealed the magnitude of Handler's transformation. Again and again, the tribute distinguished between the scientist Handler might have remained and the institutional statesman he became. Smith repeatedly returned to the idea that Washington had claimed Handler away from laboratory science. The implication lingered beneath the tribute: the Academy presidency had not simply enlarged Handler's influence; it had redirected his identity altogether.

Lewis Branscomb presented Handler as international diplomat, architect of scientific cooperation, defender of scientific freedom, and visionary of global scientific institutions. His remarks ranged from the Law of the Sea negotiations to Soviet-American cooperation, China, arms control, and the International Institute for Applied Systems Analysis. Handler emerged as cosmopolitan mediator — a man who believed science could become a universal language transcending ideological division.

Branscomb repeatedly emphasized Handler's patience, optimism, and commitment to international trust. But here again the tribute revealed a profound duality.

Internationally, Handler defended openness, communication, and the free circulation of scientific exchange. Domestically, his institutional practices frequently narrowed admissible scientific frameworks and concentrated legitimacy within tightly controlled procedural structures. Abroad, science appeared as bridge; internally, it often functioned as gatekeeping authority. The tension was never acknowledged directly, yet it hovered silently beneath the praise.

Emilio Daddario's tribute came closest to identifying the mechanism through which Handler exercised power. Daddario remembered Handler not merely as scientist but as speaker — congressional witness, lecturer, conversationalist, and public persuader. He emphasized Handler's "rhetoric and syllogism," his ability to abandon prepared text and move effortlessly into extemporaneous argument, and his remarkable power to captivate listeners through verbal brilliance. Handler appeared as master performer of scientific authority. This tribute unintentionally illuminated the central paradox of Handler's public life. His authority rested not primarily upon sustained written analysis, experimental originality, or philosophical rigor, but

upon speech itself — cadence, confidence, institutional prestige, improvisational fluency, and the ability to transform assumption into apparent inevitability. Daddario admired the quality unreservedly. Yet the very characteristics he praised explained much about Handler's extraordinary effectiveness in shaping scientific policy while simultaneously obscuring the evidentiary and conceptual weaknesses beneath many of his assertions.

Taken together, the tributes constructed a remarkably unified image: Handler as eloquent statesman, institutional savior, humane internationalist, defender of scientific freedom, brilliant communicator, and guardian of civilized order.

Almost entirely absent were discussions of methodological exclusion, ideological rigidity, evidentiary narrowing, committee manipulation, suppression of dissenting scientific frameworks, or the concentration of institutional authority that increasingly characterized the Academy under his presidency. The memorial therefore revealed less about the totality of Handler's career than about the institutional needs of those who survived him. The ceremony functioned as an act of collective stabilization. It preserved prestige, continuity, and institutional dignity at precisely the moment when a fuller reckoning might have become possible.

7. Handler, Becker, and the Consequences of Reductionism

The contrast between Philip Handler and Robert Becker was not, at its core, a contest between two scientists of equal institutional weight. It was a contrast between two fundamentally different conceptions of what biomedical research was and whom it ought to serve. Becker's role in this narrative was therefore not as a co-equal protagonist, but as a clarifying counterpoint—a figure whose orientation toward medicine and public health exposed, by contrast, the priorities embedded within Handler's system. Becker was a physician. His scientific inquiries emerged from clinical observation — the lived realities of injury, disease, degeneration, and recovery.

His work on healing, regeneration and bioelectric phenomena was not an abstract pursuit of knowledge for its own sake; it was rooted in the question of how to restore function, alleviate suffering, and expand the therapeutic possibilities available to patients. In Becker's framework, science was inseparable from medicine, and medicine was inseparable from public health. Knowledge was valuable insofar as it could improve human outcomes. Handler, by contrast, was a biochemist whose intellectual commitments were directed toward the advancement of science, particularly biochemistry, as an autonomous enterprise. Under his leadership, the National Academy of Sciences increasingly defined biomedical research in terms of molecular mechanisms, reductionist methodologies, and laboratory-based inquiry.

In this framework, the purpose of research was not primarily to address immediate clinical or public health needs, but to deepen the molecular understanding of biological systems. The implicit assumption was that such understanding would eventually translate into practical benefits — a promise perpetually deferred.

This distinction — between science in service to patients that sought to understand causes and science in service to itself to expand what Handler called "the cathedral of knowledge" — was the axis upon which the divergence between Becker and Handler turned. Yet the significance of that divergence laid not in Becker's alternative vision, but in the institutional dominance of Handler's — Becker was a mirror that clarified Handler.

During his tenure, Handler did not merely advocate for a particular scientific approach; he embedded a comprehensive set of policies, procedures, and objectives within the Academy and, through it, within the broader apparatus of American science policy. Handler's system defined biomedical research as an enterprise whose primary objective was the production of molecular-level knowledge. Science was an end in itself. While framed as ultimately beneficial to society, this objective was structurally decoupled from immediate public health outcomes. The Academy's continued assertion of its role in providing "independent, objective advice to the nation" reflected this orientation: authority derived not from clinical efficacy or population health impact, but from epistemic control. The procedural core of Handler's system lay in the committee structure of the Academy. Knowledge and advice were produced through committees whose outputs were framed as "consensus judgments." This process did not merely aggregate expertise; it regulated it. By privileging agreement within controlled settings, the Academy ensured that only certain kinds of evidence — those compatible with prevailing reductionist paradigms — would achieve institutional legitimacy. Handler's policies aligned scientific inquiry with state-defined priorities, repeatedly invoking "national needs" as the criterion for relevance. This alignment transformed science into an instrument of governance, directing resources toward areas deemed strategically important, while marginalizing others. Together, these elements formed a self-reinforcing system. The objective defined what counted as valuable knowledge; the procedures determined how that knowledge would be validated; and the policies ensured that the system remained aligned with external power structures. By 1981, this system was no longer dependent on Handler's direct leadership. It had become institutionalized.

The leadership transition from Handler to his successor did not disrupt this system. The Academy's *Report for 1981 and 1982,* authored by Handler*,* emphasized continuity through phrases such as "the Academy continues" and references to "continuing programs." These were not merely rhetorical expressions; they were indicators of what he expected would be the structural stability of what he built.
The Reports' language — their emphasis on committee work, consensus judgments, basic research, and national needs — demonstrated Handler's belief that what he established was permanent. The tone and the scope of topics varied, but the underlying logic of the Reports never varied. Handler's influence persisted not as a set of explicit directives, but as an embedded framework that shaped how problems were defined, how evidence was evaluated, and how conclusions were drawn. In this sense, the mid-1981 transition in Academy leadership would represent not a break, but a confirmation. The system he built had achieved a level of entrenchment that rendered it self-sustaining.

The implications of Handler's system extended beyond the internal dynamics of the Academy. They were manifested most starkly in the domain of environmental and public health regulation, where the principles of Handlerian reductionism had profound and enduring effects. At the heart of Handler's version of reductionism was his methodological demand: that claims of health risks be supported by scientific evidence that was both molecular and conclusive. While this standard appeared rigorous, in practice it established a threshold of proof that was

extraordinarily difficult — even impossible — to meet, particularly for low-dose or long-term exposures to anthropogenic agents. The result was a continuation of the Academy's systematic bias regarding regulatory decision-making. By requiring knowledge of molecular-level causation —produced only in reductive experimentation — as the basis for regulatory action, Handler effectively, intentionally set the evidentiary bar for public-health protection what his critics called "as high as the moon." The practical, achievable, traditional, precautionary scientific methods for identifying health risks — animal research, epidemiological studies, clinical observations — would continue to be regarded by the Academy as insufficient because they were non-molecular and dismissed as inconclusive. This dynamic consistently favored industrial interests, which benefited from the continued absence of restrictive regulation. The most profound consequence of Handler's system was that the burden of uncertainty was shifted onto the public. In effect, the public become unwitting participants in large-scale, uncontrolled biomedical experiments that tested his hypothesis that exposure to anthropogenic agents was harmless because the exposure levels were too low to produce obvious, acute hazards. But it was faux experimentation because Handler and his followers never collected the pertinent data. Exposure preceded understanding; harm was recognized only after it becomes undeniable; regulatory response lagged behind both.In this framework, the absence of evidence was treated as evidence of absence — a logical inversion that transformed scientific uncertainty into a justification for continued exposure.

The injustices produced by Handlerian reductionism were not incidental; they were structural. By privileging a form of evidence that was enormously costly but effective only in theory, never in reality — molecular studies of health risks —Handler's system prevented recognition of harm and disproportionately affected those with the least capacity to avoid exposure and to cope with its health consequences.-Communities located near industrial sites, workers in high-exposure occupations, and populations lacking access to healthcare bore the greatest risks, because the standard of proof Handler required to protect them was calibrated to a model of science that prioritized molecular certainty over human experience. In this context, Becker's orientation toward animal studies, analysis of public-health data, and clinical observation appeared corrective. His willingness to engage with phenomena that did not fit neatly within reductionist frameworks reflected an alternative vision of science — one in which the primary obligation was to the patient and the population, rather than to the internal coherence of a disciplinary paradigm. But Becker's vision did not prevail. The institutional weight of the Academy, shaped by Handler's policies, procedures, and objectives ensured that reductionism remained dominant.

By 1981, the National Academy of Sciences had become the institutional embodiment of Handler's ideology. Its objectives, procedures, and policies reflected a coherent system that defined what counted as legitimate science and how that science would be applied in the world. The contrast with Becker serves to illuminate this system, but the story remained fundamentally about Handler. In his vision, biomedical science was an autonomous reductionist enterprise aligned with state power, and he structured and shaped the Academy's operations to maximize its influence on policy.

The consequences of that vision were measurable not only in the direction of research funding or the content of advisory reports, but in the lived experiences of those exposed to environmental risks under regulatory regimes that demanded certainty before action. In this sense, the legacy of Handlerian reductionism was not confined to the laboratory or the committee room. It was written into the conditions under which the public lived, worked, and became, in effect, the subjects of perpetual experimentation. The Academy, to the extent it would continue to operate according to the policies, procedures, and objectives Handler established, would not merely preserve his legacy. It would extend it — transforming a set of ideas into a durable system whose consequences would continue to unfold.

8. Institutional Inheritance

In official 1980 and 1981 reports that described the Academy's policies, procedures, and objectives, written before Handler left office, he depicted the transition in leadership to his successor as an inheritance.-The reports spoke in a voice less personal than institutional, yet unmistakably encoded with the objectives [3], procedures [2], and policies [1] he had spent more than a decade constructing, refining, and defending. The gestalt that appeared was a promise the new Academy administration would continue the ruling architecture Handler stamped with his ideology. At the level of objective , the Academy continued to present itself as the authoritative arbiter of scientific truth in service to the nation, asserting its role in providing "independent, objective advice to the nation." The formula encapsulated Handler's foundational goal: to position the Academy as the central authority in national decision-making in matters related to science.-Under Handler, this goal was operationalized by aligning the Academy's advice with agency and department priorities, thus ensuring that scientific authority and governmental need were mutually reinforcing.

In the reports, Handler's parallel emphasis on "service to the government in matters of science and technology" confirmed he expected the alignment would persist intact beyond his tenure — the Academy would continue to not only advise government but also define the terms under which advice was considered legitimate.

As with objectives, Handler said the procedures by which the Academy produced and validated knowledge would remain stable. The Reports repeatedly attributed the Academy's authority to "the work of its committees," whose outputs were framed as "consensus judgments." The phrases, deceptively neutral, encoded a procedural system that Handler elevated to dominance. Committee-based consensus was not simply a method of organizing expertise; it was a mechanism of epistemic control. By structuring inquiry through carefully constituted committees and requiring convergence before publication, the Academy effectively filtered out heterodox perspectives. The result was not the organic emergence of agreement, but its managed production. In this sense, "consensus" functioned less as a reflection of scientific reality than as an instrument of institutional legitimacy. This procedural continuity was particularly significant in light of Handler's broader ideological commitments.

As a co-inventor and proponent of biochemical reductionism, Handler advocated a model of biomedical science that privileged molecular-level studies and biochemical explanations, to the exclusion of system-level studies and causal explanations.

While the Reports did not explicitly state an ideological belief in the necessity and sufficiency of biochemical studies for the explanation of all biomedical phenomena, their procedural

architecture did so implicitly. The prioritization of “basic research” and the framing of scientific advancement as the “advancement of knowledge” operated within a definitional system that Handler developed. What counted as “basic,” and what qualified as legitimate “knowledge,” were not neutral categories; they were the products of institutional boundary-setting. Under Handler, those boundaries were drawn in ways that marginalized experimental studies of control and regulation at the system level in favor of mechanistic studies at the molecular level, and that regarded as unscientific the work of investigators like Robert Becker. Seized by this bent of mind, Handler ignored studies designed to determine what caused chronic diseases, such as cancer, in favor of determining exactly what biochemical processes mediated diseases when they developed and worsened. Becker, in stark contrast, focused on control and regulation of system-level biomedical phenomena — healing, growth, regeneration, physiological stress, chronic disease — and on related mechanistic studies of the electromagnetic properties of cells and tissues that mediated and facilitated the biophenomena.He regarded biochemistry as important but not exclusively so, and not the best way to spent tax dollars for research that benefited the health of the public.
The continued emphasis in the Reports on the role and importance of reductionist paradigms was not inadvertent but structural.

At the level of policy , the Reports aligned the Academy with national priorities, further illustrated the durability of Handler’s influence. The repeated invocation of “national needs” as a guiding principle for research reflected a policy framework in which scientific inquiry was subordinated to agency-defined objectives. This alignment was a hallmark of Handler’s tenure, during which the Academy increasingly positioned itself as an indispensable intermediary between scientific expertise and federal policy.
By framing science and technology as “essential to national welfare,” the eports reinforced a vision of science as infrastructure — an integral component of national power rather than an autonomous domain of inquiry. This policy orientation not only channeled resources toward approved areas of research but also legitimized the exclusion of lines of inquiry deemed irrelevant to immediate national concerns.
The cumulative effect of these continuities was that, despite a change in leadership, the Reports promised that the Academy would remain fundamentally unchanged in its operational logic. The reports’ recurrent phrasing — “the Academy continues,” “continuing programs” —served as a rhetorical signal of stability, but it also revealed the successful internalization of Handler’s ideology within the Academy’s organizational fabric.
What Handler constructed was not merely a set of policies or a preferred scientific agenda, but a system intended to be self-reproducing. Its objectives defined its purpose, its procedures regulated its work products, and its policies aligned it with external power structures. Together, these elements formed an institutional genome that could persist independent of individual leadership — continuity that amounted to institutional heredity.

Handler did not simply lead the Academy; he reshaped it in his own image, embedding within it a set of assumptions about what science was, how it should be conducted, and to whom it should answer. The Academy that existed when Handler handed it to his successor in 1981 was thus a new entity carrying forward the defining characteristics of its progenitor. Its claims to objectivity, its reliance on consensus, and its alignment with national priorities all reflected a lineage that could be traced directly to Handler’s tenure. Crucially, this inherited

structure also preserved the toxic consequences for science that defined Handler's regime as well as his career. The absence of any meaningful engagement with emergent biophenomena — studies that challenged reductionist orthodoxy — underscored the extent to which the Academy functioned not only to produce knowledge but to delimit it. What was not studied, not funded, and not considered or even acknowledged was as revealing as what was.

In this silence was the clearest evidence of Handler's intended continuity: the persistence of the boundaries he erected and the unwisdom of any inclination of the post-1981 Academy to dismantle them. Handler's project goal — to instantiate his vision of science within the structures of national policy — had achieved a level of entrenchment that was on the threshold of becoming self-sustaining. The future Academy, if it continued to operate according to the rules he established, would demonstrate that his influence extended beyond his tenure into the very logic of the institution itself.