LEWIS MUMFORD

Public Intellectual

Thomas P. Hughes
Agatha C. Hughes

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To Sophia Wittenberg Mumford

Preface

A happy combination of circumstances brought the Lewis Mumford conference to the University of Pennsylvania. The voluminous Mumford Papers are on deposit in the university's Van Pelt Library; Penn has a large and active department of the history of science which emphasizes the history and sociology of modern technology; in 1984 a group of Penn scholars from a wide variety of disciplines established a seminar on Technology and Culture; and the Andrew W. Mellon Foundation through its Program for Assessing and Revitalizing the Social Sciences provided funds for this seminar and the special conference on Mumford that drew scholars from the United States and abroad. The conference generated so much information, so many interesting points of view, and such a variety of imaginative interpretations of the Mumford oeuvre that there was general agreement that the papers should be published.

This volume, however, is not one more set of conference papers. Once the decision to publish was made and the Oxford University Press expressed interest in publication, the essays were subject to formal review. Drawing on these reviews, on what the participants had learned from each other about Mumford at the conference, and on general editorial comment, the authors substantially revised their essays for publication. In addition, the editors have drawn central and unifying themes from the various essays and structured the volume accordingly. As a result, we believe that this volume, along with Donald Miller's recently published biography of Mumford, will stimulate renewed interest in Mumford as arguably America's pre-eminent twentieth-century public intellectual, an author whose books and ideas remain highly relevant to the social and intellectual issues of our day.

The editors appreciate the enthusiastic co-operation of the various authors during the two years that this volume has been in preparation. They also wish to acknowledge the critical role that the members of the Penn seminar on Technology and Culture played in organizing and presenting the conference. Members of the seminar dedicated two of their on-going meetings to Mumford and several provided commentaries at the conference on the papers presented. These were David Brownlee; Margali Larson; David Leatherbarrow; Kathleen Reed; Alfred Rieber; Marsha Siefert; and Frank Trommler.

The conference provided the occasion for several concurrent exhibitions. Dr. Kathleen Reed of Special Collections at the University of Penn-

sylvania Library organized a rich display of Mumfordiana from the Mumford collection of papers, and Jane Morley of the Department of the History and Sociology of Science organized with the generous co-operation of Monmouth College and Vincent DiMattio an exhibition of Mumford's drawings and paintings. Several televised interviews with Mumford were also shown. These visual encounters along with the Mumford art made the participants feel closer to him and compensated somewhat for the absence of the ailing Mumford who had earlier endorsed the conference. But the presence of Sophia, Lewis's wife, provided an even greater compensation. The participants found conversations with her providing nuances and insights into the creative life she has shared so intimately and for so many years with her husband.

We also wish to acknowledge the support of Dr. Daniel Traister, Assistant Director of the Libraries of Special Collections at Penn, and his staff, especially Ms. Nancy Shawcross who assisted us and other authors in making use of the Mumford Papers. In addition, Edward Lurie, a consultant to the Oxford University Press, has actively furthered the publication of this volume as has Sheldon Meyer, Vice President of the Press. Oxford's Leona Capeless provided wise counsel on matters editorial. Finally, we wish to express our heartfelt gratitude to Jane Morley whose inspired contribution as the executive administrator of the conference contributed immeasurably to its success.

Chestnut Hill, Philadelphia, 1989. A.C.H. and T.P.H.

As this book goes to press,
we are saddened to learn that Lewis Mumford
died at his home in Leedsville, New York, on 26 January 1990.
He was ninety-four years old.

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LEWIS MUMFORD

What did Mumford have in common with the other early students of technological history discussed in this article? They shared an empiricist ideal and a sense of the aesthetic pleasures of technology. Historians at the new industrial museums envisioned their institutions as showcases of ingenuity delighting the senses as well as the intellect. At the same time, Mumford's enthusiasm for technology was tempered by the influence of thinkers like Patrick Geddes and Thorstein Veblen. Clearly, Mumford offered a more critical and sophisticated perspective on technology than the popularizers and amateur historians of his time. Yet he also learned from them, translating their knowledge into his own terms for his own ends. Of the four men considered here, Kaempffert and Usher had the most direct intellectual relationship with Mumford. Mumford was familiar with their writings and took from them what he needed. Mumford probably had no contact with the Smithsonian's Carl Mitman, but found inspiration in the historic artifacts preserved in his museum and in others. The same preservationist and documentary activities were under way at amateur historical societies like the Railway and Locomotive Historical Society. Though the particularist brand of history they pursued was not to Mumford's taste, it provided the sort of detailed knowledge upon which large-frame histories like Mumford's must rely.

As a man of letters, Mumford moved in a different world from the Mitmans and the Fishers. As a historian of technology, Mumford in fact identified no community as his own. Yet, we should recognize the reinforcement and inspiration provided by other early historians of technology. Individuals like Mitman laid the groundwork for literati and scholars like Mumford. Conversely, the prestige and attention which a man such as Mumford could bring to a new area of study suggest that the seemingly diverse efforts of scholars and amateur enthusiasts provided reinforcement in pursuit of a common goal.

Lewis Mumford as a Historian of Technology in *Technics and Civilization*

ROSALIND WILLIAMS

As Lewis Mumford tells us in a prefatory note to *Technics and Civilization* (1934), that book was originally intended to be a comprehensive study covering not only the machine but also the city, region, group, and personality. He gave this study the working title "Form and Personality," and in the summer of 1930 completed an essay "Machines" that would be its first long chapter. In fact, there are two drafts of the "Machines" chapter: a shorter one (18 pages) dated 27 July, and a longer one (39 pages) dated 22 August. The shorter draft, published in the August issue of *Scribner's Magazine* under the title "The Drama of the Machines," was, in Mumford's own words, "The immediate prelude to *Technics and Civilization*. . . ."[1]

For those of us who know and admire Lewis Mumford primarily as a historian of technology, the 1930 draft chapter on machines is startling in the brevity of its historical discussion. In a brief introduction Mumford announces he intends to discuss both the cultural origins and the cultural prospects of machines, but he has much more to say about their prospects than their origins. For example, in the July manuscript Mumford's discussion of the clock as the crucial invention of modern culture—one of the most admired sections of *Technics and Civilization*—is condensed into half a sentence:

> A new rhythm crept into life; the mechanical readings of the clock supplant the unevenness of endured time, and the dream of mechanically accelerated motion keeps passing through the mind of a Leonardo, a Glanville, and Hooke, a Marquis of Worcester.[2]

In the summer 1930 draft, Mumford's discussion of the origins of the machine takes up only one-third of one chapter, out of a lengthy manuscript that also includes long chapters on buildings, cities, regions, and modern art.[3] Within that chapter the historical discussion is simply a brief prelude to far longer variations on other themes that clearly engage Mumford much more: the concept of machine design, new values implied by

machine design, the relationship between engineering and art, new arts based on new technologies, social and psychological obstacles in the way of acceptance of machines, the need for ethical transformation if machines are to become integral parts of modern culture. Looking at the 1930 acorn, we would never guess that it would grow into a historiographic oak.[4]

Mumford set out to write a critique of the Machine Age, not a history of the machine. What we know as *Technics and Civilization* is in fact a vastly expanded preface for that critique. As Mumford revised the preface, it kept getting longer and longer. He had little problem gathering information about technological history: he had read widely and learned much from museums and travel. The problem for this accidental historian was how to structure that information. What would be the organizing concepts, the theoretical assumptions? In this respect Mumford was operating in something of a void. The discipline of the history of technology was unformed and still largely at the fact-gathering stage.[5] The one obvious source of theoretical structure—Marxism—Mumford decisively rejected. What then would be the structural principles for his work?

The answer to this question rests on two well-known facts: that Mumford is a moralist and that he is strongly influenced by Patrick Geddes. I want to show how these facts fit together in the creation of *Technics,* that path-breaking and still indispensable study of the origins of the machine age. In particular, I want to show that the historical design of *Technics* has two major sources: Mumford's own moral consciousness, which led him to view history as a stage for moral dramas, and his admiration for Geddes, from whom he borrowed the crucial historical categories of technological phases and occupational types. As we shall see, in *Technics* these moral structures and historical concepts merge into a hybrid form of cultural criticism.

History as the Myth of Life Insurgent

In a brief preface to the August 1930 draft chapter on machines, Mumford explained his purpose as a writer:

> During the last three centuries our ways of life have profoundly changed. . . . This change manifested itself first as the loss of form: . . . fragmentation, disorder, atomism. . . .
>
> Yet underneath the disorder and the confusion a new civilization has been growing. . . . In many departments of art, we seem at last on the brink of achieving form: here and there the crystal of a new order has begun to take shape. . . . To understand these new potentialities, to further this crystallization, to clarify this change—these are the goals of our present discussion.[6]

Attainment of form, loss of form, renewal of order: as Peter Shaw has commented, this same pattern, this "arc" of synthesis, breakdown, and revival, is found consistently in Mumford's writings from *The Story of Utopias* to *Interpretations and Forecasts.*[7] In *Sticks and Stones* and in *The Golden Day* the pre-existing synthesis was America of the 1830s; in *The Golden Day* the source of breakdown was primarily the Civil War, while in *Sticks and Stones* the "fall" of the early New England village was caused by the same processes of disruption and dissolution that took place over several centuries in Europe.[8] Whatever the particulars of the drama, the primal plot is the same, and the leading role is played by life, or rather Life—not classes, nations, or individuals. History is the stage on which is enacted a primal, ever-repeating moral drama of Life's balance, breakdown, and renewal. Mumford came to denounce the myth of the machine not because myth has no place in historical understanding, but for the opposite reason; myth is the key to historical understanding, and the myth of the machine is a false one which must be displaced by the true myth of Life.

One characteristic of a mythological world-view is the conviction that there is at least potentially a resonance between cosmic and personal events. The primal moral dramas that govern the universe can be replayed in rituals, the smaller dramas of human life. Furthermore, by re-enacting the cosmic dramas, human beings can hope to influence a favorable outcome. Mumford seems to have assumed this mythologizing role when he was writing the "Form and Personality" manuscript. During that period of moral crisis, as he himself called it,[9] Mumford felt he was experiencing the same pattern of breakdown and renewal in his personal life that he discerned in abstract Life.[10]

There were two intertwining causes of Mumford's personal "loss of form." The first was marital and the second professional. From the fall of 1928 to the spring of 1929, Lewis and Sophia Mumford suffered a series of misfortunes: Sophia's miscarriage in November, her subsequent illness, his own, and above all their son Geddes's life-threatening mastoid infections that spring. Physically and emotionally exhausted, by summer the Mumfords entered a period of marital estrangement, which only worsened when in the fall Lewis met Catherine Bauer and eventually began an affair with her.[11]

At the same time, Mumford was restlessly seeking new balance as a writer. With the completion of *The Brown Decades,* his "desk was cleared" of a long cycle of work in American studies, his search for and presentation of a usable past in American culture.[12] In the spring of 1929, even before he had begun preparing *The Brown Decades* for publication, Mumford mentioned in letters that he was "mulling over" and "shaking down into some sort of order" various ideas as to the theme of his next book.[13] For some time he had been contemplating a work on a grander scale, something to do with Western civilization as a whole, with the breakdown of form and crushing of the personality due to industrialization, and the subsequent rediscovery of form and personality in the emerging machine age; but he had little idea where or how to begin such a vast project.[14]

Both as a husband and as writer, then, Mumford felt it was time to redefine himself. In justifying his affair with Bauer, he told himself that he had

arrived at a point in life where to continue to follow conventional moral codes would be unbearably constrictive and stifling—as he felt had been the fate of Melville (whose biography Mumford had finished writing in the late summer of 1928), who had failed to "cope with his early erotic promptings or to understand later the effect of his repressions." Instead of wandering "through the bleak waste land of tormented chastity and self-renouncing loyalty,"[15] as Melville had, Mumford felt he had to break free from past habits and received rules, and to endure a period of disequilibrium in order to achieve a new and finer synthesis.

This argument is arrogant and self-serving, but it is also fascinating for what it tells us about Mumford's understanding of his own mission. Like a Romantic poet who assumes a resonance between the inner and the outer landscapes, Mumford assumes a correspondence between the personal and the universal drama. The link between the two is Patrick Geddes's doctrine of life insurgent. On 14 July 1929, Mumford wrote to David Liebovitz that he had been reading Geddes on biology and had found that "his doctrine of Insurgence as a prime quality of all life, life perpetually striving, struggling, overcoming all obstacles, is an excellent medicine in periods of discouragement. . . ." Furthermore—and this is a prime source of Mumford's respect for Geddes—Geddes practices what he preaches. In an appreciation published in *The New Republic* in the fall of 1929, Mumford emphasized that Geddes exemplified his own "doctrine of life: its inception, its development, its struggle, its joyful insurgence."[16] The same language appeared in his August 1930 draft chapter on machines:

> Every form of life [in handwriting Mumford has added "Almost"], as Patrick Geddes shows, exhibits this insurgent reaction upon the world as it is given: in man, the reaction reaches its apex, and manifests itself most completely and objectively in the arts. . . .[17]

The analogy works both ways. By seeing his own personal problems as a microcosmic example of the historical drama, Mumford's sufferings assume a broader significance and purpose: they are necessary to achieve the larger purpose of renewal. And by seeing the problem of historical change as similar to the resolution of a moral drama, Mumford implies that if individuals (such as himself) are able to attain a new equilibrium, renewal might be possible for civilization at large. Like a high priest, he leads a ritualistic re-enactment of the mysterious drama of life's renewal.

By the fall of 1929 he was beginning to see the first glimmers of personal recovery. Thanks in part to encouragement from people like Catherine Bauer, Mumford felt ready to tackle the larger work he had long contemplated.[18] On 22 September he wrote Thomas Beer that "I am already meditating an interim book [which would be *The Brown Decades*] before I take off my shirt and unhitch my pants and start work on another masterpiece."[19] Beginning in April 1930 Mumford began to make random notes titled "form" and "machine,"[20] and by late June 1930 he had sketched out

a suggested table of contents for a book on "Form and Personality"—the skeleton that was fleshed out in the draft written in the summer of 1930.[21] By then both Sophia and Catherine had departed separately for Europe, giving Mumford some respite from the tensions in his personal life. Under these circumstances, when he had glimpsed but had not yet regained his own equilibrium, he began writing about the loss and potential recovery of form in Western civilization.

History as Revolutionary Takeover

For Mumford it is a fundamental and unwavering principle that Life, not external mechanisms of any kind, determines historical destiny. In reaction against what he saw as Marxist technological determinism, Mumford proposed that the substructure of history is human life in its creative, artistic, form-giving aspects.[22] As he stated in his preface to the draft chapters on machines, his central concern is to welcome machines into the cultural fold, to show that instead of producing human consciousness they are themselves products of it.[23] The great heap of modern machinery and industry is therefore the external, material, secondary expression of underlying desires and interests that are the primary determinants of history.

The problem is that Mumford hates much of what he sees in that heap. What does the ugliness of modern industry say about the desires and interests that produced it? In particular, how did the human spirit become so perverted as to plunge civilization into the long dark night of what is usually called the Industrial Revolution? This is both a historiographic problem and a moral one, since for Mumford the two adjectives are inseparable. He needs to explain the origin of technological evil. *Technics and Civilization* represents a crucial step in Mumford's lifelong quest to articulate the distinction between "good" machines and "bad" ones, and to explain how both the liberating and the repressive ones have emerged in history.[24] In *Technics* he faces the particular problem of explaining how the desirable values embodied in some machines can be called upon to correct the false values embodied in others.

In the 1930 draft Mumford deals with this problem by narrating a second moral drama which overlies the first. This is "the drama of the machines," to use the title he gave both to his July draft and to the nearly identical article in the August issue of *Scribner's*.[25] After a brief introduction, Mumford begins to narrate the main lines of the drama:

> Five or six centuries before the main body of the army forms, spies have been planted among the nations of Europe. Here and there, in strategic positions, small bodies of scouts and observers appear, preparing the way for the main force: a Roger Bacon, a Leonardo da Vinci, a Paracelsus. But the army of machines could not take possession of modern society until every depart-

> ment had been trained; above all, it was necessary to gather a group of creative minds, a general staff, who would see a dozen moves beyond the immediate strategy and would invent a superior tactics. These are the physicists and mathematicians . . . .
>
> Behind the scientific advance-guard came the shock troops, the miners, the woodmen, the soldiers proper, and their inventive leaders. . . . At last the machines are ready. The outposts have been planted, and the army trained. What is the order of the battle, and where does the machine claim its first victory?[26]

After discussing the contribution of the soldier, woodman, and miner, Mumford summarizes the plot:

> Once these key inventions were planted, once the medium was established, once the general staff was ready to supply a general system of abstraction, ideas and calculations, the time had come for the machine to take possession of Western Civilization. At last the derivative products of industrialism could spawn and multiply.[27]

This is a plot in more than one sense. Through repeated use of military images Mumford suggests that industrialization is a sort of conspiracy, a takeover by hostile forces within, a revolutionary coup. Even more precisely, he implies a Leninist theory of revolution. The footsoldiers are workers who have been mechanized by the habitual tools and rhythms of their trade (miners, woodmen, and soldiers proper); they are directed by a "general staff," a party of ideologists (physical scientists and the like) "who would see a dozen moves beyond the immediate strategy and would invent a superior tactics."

Mumford therefore uses a local determinism to explain the origin of technological evil. Without renouncing his overarching conviction that technology does not determine consciousness, he argues that in some occupational groups (soldiers, woodmen, miners, physicists, mathematicians) it might. The fundamental myth of history is based on the primacy of spirit over mechanism; the subplot, the "drama of the machines," introduces a limited or local form of technological determinism where that primacy does not obtain. According to Mumford, these two dramas are not inconsistent because Geddes "threw overboard" the notion that life is driven either by external circumstances or by a mysterious internal force of mind. In Geddes's view, Mumford tells us, "Life was active and passive, voluntarist and determinist, outwardly conditioned and inwardly determined; the old alternative was a false one. . . . Life is the harmonization of the inner and the outer."[28]

From "Form and Personality" to "Technics and Civilization"

"October 1930 opened a new period in my life."[29] By then, as Mumford wrote to David Liebovitz, he had his "fighting spirits back." By the time

Catherine Bauer returned from Europe in October, his marriage had not only survived but was even stronger than before. By the spring of 1931 Mumford had completed *The Brown Decades,* so that he was free to devote his full intellectual energies to the "Form and Personality" project. About the same time he began writing art and architecture criticism for *The New Yorker* (efforts that turned into a regular column in 1932), thereby assuring himself a steady if modest source of income.

Most important of all for his "Form and Personality" project, Mumford was asked by Robert M. MacIver of Columbia University, who had been much impressed by the August 1930 *Scribner's* article, to teach a course on technics in the university's extension division. In preparation for that course Mumford "discovered a sizeable literature on technics in German," which made him begin to realize that this topic alone could constitute a book.[30] ". . . in the development of that course the focus changed from America and the modern world to Western civilization and the technical changes that began in the twelfth century of our era."[31]

Mumford again worked on the "Form and Personality" manuscript during the summer of 1931, and by that fall he was working on a third draft. On 13 September 1931 he wrote to his friend James Henderson (of whom we will hear more later):

> I think you will like parts of my new book: . . . it cuts an even wider swathe [than *The Golden Day*]: Machines, Buildings, Cities: Regions, Civilization, a task ambitious enough to sink an even better armored craft than mine. When I finished the Brown Decades last May I was out of breath: now, after a long and devilish job of settling down to work, I have at last got under way and have my second wind: at . . . this present state of the universe, I could finish a dozen new books, one after the other, deliberately, like a swimmer doing the fourth mile of a ten mile race.

As this letter indicates, Mumford was still planning a book that would include nearly everything in the outline he had sketched in the spring of 1930.[32] The spring of 1932, however, was crucial in reorienting the work to focus on machines. Besides his on-going discovery of literature on technics inspired by his Columbia course, Mumford at last took a long-planned,[33] four-month visit to Europe (with financial support from a Guggenheim fellowship) where he discovered books, museums, cities, friends, all of which further redefined the project. ". . . those fruitful months altered the scope and scale of the entire work."[34] By the time he and Sophia steamed back to America, the outlines of *Technics and Civilization* "were already firm enough" so he could sketch out a layout for the illustrations he had gathered.[35] The proposed book still included chapters on regions and cities, however, as well as on machines.[36] Not until the spring of 1933 was Mumford writing a manuscript that is decisively *Technics and Civilization.*[37] In June 1933 he wrote Van Wyck Brooks that the projected book had now become three (one on machines, one on cities, and a third on personality), and that the writing had gone well over the winter and

especially in the spring: "all the gray and tangled and incomplete parts of the first draft are gradually disappearing, and what remains seems to my biased but judicious gaze pretty sound: in fact, damned good!"[38]

In understanding how "Form and Personality" became *Technics and Civilization,* the importance of this period in expanding Mumford's sources—in space from America to Europe, and in time back to the Middle Ages—is obvious. As for how this information was organized, however, the most significant event in this period may well have been the death of Patrick Geddes. Mumford had planned to visit Geddes, then living in southern France, on his spring 1932 trip to Europe.

> In my heart, I shrank from this final encounter, knowing how it would in the end only disappoint Geddes and sadden me. Yet I was inwardly unprepared for the announcement of Sir Patrick Geddes's death [on April 17], which appeared in the New York papers just a week before I sailed for Europe.[39]

From their first meeting, their relationship had been tense and often unpleasant. Geddes sorely tried the patience of all his admirers by trying to enlist their aid in what they often considered his misguided projects and by subjecting them to his rambling discourses and even more rambling efforts at writing. For Mumford, however, the tensions were even greater because Geddes had tried to make him not only a disciple but also a son—pathetically proclaiming, only a day after they first met in 1923, that Mumford reminded him of his eldest son Alisdair who had been killed in World War I.

> I put up my guard and never thereafter fully lowered it. . . . The final effect of this encounter was unfortunately to cover over and freeze up some of the natural warmth I felt towards [Geddes].[40]

At every step Mumford resisted falling into a filial role, but Geddes persisted to the end. (One of Geddes's last letters, in response to a fairly harsh one from Mumford, opened, "Dear Mumford—no! Lewis my son!")[41] Upon hearing of Geddes's death, therefore, Mumford must have felt the same kind of mixed sorrow and relief that may come upon the death of a father, especially since he had never really known his biological father. Mumford himself recognized that Geddes's death had a liberating effect:

> Released from the pressure of demands I could not fulfill, I was, at last, not merely to draw freely on those parts of Geddes' life and work that still nourished me and incited me to go further along lines he had often indicated but never followed; but at the same time I could, in a series of essays and introductions, call attention to those parts of his work that my contemporaries seemed most in need of.[42]

Mumford's books before *Technics* are predominantly Brooksian exercises in literary and art criticism; *Technics,* especially in the first half cov-

ering the history of technology, is a profoundly Geddesian work. The similarities may not be so evident if we compare Mumford's book with Geddes's best-known book on related topics, *Cities in Evolution.* As a writer, Geddes is as awkward as Mumford is fluent, and those who knew Geddes unanimously agree that his writing did little justice to his ideas. If we compare Geddes's notes with Mumford's, however, similarities of tone and texture are much more striking: they both shift around abstract categories like so many counters (especially in the form of lists of opposites), delight in coining neologisms, and, in playing with words, favor the same key terms (for example, "orientations" and "synthesis" and "escapes"), and above all display the same tone, preachy and self-assured.[43]

More important, though, is the way Mumford uses key concepts from Geddes to structure *Technics.* We have already seen how the concept of life insurgent provides a fundamental plot for the entire book. We shall now look more closely at two other key concepts of Geddes, the valley section and technological phases. As Mumford himself has sarcastically noted, some commentators have "charitably supposed that I have never entertained an original idea that I did not derive from Geddes . . . ."[44] I want to stress how much Mumford transformed even ideas that do clearly derive from Geddes.

In the summer 1930 draft Mumford discussed both the valley section and technological phases—but not in the chapter on machinery. Instead, he presented the valley section at the outset of the chapter on regions, and he located the distinction between paleotechnic and neotechnic phases of industry in the chapter on cities.[45] These are the contexts in which Geddes typically used the concepts. But when Mumford came to focus his writing on machines, he changed the context, so that the valley section and technological phases became crucial categories for organizing, both in time and space, his discussion of technological history. In changing the context, Mumford decisively altered the concepts too, as we shall now see.

From Valley Section to Technological Milieu

In *Technics* Mumford at several points credited Geddes for inventing the terms "paleotechnic" and "neotechnic," but in discussing the valley section he failed to mention that this concept too was derived from Geddes. In fact, though, the valley section played an even more fundamental role in Geddes's world-view. Sketches of it—a wobbly line descending from left to right, showing how mountains gradually decline into plains, lowlands, and eventually the sea—appear repeatedly, even obsessively, in his notes, in every imaginable context. Geddes claimed that the valley section was the key to understanding human civilization; he also used it as the basis for educating his eldest son Alisdair.[46] The origins of Geddes's fixation on the valley section lie in his own childhood. He grew up near Perth in a hillside home opening northward and westward upon a "great landscape . . . that

stretched over city and river, plain and minor hills, to noble Highland peaks, clear-cut against the evening sky." With his father he often climbed up the nearby slopes of Kinnoull, a "really glorious hill-top" above the Tay that looked southward down to its "rich alluvial plain." From the rock ridge along the river, father and son could look down into Perth, as if it were "a relief-model in perspective."[47] From childhood, then, the image of the mountains gradually sloping down to the sea was deeply embedded in Geddes's mind.

In the late 1870s Geddes began to transform this image into a general sociological theory. As a student in Paris at that time, he happened to attend a lecture by Edmond Demolins, one of the foremost disciples of the French social scientist Frédéric Le Play (1806–82). Geddes was at once convinced that Le Play's observational method and principles of study were of prime importance to social thought.[48] According to Le Play, the basic categories of social existence are "Lieu, Travail, Famille" (which Geddes translated as "Place, Work, Folk"). Le Play further proposed three primary types of family structure, each evolving from three primary occupations: the patriarchal family from herding, a stock family from fishing, and an unstable family from hunting. Any of the above family types might evolve into a fourth, secondary type based on agriculture, but the secondary type would always have traces of its origins.[49] Le Play above all admired the shepherd's way of life as the fount of spiritual virtue, cultural achievement, and familial strength. In a literal (not a literary) sense, Le Play was a pastoralist.

Geddes was somewhat less inclined toward nostalgia for that particular rural setting, preferring instead to see a more even distribution of virtue among various nature-occupations. Geddes did, however, retain Le Play's insistence that modern urban society is best understood as a derivative of simpler rural life:

> For few discern at all, and hardly any clearly, how this rural world offers us not only the beauties and bounties of nature, but also in its workers and their villages the essentials of our civilisation, the simple origins of our most complex urban and metropolitan institutions, and these easily explained, even to much of their working to this day. . . .
>
> For as we ascend the vale to the mountains, or descend again to the sea, we are for the time freed from our imperial and national cares; for the State, its bureaucrats and lawyers, its politicians and their fluctuating struggles, are for the time forgotten. Of mechanistic industry we see nothing beyond the village smithy, and of business only the convenient little shop . . . . After the fatigues and excitements of the city, we rest amid green peace, and let our tired eyes roam to the far horizon, instead of being near-focussed on task or print—a simple hygiene towards sanity of the mind. . . .[50]

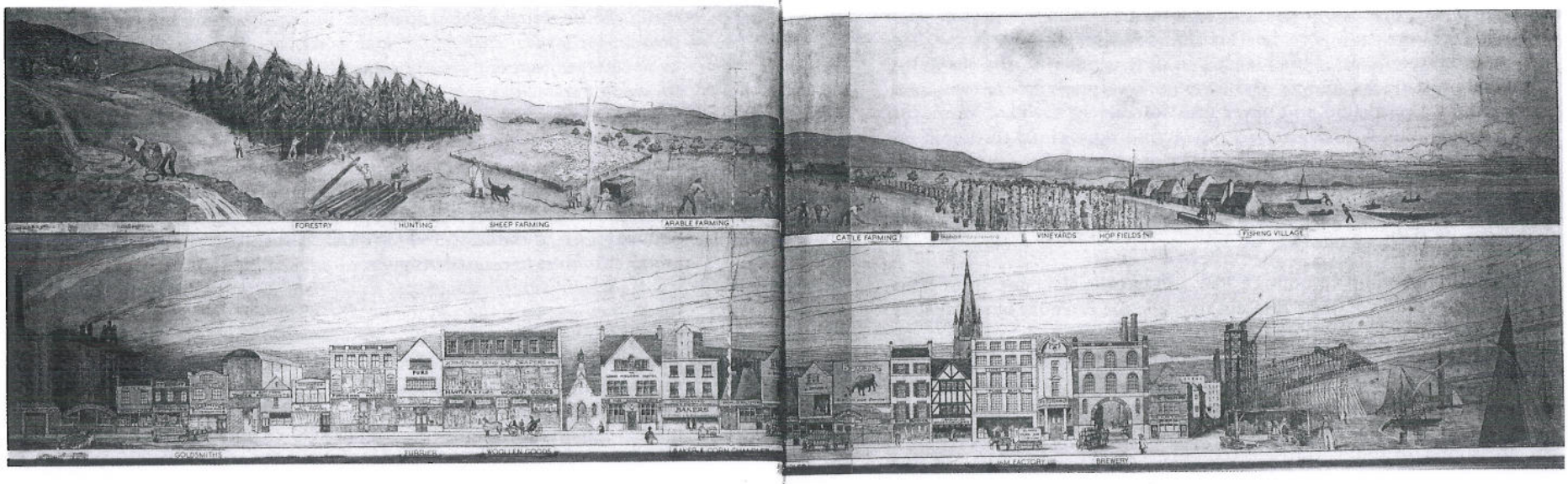
By the 1890s Geddes had expanded and combined Le Play's concept of familial types with his own image of the valley section. According to Geddes, by tracing the valley section from the mountain to the sea, one discerns six fundamental occupations: miner, forester, hunter, shepherd, peasant (or crofter or farmer), and fisherman. These nature-occupations, as he referred to them, are not sequential phases but static types: "all these fundamental occupations we have always with us."[51] The miner is seen in the modern manufacturer of aluminum; the woodman, in the house-builder and finally in all engineers; the hunter becomes the sportsman and "the maker and the leader of war";[52] the shepherd evolves into pastors, cultural and spiritual leaders, as well as into caravan leaders and "their modern successors, the railway kings";[53] in the frugal, foresighted peasant lie the origins of the bank and insurance company, as well as of the farmer and politician (when peasants gather to drink and chat, they become politically conscious); and finally the fisherman becomes the merchant-adventurer, the emigrant, the pirate, and the naval warrior. In all these ways we see "the valley in the town."[54]

In his 1959 appraisal of *Technics* Mumford summarized the valley section as "an ideal, non-historic scheme worked out by his master Patrick Geddes" which was "a useful device" for the way it "throws some light upon occupational origins" and also for the way these types intermingle in the city. "Unfortunately," Mumford added, the valley section diagram

> . . . was governed by the nineteenth-century usage that gave priority to the external environment and to tangible, observable agents. Such a mode of explanation, attributing war and weaponry to a mere extension of hunting techniques, obscured almost as much as it revealed.[55]

Certainly Mumford pinpointed the basic weaknesses in the valley section theory: its geographical determinism (Geddes preferred the term "geographical control," but the principle is the same),[56] and its ahistorical insistence that the complexities of modern civilization can be reduced to simple, eternal rural verities.[57] (For further discussion of Mumford's and Benton MacKaye's uses of valley section concepts, see Thomas, this volume, pp. 67–68, 84–86, 93–97.)

In *Technics,* however, Mumford used the valley section in a more subtle way than Geddes had. As we have already noted, the summer 1930 "Form and Personality" draft explicitly discussed the valley section only in the chapter on regionalism. In the chapter on machines, however, Mumford identified critical occupational types—primarily miners, woodmen, and soldiers—as those forming the "army" that conquered Western civilization for mechanization. In subsequent drafts, Mumford kept his discussion of these crucial occupations, now identifying them as critical "agents of mechanization" from the "upper end" of the valley section.[58] By the time he wrote *Technics* itself, the conspiratorial drama of the 1930 drafts was considerably muted. Simply by substituting the neutral term "agents" for "army," Mumford softened the hard edges of the drama of the machines. Furthermore, in *Technics* his description of the agents is preceded by a thoughtful discussion of the inner sources of decay that had weakened the



The Valley in the Town: from Geddes's Cities and Towns Exhibition comparing the natural valley section (above) and a street in Edinburgh (below). Courtesy of Patrick Geddes Centre for Planning Studies, University of Edinburgh; and Sofia Leonard.

medieval synthesis and allowed it to become vulnerable to pressures exerted by these occupational types.

Most important, though, Mumford looked more closely at the crucial occupations in order to define with greater precision the relation between internal and external mechanization. In doing so, he left behind Le Play and Geddes's stress on geography alone as a determinant of social character. In describing the animus of the miner, for example, Mumford begins with the physical environment, the "manufactured environment" of the underground, where the miner is cut off from nature and dependent upon artificial means for survival; but then he goes on to describe the business environment, the hit-or-miss, random nature of the miner's work and the "pattern for capitalist exploitation" set by the economic organization of mining.[59] The environment of labor therefore includes not just the landscape but also the temporal rhythm of the work, the tools habitually used, the pattern of rewards, and the structure of management and investment. Mumford concludes that in the occupational environment of the mine, if not in society at large, people tend to become mechanized, to assume false definitions of value, to exploit both landscape and other people, and finally to become brutalized themselves.

As we have already remarked, this analysis suggests that while technology in general might not be autonomous, in local circumstances it might be so, or nearly so. The concept of occupational environment therefore prefigures recent efforts to define relatively autonomous sectors of technological practice—above all, as Mumford himself appreciated, the military sector—that have crucial leverage in altering the direction of technological development in society at large. It also provides a conceptual framework for historians who have espoused a "systems" approach to the study of technologies. Mumford encourages us to see occupations as systems that include bureaucracies, physical environment, labor practices, and business goals. In such a system, the consciousness (or, as Mumford would say, the animus) of the worker is molded by occupational pressures. Here is an opportunity to relate the history of *mentalités* to the history of technology. Here too is an area where historians of technology might fruitfully call upon creative literature for insights into the source of occupational consciousness (as Leo Marx has done, for example, in analyzing the pressures that deform Captain Ahab in *Moby-Dick*).[60]

But the concept of occupational environment can be used without any reference to the ahistorical valley section. Mumford himself does just this in *Technics* when he discusses monastic life as an occupational environment that fostered and institutionalized technologies of time-keeping. Mumford's linkage of the clock and the monastery, of technology and occupation, results in a far more precise and powerful argument than his simple

assertion in the 1930 draft that the clock is the crucial invention of modern technology. However, where Le Play or Geddes might have insisted on analyzing the monk, a spiritual leader, as a descendant of the shepherd, Mumford presents his analysis of the monastic vocation before even mentioning the valley section and never tries to connect the two. Moreover, once having outlined the entire section, Mumford pays little further attention to it. Instead of outlining the nature-occupations of the entire valley, he discusses only the miner and the hunter/soldier at any length. He wisely treats the financier, another crucial agent of mechanization, as an independent type rather than as a descendant of the peasant, as Geddes had done.

Indeed, in the hands of both Le Play and Geddes the concept of occupational types seems a willful attempt to evade the category of social class. Geddes, for example, describes the proletariat as a descendant of the peasant, in the form of "stout fellows" who went to the city every six months or year to seek work in the labor market there. "Yet thanks to the stern discipline which his occupation gives in minute economies," especially those compelling the foresighted storage of excess crops, "the peasant is also the source of the banker and the insurance company."[61] To identify both the proletarian and the bank president as descendants of the peasant is, to put it charitably, not especially helpful in understanding contemporary social life. For all his quarrels with Marxism, Mumford appreciated the value of class analysis far more than did Le Play or Geddes—but the inherent danger of occupational analysis, the ever-present risk it presents, is that it will displace rather than complement the category of social class.

Technological Phases

Geddes's notes indicate that the concept of technological phases, like that of the valley section, emerged much earlier and took root more deeply in his thought than his published works show. Only in 1915, in his book *Cities in Evolution,* were the terms put into common circulation, but beginning early in the 1890s Geddes's notes display charts listing characteristics of "paleotechnics" and "neotechnics," as well as experiments with similar terms such as "psychotechnics," "eutechnic," "geotechnic," and "mesotechnic."[62]

Although Geddes continued to use some of these terms, he stressed above all the paleotechnic-neotechnic distinction. The underlying idea is not especially original. By the 1890s the disparity between an old and a new industrial age had impressed many observers, among them Peter Kropotkin, the Russian-born geographer and anarchist living in English exile, who hailed the new technological age in *Fields, Factories and Workshops* (1899).[63] Geddes greatly admired Kropotkin and invited him to lecture at the annual Summer Meetings he organized in Edinburgh in the 1890s. At the same Summer Meetings, Geddes himself regularly taught a course in

social evolution in which he stressed the antiquity of man and analyzed the differences between the paleolithic and neolithic stone ages.[64] Evidently in considering these differences he realized they bore an analogy to the two phases of modern industry.[65] In *Cities in Evolution* Geddes explains:

> Recall how as children we first heard of "the Stone Age"; next, how this term has practically disappeared. It was found to confuse what are really two strongly contrasted phases of civilisation, albeit here and there found mingled, in transition; . . . hence we now call these the Old Stone Age and the New, the Paleolithic and the Neolithic. The former phase and type is characterised by rough stone implements, the latter by skilfully chipped or polished ones; the former in common types and mostly for rougher uses, the latter in more varied types and materials, and for finer skills. The first is a rough hunting and warlike civilisation. . . . The latter neolithic folk were of gentler, agricultural type. . . .
>
> Simply substituting *-technic* for *-lithic,* we may distinguish the earlier and ruder elements of the Industrial Age as Paleotechnic, the newer and still often incipient elements disengaging themselves from these as Neotechnic; while the people belonging to these two dispensations we shall take the liberty of calling Paleotects and Neotects respectively.[66]

Two points should be made about this important passage. First, Geddes drew conclusions about the type of civilization ("rough hunting and warlike" or "gentler, agricultural type") from its surviving artifacts. As Mumford pointed out much later, when he himself came to study the earliest stages of humankind's social and technological evolution, there are all sorts of civilized activities, especially symbolic and aesthetic ones, that have left far less physical evidence in the historical record. To read the character of an entire civilization from its more durable tools is therefore to rely upon biased evidence.[67]

Second, Geddes identified different phases of industry with different types of people, Paleotects and Neotects. In a typical passage in *Cities in Evolution,* Geddes proclaimed that "The paleotechnic mind—whether of Boards of Directors or Worker Unions here matters little—has been too much interested in increasing or in sharing these commercial proceeds, and too little in that of maximising physical efficiency and economy all through."[68] In the same way, he continued, "the present main struggle for existence is not that of fleets and armies, but between the Paleotechnic and Neotechnic order."[69] Thus for Geddes, conventional distinctions of class, race, and nation were relatively unimportant; he substituted for these groups ones defined not by any objective social relations but only by a vague common mindset.

Throughout *Cities in Evolution* Geddes spent considerably more time criticizing the paleotechnic mind and praising the neotechnic one than he did in defining their material bases. In describing paleotechnic industry he remained exceedingly general, saying it was characterized by collieries, the steam engine, "most of our staple manufactures," railways and markets,

"and above all the crowded and monotonous industrial towns to which all these have given rise."[70] Geddes was even less precise in defining neotechnics, except to say that electrical technologies are foremost among them, and that wind power is also an example. Mainly he described the paleotechnic and neotechnic phases as urban types—the former being the chaotic, dirty, wasteful city of the iron age, and the later being the unpolluted, efficient, regional city of the age just dawning.[71]

In his summer 1930 "Form and Personality" draft, Mumford treated the paleotechnic/neotechnic distinction in much the same spirit, contrasting at length the grimy coal city and the orderly regional city. Unlike Geddes, however, Mumford stressed the technological constraints operative during the paleotechnic age.[72] In that phase of technology

> One could not plan cities . . . one could only hope to plan out of it: to use invention and imagination to get beyond it. So long as coal and steam were used in railroads, the yards *had* to be uncovered: so long as local transportation was feeble and slow, these yards *had* to push into the heart of the city. Better planning awaited a better technology [italics his].[73]

In the dawning age of regional cities, however,

> . . . instead of accepting the limitations of coal industrialism, industry is released from its narrow bondage to the railroad track and the coal mine, and it can comply with the more imperative demands of living, instead of making living conform to its own necessities.[74]

We have already noted one application of local technological determinism in the summer 1930 draft—the argument that the technologies and practices of certain key occupations tend to "mechanize" those who follow them. Here is another form of local technological determinism, localized not in space but in time. Under the conditions of the coal-and-iron age, Mumford argued, industry *did* "[make] living conform to its necessities." Fortunately, this was a temporary state that did not apply to neotechnic industry.[75] Localized occupational determinism explained humankind's fall into the long paleotechnic night; temporary technological determinism explained why the renewal of life was so long in coming. In both cases, Mumford implied, ordinary human beings are not responsible for technological evil.

In *Technics* itself Mumford retained some of his discussion of the technological determinism of the paleotechnic phase, mentioning how the steam engine "tended toward concentration and bigness" and how it tended to heap up population in great cities.[76] But in most respects Mumford's discussion of technological phases is quite different from the 1930 draft. Mumford himself succinctly described the major changes in an 8 August 1933 letter to James Henderson:

> It was only in the middle of rewriting this second draft that I finally discovered what my thesis was. Roughly, it is this. For the last thousand years there has been a constant technological progress. This has had three phases, and more roughly three time periods: the eotechnic (wind and water and wood complex) from 1000 to 1750: the paleotechnic (coal and iron and steam) from 1700 to 1900: the neotechnic (electricity and the hard alloys and the lighter metals) 1820—? Up to the neotechnic period technological progress consisted in renouncing the organic and substituting the mechanical: this reached its height around 1870. Since then the new trend, visible in technics as well as in philosophy and social life, is the return to the organic by means of the mechanical: a return with a difference, namely, with the whole body of machines and analytical knowledge we have acquired on the way. This last aspect of my thesis was unnoticed by me until the facts thrust themselves into my face.

Three phases, not two; their application to machines in general, not just to cities; and their identification with the organic, the mechanical, and the synthetic respectively—all these changes mean that in *Technics* Mumford largely detached technological phases from the conspiratorial "drama of the machines" and instead incorporated them into the three-part drama of life insurgent. Now each act of that drama has a name: life in balance is the eotechnic; life threatened, the paleotechnic; life insurgent, the neotechnic. Whatever its drawbacks in historical terms (and I shall discuss them soon), in moral terms the identification of this drama with historical periods is, for Mumford, compelling. For him these are not so much technological phases as moral ones. He now has a vocabulary to distinguish "good" machines from "bad" ones, by approving the "organic" or "return-to-the-organic" type while disapproving the purely "mechanical" ones. (As Joseph Duffey has noted, "Mumford employs the organic metaphor as a term of moral judgment.")[77]

In particular, the addition of the third, eotechnic, period makes the moral equilibrium of *Technics* entirely different from the 1930 draft. In the earlier manuscript, the paleotechnic phase had no saving virtues. It resulted from conspiratorial forces, and it was (literally) black while the neotechnic was white. In *Technics,* on the contrary, the paleotechnic period is in some way a necessary interlude, one that expresses significant human traits (even if they became overdeveloped) and that eventually makes possible a higher synthesis, an enriched culture. Moreover, the addition of the eotechnic period means that the neotechnic no longer carries the burden of being the sole repository of all virtue. The eotechnic gives *Technics* a second positive moral pole. A number of critics have found in *Technics,* as well as in other works written about that time, Mumford's neotechnic utopianism: the celebration of a new age of steel and glass, of streamlined toasters and art photography, as if the technical style he admires could be detached from the "pecuniary interests" he despises. They attribute the appeal of this superficial stylistic appeal to Mumford's immaturity; he was

still under the spell (these critics argue) of an equally superficial, liberal progressivist ideology that he later outgrew under the pressure of events such as the rise of fascism and the advent of atomic weapons.[78] But in *Technics* there are two utopias: the futuristic *and* the retrospective, the latter being the eotechnic "golden day" of medieval northern Europe to which Mumford pays homage in eloquent and deeply felt passages.[79] As well as looking forward beyond the neotechnic to the geotechnic era as Geddes had,[80] Mumford begins to gaze more steadily the other way, into the more distant past. In subsequent works his gaze became ever more fixed and penetrating, as, in the words of Casey Blake, he "summoned up the past as a standard by which to demystify the present and its claims to progress. . . ."[81]

Does the concept of technological phases have any value for other historians? Mumford thought so. In his 1959 reappraisal of *Technics,* Mumford called its three-part scheme "the most original and yet in some ways the most dubious part of the whole book." In particular he felt that recent nuclear technologies did not fit the pattern because they were far more "mechanical" than "synthetic," adding that

> . . . the whole scheme breaks down as soon as one steps outside the arbitrary thousand-year period and tries to work out a more universal succession of technological phases. . . . The author of *Technics and Civilization* may in fact congratulate himself over the fact that the division he used never effectively caught on; and it broke down in his own mind before it could do any serious damage.[82]

Still, Mumford concluded, his contribution in *Technics,* "still largely neglected," was to define "the nature of a technical phase as consisting of a particular mode of power, particular modes of transportation and communication, and a particular set of metals and other material resources."[83]

This is the issue I wish to address here: not the validity of the particular phases in *Technics,* but the validity of the underlying concept. In order to do so, I need to introduce more formally James Henderson, who has already been mentioned as a correspondent of Mumford's and who was asked by Mumford to comment on the fall 1933 draft of *Technics.* The two first met in April 1920, when they happened to take the same steamer to England. After disembarking they spent some time together in London, where Henderson introduced Mumford to some of his friends. Henderson visited the Mumfords on and off until about 1935.[84] From Mumford's apparently somewhat condescending point of view,[85] Henderson was a useful manuscript reviewer because he was immensely well-read, especially in history and in philosophy, something of a pedant, and a stickler for facts. (For example, it was Henderson who provided Mumford with the statistic that at one time there were 40,000 Benedictine monasteries in medieval Europe.)[86]

What Mumford failed to appreciate—at least judging from his failure to respond to them—was the soundness of Henderson's conceptual critiques.[87] Henderson felt Mumford became carried away by his rhetoric instead of examining more carefully the ideas behind it. Henderson once said of himself, "I get distracted from reading a book by the ideas involved"; [88] Mumford's great fault, in Henderson's view, was to become distracted from thinking by writing. In one letter Henderson cautioned, "Writing is very dangerous to thought especially when you get used to writing and where your statements are taken seriously. . . ."[89]

This is the background to Henderson's response to Mumford's 8 August 1933 letter quoted above, where Mumford excitedly explained his new thesis. In reply Henderson fairly exploded:

> As you express them your theses are too general to be clear . . . . [The organic is hardly the opposite of the mechanical.] You don't mean wood etc. is organic and iron mechanical?! And what would returning to the organic by means of the mechanical mean—it's a way of living of some kind—but you see words like these mean *anything,* and are therefore dangerous—*they* are mechanical—i.e. abstract or rationalistic. . . . [90]

When Mumford asked Henderson to review the fall 1933 draft of *Technics,* Henderson returned it with marginal comments repeatedly criticizing Mumford for relying upon abstractions—the organic, the mechanical, the valley section,[91] the paleotechnic, the neotechnic—without making clear what they meant and for turning them into historical subjects. At another point Henderson simply protested in the margin, "You can't just say this."[92]

Henderson's criticisms were, I think, just, and I also think he was right in suggesting that they arise because Mumford-the-writer tends to take over from Mumford-the-thinker. In *Technics,* Mumford repeatedly borrowed abstractions from Geddes—occupational types and technological phases—which he then reified as historical actors in his own dramatic structures (the drama of life insurgent and the drama of the machines) that so appealed to him as a myth-maker and moralist. Therefore "the eotechnic revolution" can have a goal, the machine can "be" a communist, and so forth. Geddes's terms provided the cast for moral plots, and so the historical stage became populated with pseudo-actors. As a result, in the words of one unfriendly reviewer, Mumford "psychologize[d] causes and . . . moralize[d] effects" and "a mysterious animism" comes to replace analysis.[93]

We have already seen that Geddes too used pseudo-actors such as "the neotechnic mind" or "Paleotects." In fact, many of the historiographic problems noted by Henderson can be traced back to Geddes's original formulation: not only the assumption that mindsets can be historical agents, but also the assumption that the inner spirit of a culture may be read back from its most external technologies, that ugly coal towns incarnate ugly values while cities that look efficient and orderly must express values of efficiency and order. Henderson questioned this assumption when, at the very beginning of the manuscript, he penciled in the questions, "'Form'

used synonymous with 'culture'? Explain?"[94] Henderson continued to question Mumford's habit of treating each technological phase as a cultural whole in which spirit and form are always consistent within that phase. When Mumford stated at one point that "the eotechnic revolution was diverted from finding its own goal by a new movement in industrial society," Henderson underlined "its own goal" and added in the margin, "A culture as an abstract entity can be thought of as having a goal from which it is diverted. In reality it creates its own destructive agents."[95]

This last criticism is not entirely fair. Mumford does make room for understanding cultures as dialectic processes when he combines the chronological typology of technological phases with the static typology of the valley section. In this, he is unlike Geddes, who originated both concepts without trying to harmonize them. Mumford describes the eotechnic phase as a cultural unity, in which outer forms faithfully express the inner spirit, but he also describes occupational types within the eotechnic phase (miners, woodmen, and soldiers) who operate according to other goals and values and who therefore act as destructive agents. In much the same way, the paleotechnic phase is subverted from within by occupational types who operate by non-paleotechnic goals and values—above all scientists and some engineers who act according to the values of economy, life-efficiency, and the like.[96] Thus Mumford describes both a dominant culture and occupational subcultures that operate as destructive—or constructive—agents within.

The main problem with Mumford's use of technological phases is not that he ignores the existence of processes that work against the dominant culture, but rather that he too much identifies that dominant culture with its technological forms. If a technological phase were defined (as Mumford does in his 1959 appraisal of *Technics*) as "consisting of a particular mode of power, particular modes of transportation and communication, and a particular set of metals and other material resources," then it becomes something very much like what historians of technology now call a technological style.[97] In that case, Mumford's discussion is helpful in illuminating the historical progression of technological styles. He suggests how these styles might be defined and analyzed in terms of dominant forms and rhythms and materials, and in addition he tries to relate technological systems to systems of sense impressions.

But Mumford goes further and equates styles with values. For example, he looks at the eotechnic era and sees objects he admires, and therefore reads back enlightened values into that epoch. Henderson had to remind Mumford that many of the abuses he attributes in *Technics* to the paleotechnic era had really begun much earlier in the eotechnic phase. Henderson pointed out that wood-and-water technologies were also highly developed not only in northern Europe, where Mumford focused almost exclusively in describing the eotechnic, but also in Mesopotamia, North Africa, southern Italy and France, and Spain. In other words, similar technological styles arose in vastly dissimilar cultures.[98]

Similar distortions arise from Mumford's attempt to read back paleotechnic culture from its industrial artifacts. As Henderson noted, Mumford treats modern history as consisting only of scientists, inventors, and industrialists, as if there had been no Berkeley, Kant, Hegel, Croce, poets, novelists, artists, musicians, and others outside the "mechanical" scope.[99] Finally, in lauding the neotechnic phase, Mumford assumes that since its technological forms look efficient, dynamic, and organic, the values of efficiency, dynamism, and organism must be emerging in the general culture too. Many critics have noted the asymmetry of *Technics:* an entire section explains the "cultural preparation" that eventually generated paleotechnic forms, but neotechnic forms precede, and are themselves supposedly generating, corresponding cultural changes.[100]

Mumford began writing *Technics* as a nineteenth-century-style social prophet whose response to the disintegrating forces of industrialization and democracy was to advocate a return to a more organic culture—that is, to a deeply rooted and coherent set of values that would provide social unity and direction. In the English language, this tradition is exemplified by Matthew Arnold's essay "Culture and Anarchy"; the British tradition as a whole has been analyzed by Raymond Williams in *Culture and Society.* On the Continent, many other thinkers developed similar themes.[101] Seen in this perspective, *Technics* reads as an old-fashioned appeal to culture as a moral agent, as a corrective to the anarchy—which Mumford preferred to call the loss of form—that has descended upon Western civilization with the advent of industrialization.

What is so untraditional, though, is the way Mumford "enlarges the canon of culture"[102] to include technology. A more organic culture? Machines are potentially organic too. Machinery a threat to culture? It is also part of the cultural solution. In Mumford's own words, to see technics as "an integral part of higher civilization" represents "a shift in the whole point of view."[103] This is his fundamental and lasting contribution.

But the contribution carries with it an equally fundamental limitation: the tendency to define culture as a set of artifacts, as objects rather than processes. This weakness ultimately derives from Mumford's determination to refute Marxism by turning it upside down, to treat technological objects as the material expression of substructural cultural values.[104] When he discusses technologies according to this model, Mumford writes as an art critic, a self-appointed arbiter of taste and sensibility; he tells us about streamlined machines and the values of noble austerity and impersonal efficiency that they supposedly incarnate. The result is a consumer-oriented approach to machines, in which they are viewed not as the outcome of social processes but as cultural products. By insisting upon the distinction between the practical and the cultural significance of machines, Mumford ignores the crucial nexus where they meet, in the social conditions of production.

But Mumford ended up writing another book as well, one that embodies another mode of cultural criticism: a utopian mode. These two voices, that

of the art critic and that of the utopian, carry on a duet throughout Mumford's entire career. He repeatedly invests a golden day of the past with utopian qualities in order to imagine an ideal society and to criticize the present one. The ideal keeps receding, however, as Mumford moves it back from America of the 1830s (in *The Golden Day* itself) to the eotechnic era in *Technics* until, by the 1960s, he concludes that since the megamachine originated at the very dawn of civilization, an ideal life-centered polytechnics is incompatible with history itself.[105]

The French scholar Miguel Abensour has proposed an important distinction that helps define the nature of Mumford's utopianism. Abensour suggests that before around 1850 a systematic form of utopianism prevailed, and he defines this as utopianism that seeks to build alternative organizational models. Since the mid-nineteenth century, however, there has been a shift toward a heuristic form of utopianism, in which the focus is on the articulation of alternative values. In the systematic mode, a whole society is pictured: in the heuristic mode, new values, feelings, and relationships, with comparatively little attention to institutions. In the memorable phrase of E.P. Thompson, heuristic utopianism seeks "the education of desire."[106]

Abensour's purpose in making this distinction is to argue against the scientific/utopian dichotomy that he feels has caused Marxism to reject important insights, especially those of William Morris. Certainly the category of heuristic utopia permits new appreciation of the contribution of mavericks like Mumford and Morris. Unfortunately, as we have seen, Mumford—unlike Morris—made little effort to do justice to some important insights of Marxism. In particular, Mumford was so critical of what he considered the Marxist project of changing only institutions that he repeatedly proclaimed that a revolution in values must precede political revolution and might even render it unnecessary. Thus Mumford perpetuated an unrealistic dichotomy between institutions and values: the education of desire becomes a largely apolitical project.

There are obvious autobiographical reasons for Mumford's tendency to see values in such aesthetic and individualistic terms. He himself was so disconnected: fatherless, with only a sketchy family, a free-lancer, a bohemian, he fiercely asserted his independence, whether marital or professional, and always felt he existed outside conventional social niches. But let us not in turn be too individualistic in analyzing the sources of Mumford's heuristic utopianism. We must also consider the larger historical context, the water in which not just Mumford but we ourselves swim. Raymond Williams has suggested that systematic utopianism typically arises in extreme social situations, either one of great confidence, "the mood of a rising class, which knows, down to detail, that it can replace the existing order; or that of social despair, the mood of a declining class or fraction of a class, which has to create a new heaven because its Earth is a hell." Williams continues:

> The basis of the more open but also the vaguer [heuristic] mode is different from either. It is a society in which change is happening, but primarily under the direction and in the terms of the dominant social order itself. This is always a fertile moment for what is, in effect, an anarchism: positive in its fierce rejection of domination, repression, and manipulation; negative in its willed neglect of structures, of continuity and of material constraints. . . the heuristic mode . . . seems often to be primarily a response to a constrained reformism. . . . The heuristic utopia offers a strength of vision against the prevailing grain; . . . at the same time, [it] has the weakness that it can settle into isolated and in the end sentimental "desire," a mode of living with alienation. . . .[107]

In *Technics and Civilization* Mumford writes not so much as a historian of technology as a retrospective heuristic utopian who connects changes in values with changes in technology. The book he wrote is not the book he set out to write, however, and we can see traces of both in the final manuscript. Mumford sometimes writes as an art critic and sometimes as a utopian, and he feels the tug of the futuristic utopia as well as of the retrospective one. Still, he reached a pivotal point. Although Mumford would never be able to disentangle history-writing from myth-making, historical dramas from moral ones, he came to discern the invisible components of past technologies—the megamachines of the powerful, and the container-based polytechnics of ordinary people—and therefore to disengage cultural criticism from art criticism. As James Henderson wrote in his "final note" on the title page of the 1933 draft of *Technics and Civilization,* "Write the book you discovered you were writing not the one you intended to write."[108]

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