Impersonal forces do not transform human settlements. Or at least they do so only on rare occasions, and these are natural disasters: fire, flood, earthquake, and pestilence. Otherwise, the modification of settlement is a human act, however complex, accomplished for human motives, however obscure or ineffective. Uncovering those motives gives us some first clues to the connections between values and environmental form. A brief narration of several striking cases of urban transformation will give us something to chew on.

The primeval transformation is the emergence of the city itself. Why were these peculiar environments created in the first place? Since the first cities preceed the first written records, we have only indirect evidence, but archeology and myth tell us something. The independent and relatively sudden jump to civilization has occurred some six or seven times in world history.* This jump has always been accompanied by the appearance of cities, that is, by large, relatively dense settlements of heterogeneous people, which organize a large rural territory around themselves. And with cities and civilization there appear a stratified society, unequal ownership, full-time specialists, and usually writing, science, war, realistic art, luxury crafts, long distance trade, and monumental ceremonial centers. Why these things should repeatedly be linked together is a fundamental problem. It is interesting to speculate about what cities had to do with it, and what this tells us about city values.

In every case, the first cities emerged only after a preceding agricultural revolution, during which plants and animals were domesticated and small permanent settlements of cultivators appeared. This was a necessary, but not a sufficient, condition. In many cases, permanent agriculture did not

*In Sumer and perhaps independently in Egypt; in the Indus Valley; Shang China; Mesoamerica and perhaps independently in Peru; and just possibly in certain areas of Southeast Asia or Africa not yet thoroughly studied.
lead to an independent appearance of cities.* In those few favored (?) cases where urban civilization did appear, it came a millennium, more or less, after the fundamental agricultural revolution occurred in that region. Domesticated plants appeared in Sumer about 5000 B.C., while Eridu—the first city that we know of in that area—existed by 4000 B.C., housing several thousand persons. By 3500 B.C., there were 15 to 20 city states in Sumer, including Ur, Erech, Uruk, Lagash, Kish, and Nippur—all of them full-scale cities, and some with populations of 50,000. Ur was four square miles in extent.

These are walled cities, and the contrasts of size between their several houses, and of the value of goods in their graves, indicates marked differences of rank and power. The cities boast large elaborate temples on high platforms, carefully oriented. The temples were built on successive ruins of older, smaller temples. There were specialist crafts in stone, metal, pottery, wood, and glass. Trade was organized, reaching as far as Syria or the Indus Valley. Food and other goods were gathered as tribute from peasants and outlanders and distributed among citizens by a priestly class, who were at the center of society.

Writing, an invention which was to have explosive consequences, developed from the pictographs and counters used to tally goods. It flowered into a complicated cuneiform system, taught in scribal schools and based on lexical lists common throughout the region. Regular astronomical observations were made; a number system was developed. Bronze and some iron appeared by 3000 B.C.; there was a precocious leap in art and technology. The wheel was invented.

Yet the wheeled cart was used in battle and religious ceremony for a thousand years before it was used to carry cargo. The imported goods were luxuries, the specialized crafts and the new technology served war and ritual, not daily use. Gradually, the relative equality of the village was converted to a stratified society, one which shifted its dominant

*Moreover, in at least one case—Jericho—urban development may have been a stillbirth. Jericho apparently had no direct successors and led to no permanent civilized states.
New skills develop to serve the new elite, to manage their affairs, or to impose their will on surrounding populations. The voluntary gifts and adherence of the rural population are converted into tribute and submission. The central collection of food has secondary advantages, since it serves as a reserve in famine, and as a way of exchanging complementary products.

The physical environment plays a key role in this unfolding. It is the material basis of the religious idea, the emotional stimulus that binds the peasantry to the system. The city is a "great place," a release, a new world, and also a new oppression. Its layout is therefore carefully planned to reinforce the sense of awe, and to form a magnificent background for religious ceremony. Built with devotion and also with conscious intent, it is an essential piece of equipment for psychological domination. At the same time, it is a glorious expression of human pride, relief, and awe. As the civilization develops, of course, the city takes on many other roles in addition to this primary one. It becomes storehouse, fortress, workshop, market, and palace. First, however, it is a holy place.

A number of urban centers in Mesoamerica followed similar paths, including the early Olmec center at La Venta, and later places such as Monte Albán, Tula, the Mayan cities, and Tenochtitlán (now Mexico City). One of the greatest of these centers was Teotihuacán, just to the northeast of Mexico City. Although the Olmec sites are earlier, Teotihuacán was the great metropolis of Mesoamerica in its day, unparalleled in its size and intensity of urbanization, and the first in a succession of power centers that culminated in Aztec Tenochtitlán. Teotihuacán has been carefully investigated as a whole urban system by René Millon and his associates.

At its zenith around 450 A.D., the city may have contained up to 200,000 people and was only partially walled. It was laid out along a great monumental avenue which ran straight across the valley, rising by gradual steps for some 5 kilometers. Toward the north, this main avenue was intersected by a major cross-avenue. At this cross-}

- Andrews
- Hardoy
- Millon

See fig. 3
See fig. 4
See fig. 5

Village to city
Path of emergence

social relations from kin to class. The social pyramid ran up from slave and peasant, through overseers and soldiers, to state officials and priests. The ownership of land was concentrated in the hands of the latter. The border wars between city states led to permanent war leaders, professional armies, and perpetual aggression. Priest and king became separate, and in time the latter dominated. Finally, with the rise of Sargon of Akkad in 2400 B.C., we enter the period of military empire.

As far as we can tell, this same tale seems to have been repeated in other regions: in Shang China, in Mesoamerica, perhaps also in the Indus Valley, Egypt, and Peru—not always with just the same features, of course, but essentially in parallel. What did the physical city have to do with it? There have been a number of explanations. Cities were said to have appeared as warehouses and viewpoints in trade, or as fortified centers for war, or as administrative centers for managing complex and centralized public works such as irrigation systems. But organized war, trade, and public works seem to have appeared after the emergence of the city. They seem to have been the products of city society, and not its causes.

Apparently, the first leap to civilization has occurred along a single path, one taken independently several times in human history. Once it is made, the ideas of civilization—such as cities and writing and war—can be transmitted to other human communities, who then move along different, shorter trajectories. But the classical, independent path seems to start from a settled peasant society, which is capable of producing a food surplus and which, in local shrines and rituals, has articulated its pervasive anxieties about fertility, death, disaster, and the continuity of the human community. A particularly attractive shrine begins to gain a reputation, drawing pilgrims and gifts from a larger area. It becomes a permanent ceremonial center, served by priest specialists, and they develop their ritual and physical setting to compound the attractiveness of the place. Place and ceremony offer pilgrims a release from anxiety and become in themselves fascinating and stimulating experiences. Goods, ceremonies, myths, and power accumulate.
3 Plan of the city of Babylon at the height of its power, about 600 B.C. The religious features were dominant, especially the temple of Marduk, the city god, the temple of the new year festival (the spring equinox), and the great processional way, along which that festival was celebrated.

4 A reconstruction of the great ceremonial area at the center of Tenochtitlan, as it was just before the Spanish conquest. In the right foreground is the Temple of the Sun, and in the left corner the school for the children of noblemen. The twin temples on the main pyramid are those of the sun god Huitzilopochtli, and Tlacoc, the rain god. On the round pyramid in the center is the temple of Quetzalcoatl, the feathered serpent. The royal palaces and the offices of the central administration surrounded this walled, sacred precinct, now occupied by the cathedral and central square of Mexico City (see fig. 14).

5 Plan of the central portion of Teotihuacan, showing the great ceremonial way, which terminated at the Pyramid of the Moon on the north but ran southward across the valley for over five kilometers. The Citadel and the Great Compound were the administrative and commercial centers of the city, located at the major cross street (East Avenue-West Avenue). Temples and houses of the nobility lined the great way, which ascends by intermittent steps toward the monumental pyramids. Walled residential and industrial compounds make up the basic texture of the city. The plan shows the city at the height of its power in 450 A.D., when it covered eight square miles, and may have held up to 200,000 people.

6 Looking south along the great way in Teotihuacan, from the Pyramid of the Moon, past the pyramid of the Sun (which contains over a million cubic yards of material), toward the Citadel in the background. The modern roads overlie and encircle the site, but the traditional field pattern still reflects the ancient orientation of the compounds.
the other an administrative center. Along the great avenue and at its head stood awe-inspiring, man-made mountains and a continuous string of temples and great houses. The entire settled area was laid out in a regular network of rectangular compounds. The orientation of avenues and compounds (15°30' E of N) is close to exact. The compounds were group residences for 30 to 100 persons, many of them craft specialists working where they lived. Five hundred craft workshops have been identified, mostly devoted to preparing obsidian for export. Teotihuacán was in communication with Oaxaca, and its armed traders are depicted in Mayan murals. Its influence reached Kaminaljuyú, 600 miles away. It was the great religious and market center of its time, drawing in pilgrims and traders from an immense region.

There had been a village of moderate size there as early as 500 B.C., but the sudden leap to city occurs in the first century A.D. At that time, the great avenue and cross-avenue were laid far out across the empty land, somewhat to the south and east of the original village site, and the pyramids were begun and then enlarged. These vast public works controlled the planning of the city's growth for the next six centuries, and there is evidence that locations were provided in this initial planning that never were fully utilized. The labor for these enormous works must have been drawn from the surrounding foodshed, and most likely it drew on the contributed efforts of pilgrims as well.

Early in its history, Teotihuacán controlled an important source of obsidian, and certainly much of its later influence is based on obsidian-working and the trade in obsidian. But it appears that religious exaltation powered the first leap to urban status. The physical form of the city, and the great ceremonies that it housed, were the basis of its attraction. Surely the motive for such an extraordinary physical effort was to honor the gods, but also to induce pride and awe and to secure the city's position as a center of pilgrimage and tribute. Once the

urban machine was in motion, the additional economic and political advantages of concentration may have been self-generating.

When we look at an early city such as Teotihuacán, which has left no written records, we can only infer the motives of its builders. In civilizations possessed of writing, the trace of motive is more direct. In China, for example, the same succession of settled agriculture followed by cities and a stratified society occurs in the middle reaches of the Yellow River valley. In the earliest capital of Shang China, pillar ed buildings rose on earthen platforms, and there was a human sacrifice under each important building, or even under every pillar. Anxiety and guilt accompanied city building. The earth spirits must be propitiated and controlled. Chang'an, great capital of Han and T'ang, was run like a ritualized military camp. There were 160 wards within the city wall, like the compounds of Teotihuacán. Each ward had its own wall, and but a single gate. All gates closed at sunset to the sound of drums, and opened to drums again in the morning. Only military patrols moved through the streets at night.

This urban tradition is continuous in China from 1500 B.C. almost to the present, and the concept of the ideal Chinese city was gradually codified in writing. It should be square, regular, and oriented, with an emphasis on enclosure, gates, approaches, the meaning of the directions, and the duality of left and right. Creating and maintaining religious and political order was the explicit aim. Ritual and place were fitted together. They expressed, and indeed were believed actually to sustain, the harmony of heaven and men, which it was disastrous to disturb. The world, within this place of orderly location, orderly timing, and fitting behavior and dress, was safe and secure. Not incidentally, the hierarchical social structure was also unassailable there. A substantial literature describes this intertwining of thought and place. Its psychological power, even in relatively recent times and for a non-Chinese, is vividly conveyed in George Kate's memoirs of his life in Peking, in the twilight of the Chinese empire.
8 Air view of one of the so-called citadels of Chan Chan, capital of the Chimú empire in Peru about 1000 A.D. The city consisted of a mosaic of these walled domains, unified in orientation, but of unknown use and significance. While there were some built-up areas between the citadels there were no important streets, and the citadels often contained large open spaces. The city was a set of boxes within boxes.

9 Diagram of the awesome formal approach to the imperial audience hall in Peking. The suppliant passed through court after court, gate after gate.
Once the idea of city was conceived, it acquired new functions and new values. Some of these appear when we study those deliberate plantations made by people already familiar with the city’s usefulness. Company towns were built for clear motives of exploitation and profit, and their success or failure in achieving them has often been recorded. Another example, the colonial city, appears in two forms. First, there are the colonies in the wilderness, fixed in places where there are no other human beings, or where they are so scattered or so primitive that the colonizers see no use in them—that is, where the indigenes are either ignored or driven out. The new urban settlement is created to control some resource, or to relieve overpopulation at home. It is a small space of familiar order in an impersonal and alien region, and so the principal concerns are safety, efficient extraction of the sought resource, and a clear allocation of place and goods, so that a functioning society can be put in place as quickly as possible. Nostalgia for the homeland is a prominent feeling, and often there is a sense of temporariness, real or imagined. These places tend to be deliberately designed, quickly built, sharply defined from their surroundings, orderly in a rather simple way, and full of the conservative symbols of home.

The Greek colonies which spread along the shores of the Mediterranean and the Black Sea during the fourth and fifth centuries B.C. are classic examples of such cities in the wilderness. Most of them were laid out to a common pattern of long, slim blocks separated by narrow feeder streets. The feeder streets led into a few wider main streets at right angles. This is a repetitive pattern, applied heedless of topography. The city is enclosed by an irregular wall which responds to the defensibility of the terrain, having no apparent relation to the street pattern within. Defense, order, and a rapid and equitable allocation of house site and access seem to be the principal motives. Military camps and many nineteenth-century North American cities have similar features. We will see many of these characteristics once again, when we begin to build space stations.

See fig. 10

See figs. 11, 12

See fig. 13

10 View of the company town of Sewell, built to house workers of the El Teniente copper mine, in the arid highlands of Chile. Mine buildings occupy the only relatively level ground. There is no public open space, and goods are carried by hand and back, up the steep streets. Mine workers are housed in the long, five-story dormitories ("ship’s bunks"). Employees paid in U.S. dollars live in one-family houses on the north-facing (in the Southern Hemisphere, sunny) slope above.

11 Air photo of the center of Napier, together with a plan of the corresponding streets of the original Greek colony of Neapolis ("new city"), whose streets followed the typical pattern called per stiger (by row, or furrow). The defensive wall is related to the form of the ground, and not to the street pattern. This layout has persisted for 2600 years.
12 Five residential blocks of the new section of the Greek city of Olynthus, built about 430 B.C., and destroyed in 348 B.C. Although the older city is irregular, this new portion is regularly planned, with long, paved avenues running north and south, small cross streets at short intervals, and smaller alleys for drainage, making blocks about 120 by 300 feet. Note the modular plan of the houses and the consistent orientation of the open courts to the sun, regardless of the street entrance. The repetitive form is overlaid by subsequent remodelings. In the entire city, there was no great differentiation among the houses, except for a very few large structures, and some poorer houses in one quarter.

13 A bird's-eye view of Fort Worth, Texas, in 1876, a typical North American frontier city, laid out in a regular grid for rapid development and the easy exchange of land.
There is also a different type of colonial city, created within some well-populated region by an external power. Here, the local population is part of the resource to be exploited. Its usefulness and also its threat must be controlled. The resulting conflicts of culture must be faced. The Spanish ritual of town founding in the Americas began with the planting of a pike, the utterance of a challenge, and the cutting of weeds, as an act of possession. A gallows was erected, and only then was the cross raised and the founding mass celebrated. Indigenous systems of land tenure were abolished or absorbed into a system of rights imposed by the conquerors. A floating population of displaced Indians soon invaded the designated common lands and the town margins, distorting their orderly patterns, as may be seen in many early town surveys. Segregated Indian communities were created, to which the natives were removed by force and there subjected to religious teaching and social reorganization. Lima, for example, founded by Pizarro after the conquest of the native capital of Cuzco, had a walled cercado at its eastern end for Indians (from which they persisted in running away). Not that the indigenes were wholly excluded from the new center. The Laws of the Indies propose that they be kept out during construction, and only admitted when it was splendid and complete. The strange new city is to awe them into submission, just as the first cities awed their peasants. The house of the rulers should be distant but approachable. The double settlement (the familiar bipolar form) appears early in colonial history. Peking is one striking example.

The British built many examples of this type of dominating colony, in which the prime motive is the control of others, and the leading emotions of the conquerors are pride, fear, and a sense of exile. Delhi was the old locus of Moghul rule, in the center of India, on the main invasion route from the northwest. In 1911, the Queen's viceroy removed from Calcutta to Delhi, and a new capital was laid out, south of the old city. It was disposed along a set of great axial avenues of baroque inspiration, with ample space for the display of military force and civil grandeur. Society was minutely ranked, and the ranks were carefully located in precedence, pay,
14 A plan of Mexico City in 1750, as rebuilt by the Spanish conquerors on the ruins of Aztec Tenochtitlan (see fig. 4). The city core has a regular "bastide" plan and a ring of irregular "southerner" housing surrounds it.

15 Aerial view of the boundary between Old and New Delhi, taken in 1942. The "greenbelt" is the clearance for gunfire which the British military government created just outside the old city walls after the Sepoy rebellion. The contrast in scale and texture between native and British quarters is striking.

16 Bird's-eye view of Soweto in South Africa, one element in the string of new settlements built to relocate the black population out of Johannesburg, in pursuit of the official policy of apartheid. Note the personlized facades on the standard units, and the two user-built houses in the left foreground.
at all clear how the space can be reorganized to make it fit with society again. When the South Africans gain control of their country, what will they do with Johannesburg?

While the planted city is usually built for obvious reasons, it is more difficult to untangle the motives governing a more gradual development. How cities are reconstructed after major disasters gives us clues to this more general process, despite the complexity of rebuilding, and the inertia of the remains. We could analyze London and Chicago after the fire, Lisbon, San Francisco, Tokyo, Managua, and Anchorage after the earthquake, Atlanta, Halifax, and Warsaw after the human holocaust. The city is rapidly rebuilt, and motives are debated openly. As in surgery, much can be learned about normal city function and value by observing events when normal function is brusquely interrupted.

But the most difficult intellectual challenge is presented by the gradual development of cities, accomplished by many different, conflicting actors. The values inherent in this process are those closest to our own interests. Most relevant of all was that long, complex upheaval that transformed our cities into what is now their familiar form. It took place in the nineteenth century in Europe and North America and is still working itself out. Unlike first emergence, or most cases of deliberate plantation, this great change involved the reconstruction of a substantial existing fabric. The story is more intricate.

London and Paris are often-cited examples of this transformation—particularly London, where capitalism enjoyed its first strength. A small class built a new landscape to permit profitable production and the cumulative concentration of capital. Road, rail, and water lines to carry goods and workmen were driven through the old city. Efficient sites for production were created. New financial devices—such as deficit spending, building societies, and betterment assessments—and new public and private institutions were developed to build and manage the city. Work and residence were segregated by type and class, where possible—to some degree for greater efficiency, but more particularly to control the threat of violence and disease, and to remove from the sight of the upper class the painful labor on which its profits were based. The dispossessed of the countryside flooded into the cities. Their cheap labor made profitable production possible, but their numbers, their diseases, and their grievances made life uneasy for those who profited. City evils appeared as a common literary theme. Gains could be extracted both from the production of goods and from the renting of sites for production and housing, and the two groups of capitalists, based on these two sources of gain, were often in conflict over the development of the city.

The story of the nineteenth-century transformation of London and Paris has often been told. But the same events were occurring in other European and American cities, if somewhat later. Look, for example, at the case of Boston.

The period after the American Revolution had been one of growth for the city of Boston, but it was still a mercantile town, both in its society and in its economic base. It was a center of world trade, a port of exchange. Its shipping dominated the South Atlantic, but it also traded in the Pacific and Indian Oceans, the Baltic, and the Mediterranean. Carrying goods about the world, buying cheap and selling dear, using its wits and capital to snatch at new opportunities, or to drop them once exploited, Boston was linked more closely to the navigable world than to its own rural hinterland. The port, in the curve of shore between Fort Hill and the North End, was the center of action, with the Long Wharf—and State Street, its inland extension—as its focus. Along State Street the great merchants lived and kept their countinghouses. At the head of the street stood the Old State House, which had only recently been replaced by the new capitol on Beacon Hill. Artisan and middle classes lived in adjacent areas, surrounding the core, producing goods primarily for local consumption in small, home-based workshops. A few Irish had arrived, huddled close to the edge of the port, but most of the transient, marginal people—the poor, the casual laborers, the sailors, prostitutes, and criminals—lived on the margins of the town, such as
along the back side of Beacon Hill. Accustomed as we are to the poor at the center and rich on the outskirts, this mercantile city seems inside-out to us.

Mercantile Boston was transformed by two groups of people: the merchants, who stood at the center of the web of production, distribution, and credit, and who required a new habitat for a new economy, and the investors in land, building, and transportation, who sought to profit from this act of transformation. The process of change was a growth and differentiation of specialized land uses, which spread and shifted incrementally, moving painfully around obstacles of topography, prior occupancy, or symbolic sacredness, and always in competition with each other for the control of space. The process is marked by repeated efforts to improve the communication between various key activities, efforts marred by frequent failure.

The occasion for this transformation was the shift of the city's economy from a mercantile port of exchange to a center of industrial production, made possible by steam power and the flood of cheap Irish labor, and made necessary by the decline of the carrying trade after the depression of 1857. Merchant capital and organizing ability moved from overseas trade to investment in large, inner-city workshops. These shops were able to use cheap but unskilled labor, by means of a minutely divided process of production which reduced the worker's behavior to some routine, repetitive action. In particular, these shops produced ready-made clothes and shoes for sailors, slaves, miners, soldiers, and frontiersmen. The demands of the Civil War, and the opening of the west, gave great impetus to this industry.

Thence began a complex spatial quadrille, in which factories and warehouses shuffled among the restricted spaces and dense buildings of the peninsula. The first of these "rationalized" workshops took over the old warehouses as the carrying trade declined and then were pushed out again when the traffic revived in such western staples as wool, leather, and wheat. Some industries, shoes and textiles in particular, were later successfully mechanized on a large scale, and jumped out to

17 Plan of the city of Boston in 1837. Landfills have begun around the original peninsula: in the Mill Pond and the South Cove to accommodate the new railway lines, and, along the edges of the Neck, to form the new South End. But the Back Bay is still open, and much of East Cambridge, East Boston, and South Boston remain to be made. The future airport has yet to engulf the Bird Island flats. (Fig. 19 shows the eventual extent of the filling.) Long Wharf, the extension of State Street is the heart of the harbor, and the new Quincy Markets are the black rectangles just north of it.

18 A bird's-eye view of Boston in 1850, looking from a point over the Back Bay, across the newly created Public Garden and the Common, to the harbor, crowded with ships. This is the mercantile city at the beginning of its transformation, still focused on its counting houses and its shipping, its wealth still at its center.
suburban locations, such as Brockton and Lynn, where spacious new plants could be built and a permanent labor force housed and controlled nearby. Other industries, such as clothing, were unable to mechanize, and in consequence were converted to sweatshop production in the adjacent tenement areas of the North End and the South Cove. The warehouses and markets themselves began to specialize and diverge: wool and leather on one side of State Street, the food markets for local supply on the other. While maneuvering outward, they had to maintain connections to the port for raw materials and to labor at walking distance, but, above all, to the supply of credit and of market information in the specialized financial district. This latter zone, whose origins lay in the former mercantile countinghouses of State Street, moved very little, only expanding southward as it needed space, while leaving the north side of the street to the food markets and the Irish.

Adequate space for offices, production, or storage was important, but access by adjacency was crucial, and access to credit and information was the most crucial of all. Growth was always incremental, invading some neighbor's space. Where necessary, substantial capital, or even public power, could be marshaled to clear and rebuild a needed ground, as occurred when Quincy Market was erected, the Broad Street wharves were laid out, Fort Hill was cleared and leveled, or Atlantic Avenue was cut through. The hilly, deeply indented peninsula of Boston was leveled and extended at great cost. Nine hundred acres were added to an original area of less than eight hundred. The developing city was compelled to thrash about in a narrow room, and as a result few early buildings have survived. The peninsula—almost island—site had originally been chosen for its defensibility, its harbor, and its water supply. The price of inadaptability and poor access that accompanied those assets was paid in the nineteenth century.

Simultaneously, repeated efforts were made to link up the port with the regional transport system. Eight independent railroads were brought into Boston between 1835 and 1855. None of them succeeded in reaching the port or the business center. Space for their lines and terminals could only be found in the marginal wetlands of the Mill Pond, the Back Bay, and the South Cove. One railroad reached deep water in East Boston, but it served a minor hinterland. The Cunard lines from Great Britain located at that point, but goods and passengers landed there had to be ferried across the harbor to the city center. Cunard soon deserted Boston for New York.

In the opposite direction, going outward from the city, one railroad had reached as far west as the Hudson River by 1842, but pushed no farther. Earlier ambitious plans for a canal across the Berkshires were abandoned. While struggling internally to reach deep water, Boston lost to New York the external race for access to the interior of the continent and never regained its original dominance. Thus, the Boston railroads served primarily to transport local passengers, especially commuters, and were interconnected only at a much later date. When the export of western staples by rail picked up, goods were transferred to ships at independent suburban railheads. The historic gulf between the city center and its port on the one hand and the rural interior on the other remained unbridged. Within the city, freight traffic between terminals, along with the converging horsecar lines, continued to congest the tangled central streets.

Meanwhile, the flood of Irish immigrants, which made this boom possible, had also to be fitted into that tangle, within walking distance of factory work and odd jobs. In one decade, the foreign-born in Boston increased from 15 to 46 percent of the city's population. They were packed into the old residential areas nearest to the docks where they had landed, along the margins of the North End and in the neighborhood of Fort Hill. Speculators built dense tenements and alley dwellings and converted old houses and their cellars. As a result, the Irish lived in numbing filth and crowding. In 1850 in the Fort Hill area there were, on the average, more than four families, or twenty persons, in every small apartment. Cholera broke out, redoubling the native fear and hatred of the Irish, on whom the economic machine now depended. The Fort Hill slums were acquired and cleared of tene-
19 A diagram of the conversion of mercantile Boston to industrial Boston, showing the landfills, the penetration of the railways, and the movements of some of the principal activities and population groups.

20 Faneuil Hall, "cradle of the Revolution," at the left, and beyond it the long, granite Quincy Market, built and donated to the city by Josiah Quincy in 1824. The market was the centerpiece of Quincy's successful private speculation, which used public condemnation powers to redevelop the old town dock area for a new food market. This same area was rehabilitated once more, in 1978, to make a lively downtown shopping center.

21 Leveling Fort Hill in Boston, by pick, shovel, and horsecart, after the Irish tenements had been cleared away.
ments through public power and at public charge. The hill was leveled, and its inhabitants were pushed out to provide space for business expansion. The Irish went on to pack the South Cove, the North End, and South Boston, the latter a spatial cul-de-sac which they have continued to occupy.

The old South End (a region now part of the city's central business district, but not to be confused with what is called the South End today) was an elite residential area which first was converted to profitable slums and then cleared for business use. In other directions, residential enclaves held out against business pressures. Elite Beacon Hill stood firm, for example. It lay behind the State House and off the axis of commercial growth, which had been turned aside by the sacred Boston Common. In another direction, the working-class North End also held its ground. It was a dead-end peninsula behind the food markets, whose inhabitants manned those markets at early hours and had to be within close walk of them. The very constriction of the urban ground within which these elements battled for space and the tenacious resistance of some groups has resulted today in a variegated, multi-ethnic central city, quite unlike the empty speculative ring which surrounds the central core of most North American cities.

A breakout was effected to the south, however, through which the horsecar lines were extended beginning in the 1850s. Many of the affluent had already jumped out to country homes within 5 miles of the center, relying on the commuting railroads. A solid remnant stood their ground on Beacon Hill or took possession of the Back Bay as it was filled, but the well-to-do abandoned Tremont Street, the old South End, and then the new South End along the Neck to the oncoming waves of businessmen and Irishmen. That now familiar spatial segregation by social class began to appear, as well as a reversal of the old radial gradient of wealth, whose pinnacle had been at the center and was now shifting outwards.

Railroads were too expensive for the great mass of the citizens. Workingmen walked to work. However, the new horsecars and their 5-cent fare suddenly made it possible for the lower middle class and even the upper working class to escape the central tenements. The car lines were independent enterprises, often financed by real estate interests to make their lands accessible for use for city houses. (In the same way, the first bridges out of Boston had been built largely to support real estate speculations.) The uncoordinated car lines congested the downtown streets, but they gave almost a third of the population a chance for better housing. Small cottages, duplexes, and wooden two- and three-decker apartments spread outward as far as 3 miles from the center, until fire laws and the declining profits in horsecar service checked their extension. Poor layout, cheap construction, and a lack of community facilities left Boston a difficult heritage for the future, but families of moderate income had their first opportunity for ownership and "rural air." Good profits were turned, many small entrepreneurs began their way up with shoestring capital, and the political dangers of middle and upper working-class discontent were relieved, all without putting the labor force beyond reach of the shops. The 5-cent fare was maintained by law, and large public subsidies went into the extension of streets and utilities, which made raw land saleable. For a time, street improvements made up half the city budget. Boston followed after this growth with successive annexations of suburban territory. Later, when the transit enterprises became extended and unprofitable, they were gradually taken over at public charge.

This era of romantic capitalism, of great stress, vigorous expansion, and buoyant confidence, was largely over by 1880 in Boston. Many young upper-class men, the future leaders, had been killed in the Civil War. The Panic and Great Fire of 1873 were serious shocks. Moreover, the Irish had begun to take up the reins of municipal government, and the Town of Brookline refused to be annexed, halting any further effort to keep the political unit in scale with the functioning urban territory. The city budget was sharply cut, and the Board of Health, once a powerful influence in regulating development, was subordinated within the Board of Lunacy and Charity. The Yankee leadership began its gradual retreat from city to state politics and
from political dominance to a reliance on economic power. In the 1880s, the immigrant tide rose once more, but now it was made up of French Canadians, Eastern European Jews, and southern Italians.

Merchant and speculative capital transformed the old mercantile city to house a new economic function and to absorb a stream of labor on which that function rested. But this was done only with great effort, within a resistant medium. The result was never an efficient locus for production, nor was an integrated transportation system ever attained. A severe price was paid in the health of the population. This struggle for territory left a powerful legacy of ethnic enclaves and exclusionist attitudes, as well as that diverse, tight center that seems so distinctive today. The horsecar expansion into Roxbury and Dorchester was a liberation for many families, a first step toward decent housing and a chance for social mobility. These early suburbs are also the areas with whose abandonment and decay Bostonians now must reckon. The motives of the transformation are clear—better access and space for production, an opportunity for profit in real estate development, and the control of space in order to control the productive process and its participants. Issues of health, of the dangers of violence or of fire, and of creating a setting better fitted to family life, all followed after these first three motives and as a reaction to the consequences of that initial transformation.

The values and the valuers who transformed Boston can be traced, overlaid as they are by the complexity of a great city and the vast inertia of its form. The city did not just “grow naturally,” nor was it the inescapable outcome of impersonal historic forces. Neither was its growth a unique or incomprehensible tale. In the same fashion, one could look at the cities of some different culture, to see how variations in value affect city form. The medieval Islamic city, for example, with its emphasis on privacy, is markedly different from the cities we are accustomed to. Its dense, dendritic pattern seems at first very mysterious to us, until the underlying values are understood.
What Is the Form of a City, and How Is It Made?

Three branches of theory endeavor to explain the city as a spatial phenomenon. One, called "planning theory," asserts how complex public decisions about city development are or should be made. Since these understandings apply to all complex political and economic enterprises, the domain of this theory extends far beyond the realm of city planning, and it has been well developed in those other fields. So it has a more general name: "decision theory."

The second branch, which I call "functional theory," is more particularly focussed on cities, since it attempts to explain why they take the form they do and how that form functions. This is a reasonably thick theoretical limb—if not as robust as decision theory—and engages renewed interest today. I have summarized its leading ideas in appendix A, and there, from a safe distance, point to some of the more common blemishes on this limb.

The third branch, spindly and starved for light, but on which so many actions are hung, is what I would call "normative theory." It deals with the generalizable connections between human values and settlement form, or how to know a good city when you see one. This is our concern.

As on any healthy tree, the three branches should spring securely from a common trunk. Unlike the branches of trees we know, they should not diverge. They should interconnect and support each other at many points. A comprehensive theory of cities would be a mat of vegetation, and some day the branches will no longer exist in separate form. While working perilously far out on the weakest branch, we must be aware of the other two and look for favorable places to insert a graft.

So this chapter scans planning theory and functional theory, the two companion branches to our own. It also sets forth what I mean by the "form" of the city. Otherwise, what are we talking about?