

Detail of 116b

New Technology and Architectural Form, 1851–90

7

The iron 'problem'

By 1850 iron was interwoven in the fabric of daily life at every scale, from mass-produced decorative embellishments of apartment houses and commercial buildings to train sheds that welcomed the 'iron horse' to the gates of the city [**100**]. Yet Queen Victoria's opening on 1 May 1851 of the glass and iron hall hosting the 'Great Exhibition of the Works of Industry of All Nations'—the first of some 40 'Universal Exhibitions' in the second half of the century by which the competitors in global industrialization sought to contain an expanding world of both knowledge and trade under a single roof—also inaugurated debates over the 'new' material and over relations of art to industry. Technologically Joseph Paxton's (1803–65) 'Crystal Palace' [**101**]—as the satirical *Punch* dubbed it—offered little more than refinements of technology developed in greenhouses, including those designed in the preceding decade by Decimus Burton at Kew and Paxton himself at Chatsworth, and in the youngest generation of railway sheds, notably London's King's Cross Station (Lewis Cubitt, 1851–52), Paris's Gare de l'Est (Duquesny, 1847–52) [see **121**], and Munich's Hauptbahnhof (Bürklein, 1849). Iron had not been confined to gardens or the working edge of cities. Already in 1829 Percier and Fontaine, style-makers in Parisian architecture for over two decades, introduced iron skylights into the Palais Royal with their Galerie d'Orléans, a late addition to those shopping arcades by which light, pedestrian shoppers, and commercial capital penetrated the dense heart of cities.

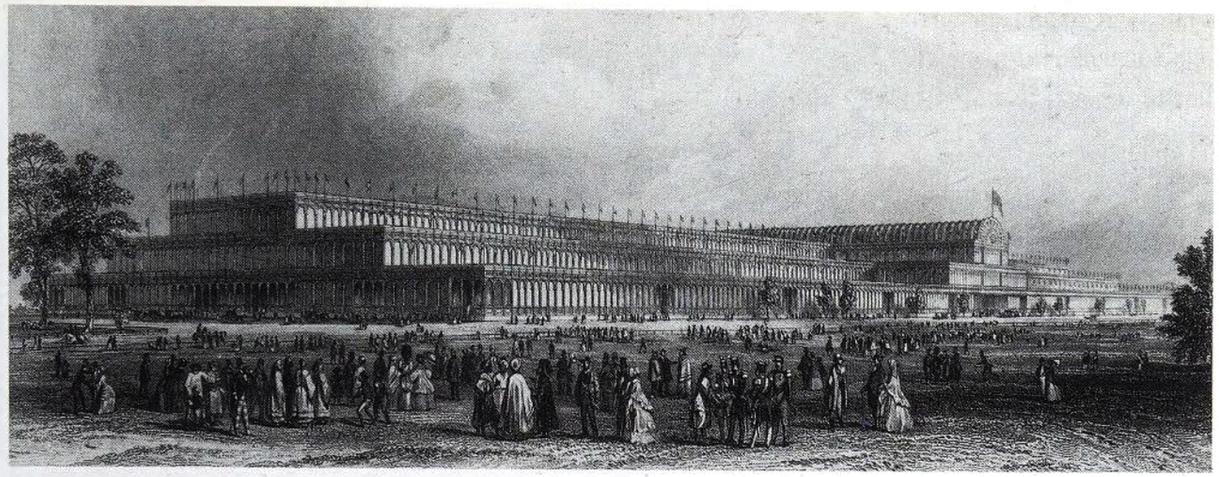
The Crystal Palace

But the Crystal Palace demanded attention in a new way. Its scale was daunting. At a symbolic 1,851 feet (564 m) long it enclosed an unprecedented 18 acres—and even mature trees—in an enclosure free of internal walls. The breathtaking speed of its assembly—in a mere 9 months 6,024 cast-iron columns and 1,245 wrought-iron girders were manufactured, delivered, and assembled—was spectacular even for Victorians



100
Aerial view of King's Cross and St Pancras stations, London
Unprecedented as building types, train stations challenged architects aiming to design buildings that could communicate function and fulfil monumental expectations even for utilitarian programmes. Conceived as new city gates, stations were given every conceivable form from Cubitt's frank expression of the shed itself as a monumental triumphal arch to Scott's use of north German Gothic, borrowed from medieval town halls, for the hotel which fronts St Pancras Station **[82]**.

regularly appraised of the country's new engineering feats in the pages of the illustrated press. Yet it was less the record-breaking statistics than the pretensions of this unadorned building to the status of a representational monument which made it the object of vociferous debate. Set amidst greenery in Hyde Park, within view of royal residences and London's smartest districts, the prefabricated building, the largest to date, was a monument on display. Even while the architectural profession on both sides of the Channel debated how the laws of history or of nature might serve as guides to the vexing dilemma of how the nineteenth century could invent a style indelibly its own, unprecedented crowds were flocking to what *The Times* of London heralded as the embodiment of 'an entirely novel order of architecture, producing, by means of unrivalled mechanical ingenuity, the most marvellous and beautiful effects'.[1] No less compelling than questions of whether the Crystal Palace deserved a place in the architectural canon was the spectacle of the globe's production: over 100,000 objects from Britain and rival industrialized nations of Europe as well as from the vast 'new' world that colonization and trade had opened up, from China and India to the Caribbean, filled the nave and transepts of Paxton's show-

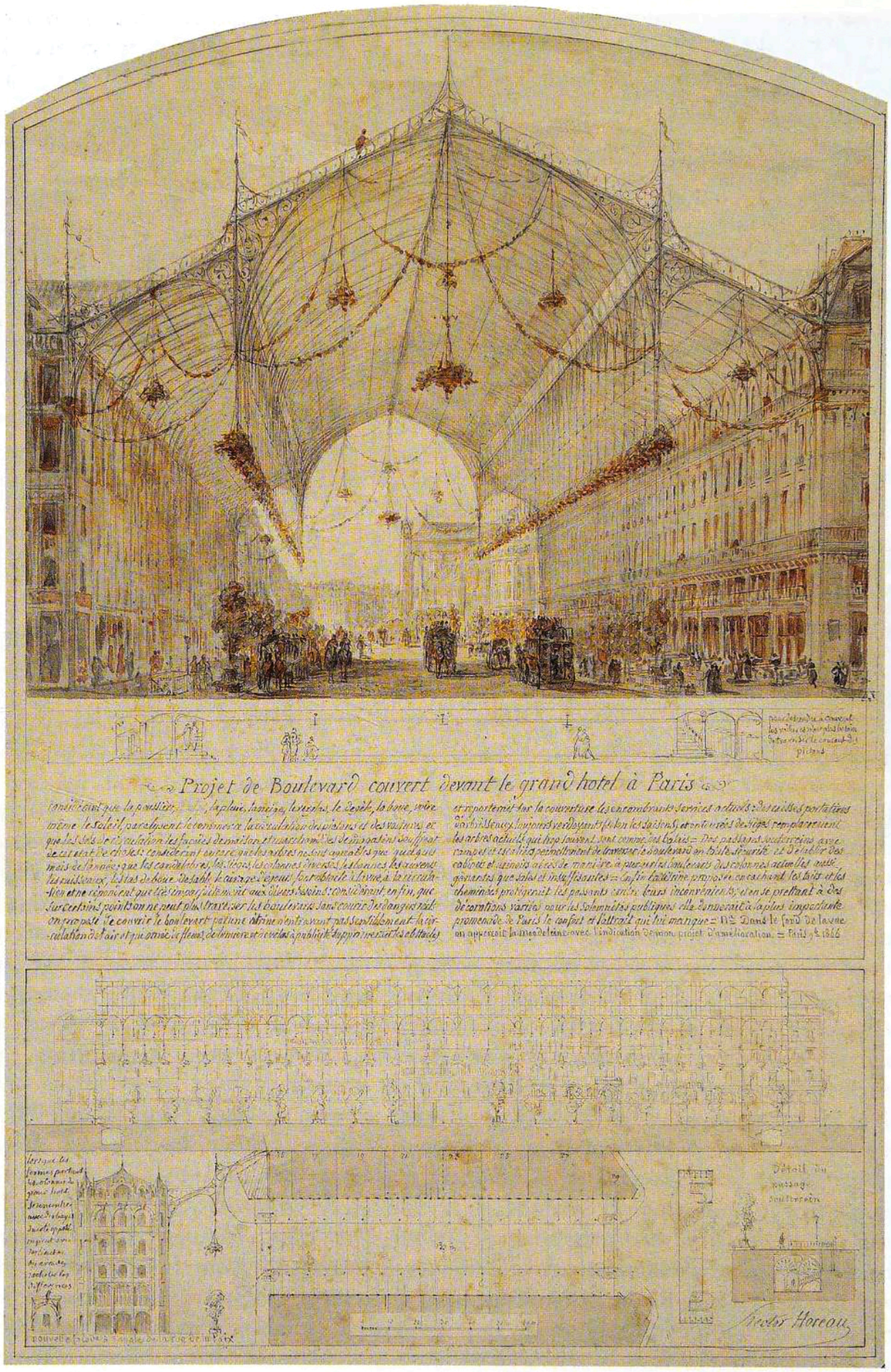


101
Crystal Palace, 1851
The first monumental building constructed principally of factory-produced parts, the Crystal Palace was subsequently taken down and re-erected at Sydenham, where Paxton made it the centrepiece of a landscaped park and various architects collaborated to create a museum of civilization within by creating full-scale architectural mock-ups to represent the different styles of historical architecture. The building was lost to a fire in 1936.

case, destined to have an impact not only on exhibition buildings but on an emergent mass consumer culture. In the wake of Chartism, economic depression, and public anxiety over the 'Condition of Britain', which had rocked the country in the 1840s, and with fresh memories of revolutions that had swept the continent in 1848–49, Victoria and Albert presided over a dazzling demonstration of Britain's place as standard bearer of the march of industry and prosperity.

An eyewitness, Lothar Bucher, Prussian newspaper correspondent, summed up just what it was that gave pause to architects grappling with issues of architectural form and values in modern society: 'In contemplating the first great building which was not of solid masonry spectators were not slow to realize that here the standards by which architecture had hitherto been judged no longer held good.' Because of the relatively narrow structural module adopted—a mere 8 feet (2.4 m)—and the extraordinary thinness of the members, the interior offered 'a delicate network of lines without any clue by means of which we might judge their distance from the eye or the real size … Instead of moving from one wall at one end to that of the other, the eye sweeps along an unending perspective which fades into the horizon. We cannot tell if this structure towers a hundred or a thousand feet above us, or whether the roof is a flat platform or built of ridges, for there is no play of shadows to enable our optic nerves to gauge the measurements … all materiality is blended into the atmosphere'.[2]

Boullée [**39b**] could only dream of simulating nature's atmosphere and stimulating emotions through kinaesthetic experience, but Paxton created unprecedented visual effects even while his attention was focused elsewhere, on honing his extraordinary supple kit of parts to meet a tight budget and schedule. With a last-minute sketch Paxton eliminated not only the 245 designs entered earlier in competition—including that of French architect Hector Horeau [**102**]—but the selected project by the engineer I. K. Brunel with its great dome of sheet iron. Now he worked furiously to craft a complete architectural system.



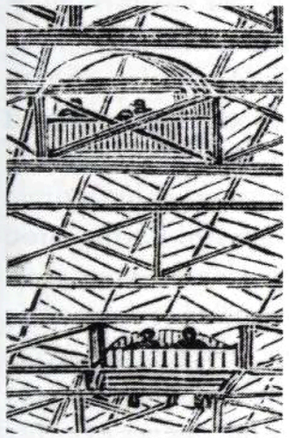
102 Hector Horeau

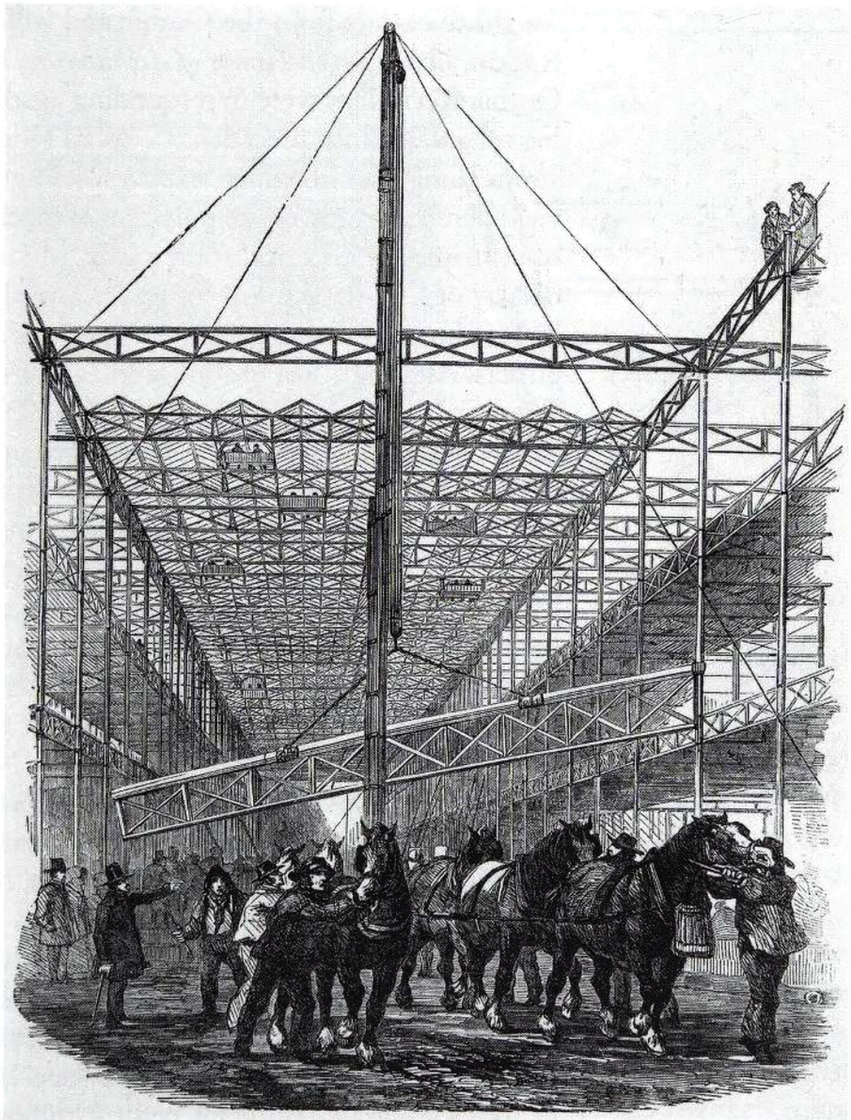
Proposal for covering the projected Avenue de l'Opéra, *c.*1862

A fervent advocate of vast covered spaces of iron and glass as remedies for the ills of the modern city, Horeau took up the prophetic role of glass and iron architecture first advanced by Saint-Simonians. The technology of the Crystal Palace, for which he had bid unsuccessfully, could foster a whole new vision of urban space, such as this proposal for the boulevard projected to terminate in the new Opéra [see **127**].

Hollow cast-iron members served not only as structural uprights but as a drainage system, while the much-vaunted ridge and furrow roof design channelled water at the same time as it created tracks for small iron carts used by the roof glaziers to insert thousands of glass panes into the iron frame [**103**]. The Crystal Palace was at once assembly line and finished product; not surprisingly Paxton's profits derived both from his fees and from the new patents registered for his design.

Yet the visual effects were not entirely an unconscious byproduct of Benthamite utilitarianism, for the fitting-out of the interior was entrusted to Henry Cole, who for 15 years had been formulating strategies to forge new alliances between art, commerce, and industry through periodicals, associations, and a series of tuition-free schools of design in Britain's manufacturing cities. Cole turned to fellow explorers of fundamental laws of forms to make the Crystal Palace a veritable ad-





103

Glaziers' wagons at the Crystal Palace

Paxton masterminded both the design of the Crystal Palace and its assembly-line production, including adaptations of narrow-gauge railways used in mines to run along the metal members of his famous ridge and furrow roof design installing the pre-cut glass panes (*see detail above*). For the first time the spectacle of building as a factory system rather than a craft-bound skill was available prominently in the national capital.

vertisement for the quest for a new industrial art. Painting the girders in turn with the three primary colours alternating with white, the Welsh architect Owen Jones explored the scientific chromatics of Michel-Eugène Chevreul's *Of the Law of Simultaneous Contrasts of Colours* (1839) to enhance the atmospheric haze, an effect contemporaries associated with the paintings of J. M. W. Turner, himself an advocate of simulating optical effects rather than imitating natural appearances. The whole was treated with that abstraction and flatness subscribed to by nearly all mid-century design reformers, those apprenticed in Gothic Revival architectural offices and those tutored in the government's schools of design.

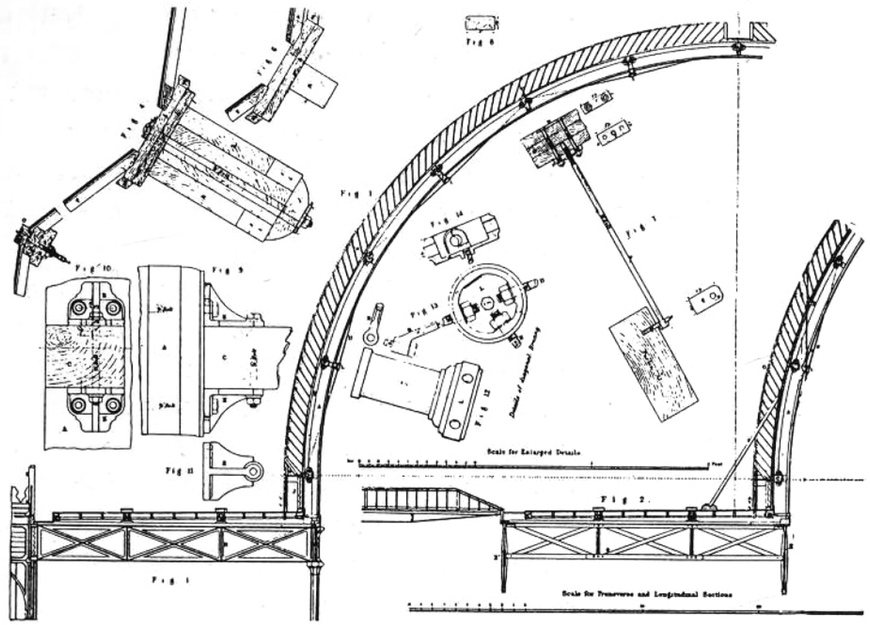
Truthful to materials, honestly expressive of its structural principles, and—with the exception of difficulties in controlling interior temperature—admirably suited to its purpose, the Crystal Palace seemed the fulfilment of those ethical laws of architecture Pugin sought to extract from the Gothic and which the Ecclesiologists and Ruskin, in his *Seven Lamps of Architecture*, had also preached. Yet the Gothic Revivalists were in resounding agreement that Paxton's building set a dangerous precedent. 'Crystal Humbug' and the 'most monstrous thing ever imagined' exclaimed Pugin. Yet Pugin himself gave vivid demonstration of the potential of machine production harnessed to principles of historical form in the 'Medieval Court', an influential display of his own designs for ecclesiastical metalwork manufactured by Hardman of Birmingham, the very city that supplied Paxton's iron girders. Although 'lost in admiration at the unprecedented internal effects of such a structure', *The Ecclesiologist* felt compelled to draw a line in the sand: 'the conviction … has grown upon us, that it is not architecture; it is engineering of the highest merit—but it is not architecture'.[3] Ruskin agreed: 'mechanical ingenuity is *not* the essence of either painting or architecture, and largeness of dimension does not necessarily involve nobleness of design. There is assuredly as much ingenuity required to build a screw frigate, or a tubular bridge as a hall of glass;—all these are works characteristic of the age; and all, in their several ways, deserve our highest admiration; but not admiration of the kind that is rendered to poetry or art.'[4] In 'The Nature of Gothic', the central chapter of his influential *Stones of Venice*, Ruskin formulated his compelling critique of industrial and commercial capitalism in the afterglow of the Crystal Palace, taking as his theme the rise and fall of the mercantile Venetian Republic.

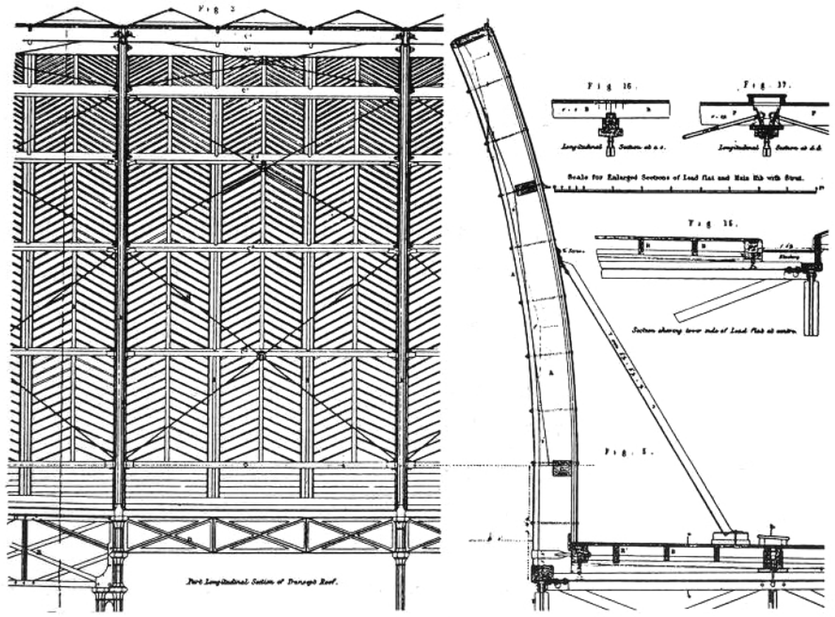
Paxton is never mentioned in 'The Nature of Gothic', but Ruskin drew a vivid portrait of the dangers of the factory system to the dignity and freedom of individuals which he took as the most pertinent lesson to be drawn from the prefabricated palace. He advanced his arguments in appreciation of a different 'central building of the world', the fourteenth century Doge's Palace in Venice, celebrating not only the way an

104 Charles Downe

Working drawing for Paxton's Crystal Palace

The precision assembly of the Crystal Palace, as much machine as building with its systems of working parts for ventilation, required a set of precise working drawings to guide on-site work.





amalgam of Roman, Lombard, and Byzantine influences had left a legible portrait of Venetian civilization at its apogee, but the fact that the variously designed column capitals bore testimony to the diversity of nature and the multitude of individual workmen pursuing their craft. Every stone confirmed the central mantra of Ruskin's 'political economy of art', namely 'the value of the appearance of labour upon architecture'.[5] The Doge's Palace not only encapsulated the seven ethical lamps of architecture that Ruskin had defined, including the capacity to serve as the repository of civilization's memory and thus be a school of morals and culture; it served as the springboard for an impassioned



105 Ruskin
Fondaco dei Turchi, Venice, 1853
In exquisite watercolours the author of *The Stones of Venice* captured not only the passage of light over a building's surface but celebrated the visible traces of human and natural history. The encrustation of different styles bore witness to the march of human time even as the weathering and decay provided a rich patina on the palette of materials, a vibrant example of Ruskin's call for architecture as a repository or lamp of memory.

condemnation of the modern factory system which had transformed the English landscape in less than two generations [**76**]:

> We have much studied and much perfected, of late, the great civilized invention of the division of labour; only we give it a false name. It is not, truly speaking, the labour that is divided; but the men:—Divided into mere segments of men—broke into small fragments and crumbs of life … And the great cry that rises from all our manufacturing cities, louder than the furnace blast, is all in very deed for this,—that we manufacture everything there except men; we blanch cotton, and strengthen steel, and refine sugar, and shape pottery; but to brighten, to strengthen, to refine, or to form a single living spirit, never enters into our estimate of advantages.[6]

In place of the system of working drawings [**104**] by which Paxton assured virtually flawless manufacture and assembly, Ruskin advocated roughness and imperfection—not simply as elements of the Burkean sublime but as voices for the labouring hand and individual mind 'which it must be the first aim of all Europe at this day to regain for her children'.[7] 'All cast and machine work is bad, as work … it is dishonest',[8] he inveighed in 'The Lamp of Truth'. The architect should 'work in the mason's yard with the men'.[9] Stone alone he felt could develop the patina of history and take its place in the legible landscape [**105**].

Deane and Woodward's Oxford Museum

Even as Ruskin was putting the finishing touches to *The Stones of Venice*, plans were afoot for a building he hoped would be the apotheosis of his conviction that architecture should elevate and educate both its makers and its public. In 1853 Oxford University announced a competition for designs for a new museum building to accommodate the great expansion in scientific teaching; research rather than tutorials would be central to 'new' branches of learning. The selection of Deane and Woodward as architects [**99**] meant that Ruskin's influence would permeate the building, which rose over the next 7 years in counterpoint to the project entrusted to the Cole circle to re-equip the Crystal Palace in its new location at Sydenham as a museum of civilization. The symmetrical Venetian Gothic façade with its stout central tower was a veritable billboard for the suitability of Gothic for secular design, but the demonstration went beyond exterior image as the museum's chief promoter and Ruskin's friend, Henry Acland, Regis Professor of Medicine, set out to craft a museum whose didactic mission was contained as much in its building fabric as in its collections. In the years before Darwin published *On the Origin of Species* (1859)—one of the first public debates over Darwin's theories would take place in the museum's lecture hall—the Oxford Museum simultaneously celebrated God's presence in all things and mankind's capacity to order and penetrate nature's abundant diversity. Under the chisels of the O'Shea brothers, brought over by Woodward from Ireland, the window and door frames were to be rich in naturalistic ornament, a modern evocation of the medieval cathedral façades Ruskin celebrated as stone bibles [**106**].



106
James O'Shea carving a jamb of a first-floor window of the University Museum, Oxford, *c.*1860
Using leaves as ornamental models, the O'Shea brothers realized the didactic realism that Ruskin advocated as a vital role of public architecture. In contrast to the mechanization of construction [cf. **103**] these Irish workmen were rare survivors of a disappearing craft, expressing their own identity in the framework of another's design. Tellingly, the work was never completed.

107
Central Court of Oxford Museum
The great glass and iron shed of the Oxford Museum provided a flexible exhibition space and was deliberately left open at the rear for future expansion, acknowledgment that the systematic classification of the world's natural history was an open-ended research. Few spaces speak more compellingly of the emergence of organic analogies between the structure of nature and the quest for architectural style than this great hall of skeletons.

The museum's façade would bristle with carvings of the flora and fauna of the earth, even as the polychromatic façades and interior arcades comprised a built-in collection of geological specimens. These were arranged to help the student remember the latest systems of classification—the stone piers, for instance, classed by mineral type with igneous rocks on the ground floor and sedimentary specimens above. Here was a demonstration not only of Ruskin's principle 'that all art employed in decoration should be informative, conveying truthful statements about natural facts',[10] but of his conviction that 'all architectural ornamentation should be executed by the men who design, and should be of various degrees of excellence, admitting and therefore exciting the intelligent cooperation of various classes of workmen'.[11] Even today much of the exterior ornamentation remains uncarved, a poignant reminder of the struggle facing the pre-industrial crafts in the capitalist world of survival of the fittest.

In the astonishing glass and iron courtyard [**107**]—required by the competition brief—the Oxford Museum took up the challenge of the industrial age most clearly. Here was proof, in the words of *The Building News*, of the 'applicability of Crystal Palace architecture Gothicised'.[12] The design and manufacture were contracted to F. A. Skidmore of Coventry, an ironmaster in the circle of the Ecclesiologists. In an 1854 lecture, 'On the Use of Metals in Church Building and Decoration', Skidmore critiqued Paxton's mute utilitarianism, arguing that iron could be hammered and worked into a formal language at once its own, finer and more delicate than stone, and capable of imitating the natural forms Ruskin upheld as guarantors of truth in art. Ruskin remained sceptical; like others he doubted if the frailty of iron construction had the makings of monumental architecture with a public presence and a moral aura. Woodward and Skidmore created an ogival arched skeleton that at once echoes in architectural terms the anatomical specimen collections and, in the spandrels, literally bursts into leaf and flower to add native and exotic trees to the building's visual encyclopaedia, while vines of all sorts ornament the trefoils of the girders. Even iron, they demonstrated, had the potential for higher expression in the aesthetic of realism preached by Ruskin and the Pre-Raphaelite painters just getting their start in Oxford in these years.

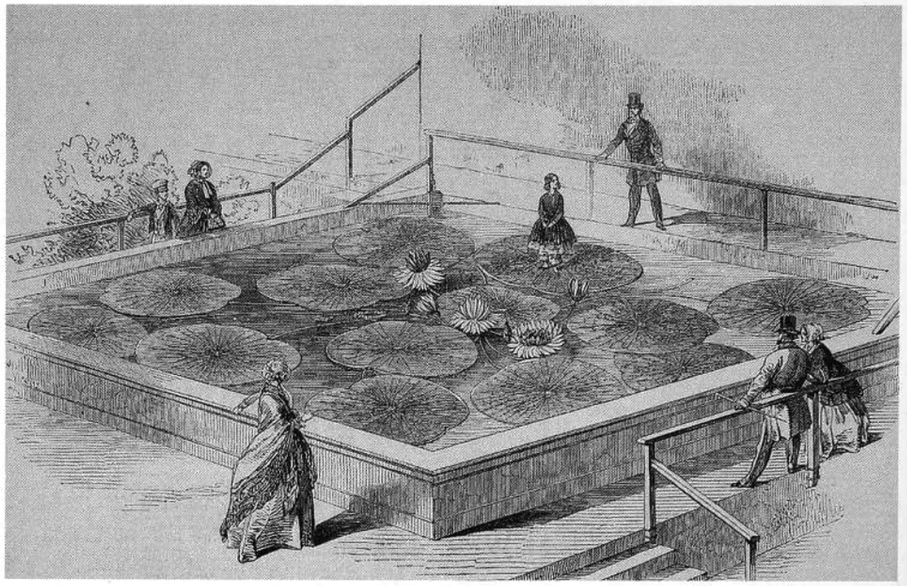
Both nature and the nature of materials were open to interpretation. Even before it was completed the glazed roof had to be dismantled and redesigned as Skidmore had underestimated the sheer weight of even its thin members; the whole had begun to buckle under its own weight. Paxton, for all his critics accused him of reducing architecture to calculation, proudly maintained that nature had been his guide for finding efficient forms of broad-span iron and glass structure. The hollow ribs and thin leaf membranes of the Duke of Devonshire's exotic giant water-lilies—the famous *Victoria Regia* for which Paxton had designed

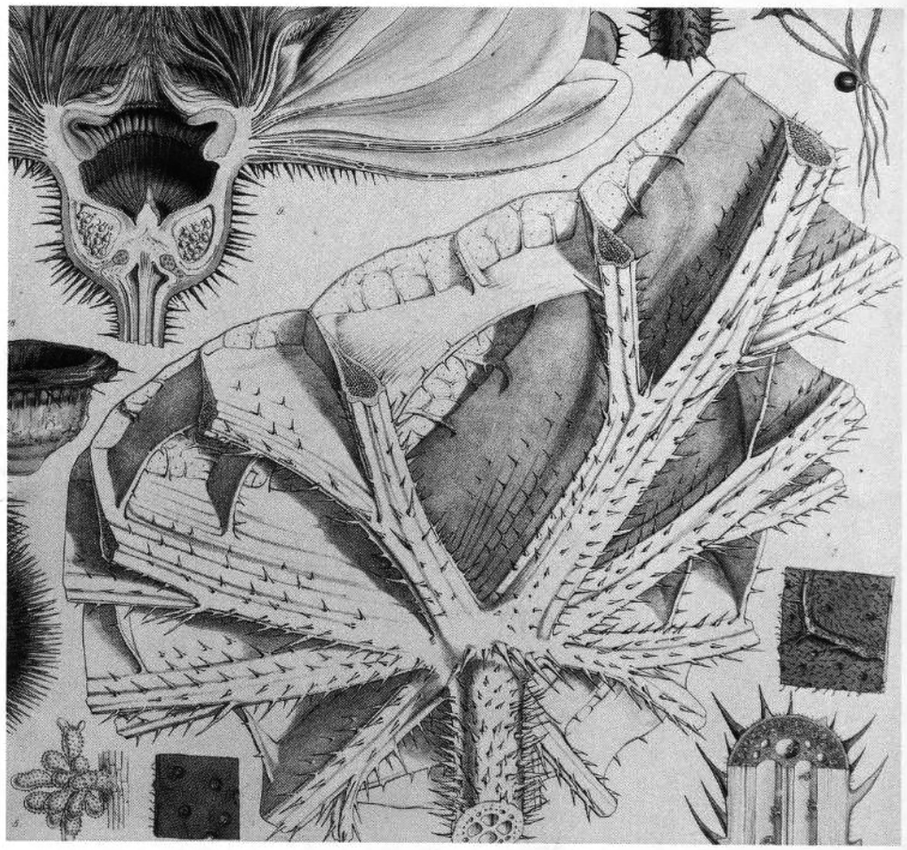


108 Paxton

a) Lily house at Chatsworth
b) Botanical diagram of structure of leaf and stem of the *Victoria Regis* water-lily

Paxton built a special glass house to display the Duke of Devonshire's prize specimens, the great *Victoria Regis* water-lily. To demonstrate the strength of its rib and infill leaf structure Paxton had his daughter walk across one of the great circular leaves and claimed it a moment of revelation for his own inventions. In contrast to Ruskin, Paxton maintained that nature provided structural lessons rather than forms.



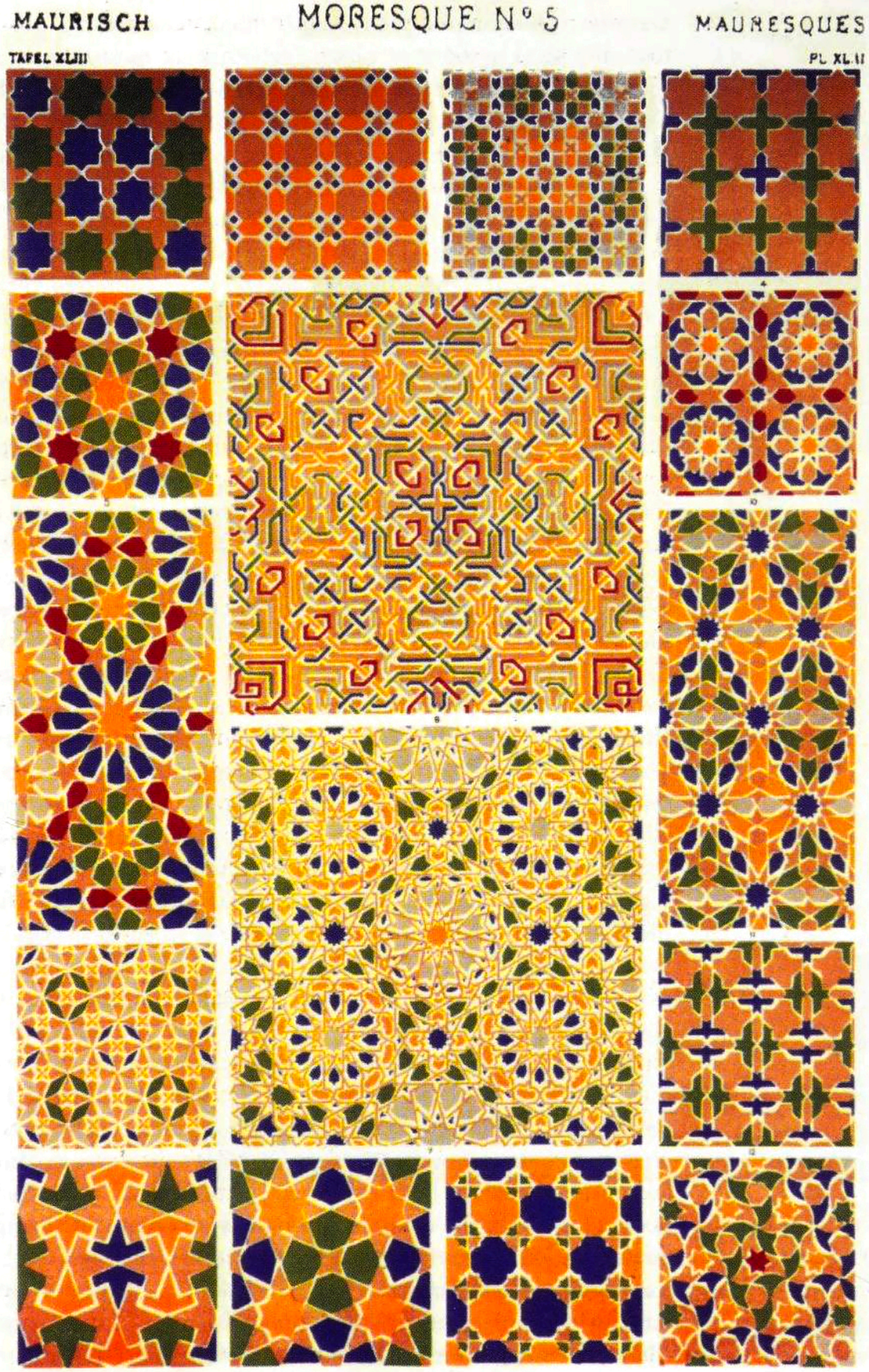


a special greenhouse (1849–50)—had provided the first inspiration for his innovative architecture of frame and infill, as much a product of the intellect as the factory [**108a, b**]. Structure rather than ornament, he claimed, was the true lesson of nature. By the time of Paxton's writing, the circle around Cole was formulating a theory of ornament and form in opposition both to Ruskin's vision of didactic naturalism and his fear of the machine.

Art and industry: Henry Cole and William Morris

Despite resounding popular success, the manufactured goods displayed in the Crystal Palace signalled to many, including the design theorists Cole had gathered to work on the installation, a veritable crisis in art's relationship to industry. 'The absence of any fixed principles in ornamental design is apparent,' Cole concluded reluctantly. Finding 'the art manufacturers of Europe … thoroughly demoralized',[13] he was not alone in admiring the originality and integrity of the hand-crafted objects sent by Asian and Islamic countries. Seeking explanations and correctives, architectural theorists in the 1850s addressed the whole range of everyday objects, redefining the relationship between the decorative arts and the fine arts, and postulating comprehensive theories of architectural form—most influentially in the seminal writings of Ruskin, Viollet-le-Duc, and Semper—which were to be the foundation for European architectural debate and practice for the rest of the century. Responding to official reports, such as those drawn up by the Comte de Laborde in France in 1856, governments promoted design reform as a strategy of commercial competitiveness as never before.

The greatest impact came from Cole's renewed efforts to educate designers, manufacturers, and consumers. After 1852 the vortex was the Department of Science and Art within the government Board of Trade, which took up quarters at Marlborough House while plans were studied for a permanent home at South Kensington. Inspired by Pugin, whose Medieval Court Cole thought one of the few successful marriages of good design and quality manufacture, Cole set up a museum of prototypes which included examples from all historical periods as well as a 'Gallery of False Principles in Decoration', best known today through Charles Dickens's parody of this pious effort at reforming public taste in *Hard Times*. What had captured the public's fancy in the Crystal Palace was now to be the object of scorn, as visitors learned to reject products that defied the nature of materials and to disdain illusionistic 'direct imitation of nature', particularly in fabric and wallpaper design. While the gallery was short-lived, the influence of the museum—today's Victoria and Albert—was enormous; by the end of the century it had spawned numerous imitators in the Arts and Crafts museum movement in German-speaking countries. Despite the emphasis on models, the mission shared by Cole's circle was to combat illusionistic imitation, be it expressed in the 'vulgar' products of the marketplace or in the naturalistic approach to ornament championed by Ruskin. In his widely consulted *Grammar of Ornament* (1856) Owen Jones juxtaposed ornamental motifs culled from the most diverse cultures, with unprecedented attention to Islamic, Chinese, and even Maori ornamental forms. But unlike contemporary historicists who argued for inalienable links between individual forms and their cultures, Jones derived universal principles of good design—37 in all—



109 Owen Jones

'Moresque Ornament', details of mosaics from the Alhambra Palace, lithographic plate (no. 153) from *The Grammar of Ornament* (London, 1856)

In his great compendium of decorative systems, Jones paid particular attention to the building he had first studied in the 1830s, the Alhambra in Spain, 'the very summit of perfection of Moorish art, as is the Parthenon of Greek Art … every principle which we can derive from the study of ornamental art of every people is … present here.' He was not alone in proposing that the underlying geometries of such abstract systems, as nature itself, could liberate architecture from historicism; similar proposals were made in France in the 1860s by V.-M. Ruprich-Robert.

from his folio museum. The richly coloured lithographic plates could easily be misused as templates to be copied, but careful study brought the student to a series of plates—drawn by a pupil of the school, Christopher Dresser—demonstrating how original designs could be derived by abstracting the underlying patterns of leaves and plants [**109**].

In the 1850s Dresser pursued these new interests in both nature and the art of the east as paths away from what Jones condemned as the 'fashion of copying'. As a student of the Schools of Design in the late 1840s, he attended Richard Redgrave's lectures on 'The Importance of the Study of Botany to the Ornamentist'. A decade later he enrolled at the University of Jena to write a dissertation on Goethe's theory of metamorphosis in relationship to plant morphology, the doctrine celebrated three decades earlier by Schinkel in his Bauakademie [**93**]. By the 1860s Dresser was teaching that conventionalization of natural forms was a stage rather than a goal in the artistic manipulation of geometric principles of order observable in nature. In *The Art of Decorative Design* (1862) he laid out a veritable set of spiritual exercises by which the designer progressed from 'natural adaptations … the lowest form of ornament' to 'purely ideal ornament'. 'The designer's mind must be like the vital force of the plant, ever developing itself into forms of beauty, yet while thus free to produce, still in all cases governed by unaltered laws,'[14] Dresser concluded, in lines that recall the German Romantic theory of the free genius in rapture before nature as much as they anticipate the growing impact of the young science of experimental psychology on theories of abstract form in the 1880s and 1890s. Yet for all his celebration of inspiration, Dresser also embraced the rationality of machine production, which he thought had unlimited potential and provided the only means by which the artisan could assert his place in society on an equal footing with industrial producers.

William Morris, Philip Webb, and the quest for an earthly paradise

William Morris (1834–96), Ruskin's most avid disciple, reached this same conclusion only with great reluctance at the end of a lifelong quest to revive endangered handicrafts as the basis for a renewal of both architecture and society. The legendary Red House [**110**], designed by Philip Webb (1831–1915), a fellow member of the 'Crusade and Holy War against the age', was a microcosmic utopia of Morris and Webb's rearguard action to restore the ethics of both design and labour they admired in the thirteenth century in defiance of industrial capitalism. 'The beauty of the handicrafts of the Middle Ages came from this, that the workman had control over his materials, tools, and time,' Morris explained years later in a lecture to a socialist group.[15] With his private fortune it was possible to create a house, much in-

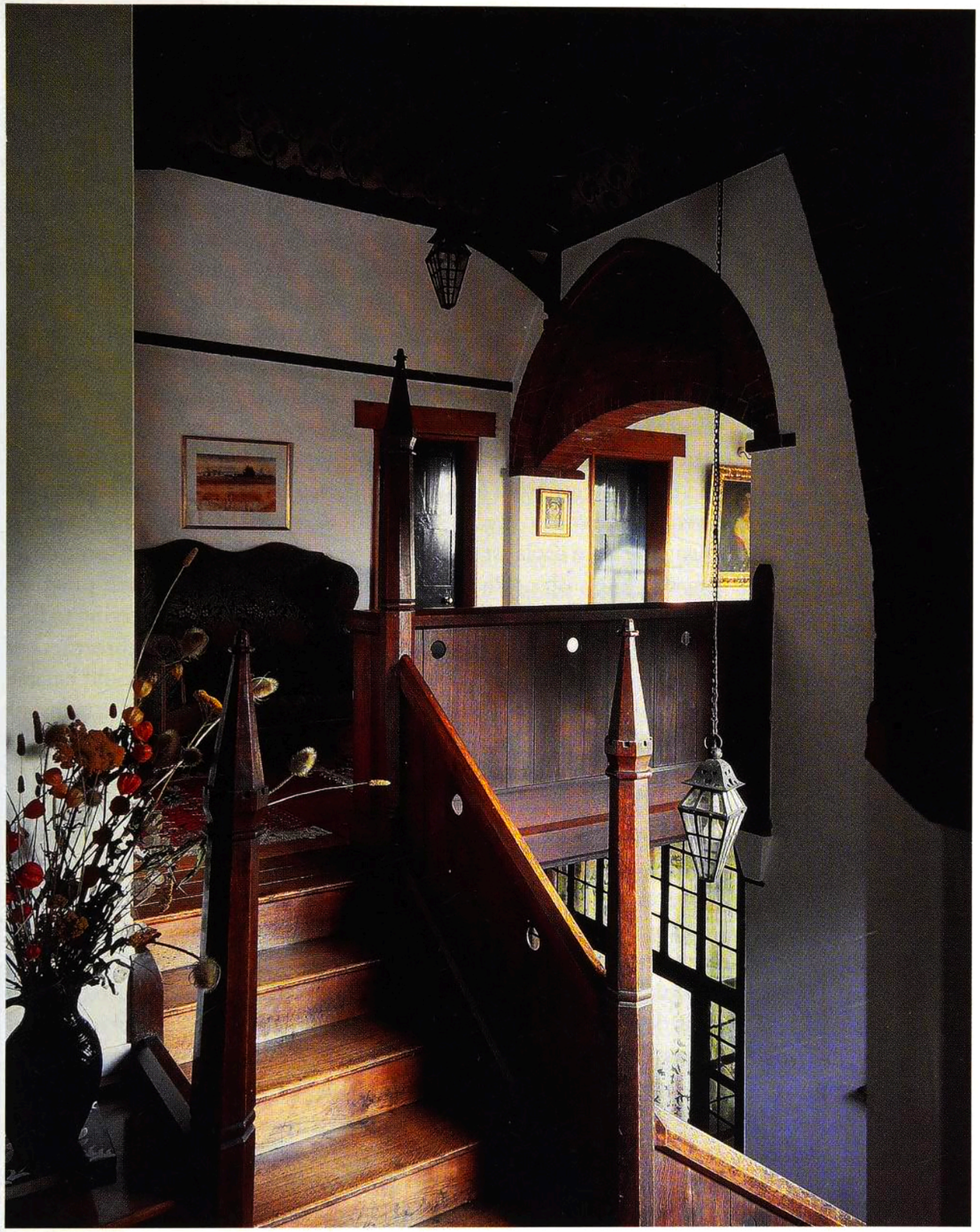
110 Philip Webb
Red House stairhall, near Bexleyheath, Kent, 1860s
To the ongoing cultivation of the small free-standing house as an architectural and social type for British middle-class society, Webb added the philosophy of Morris and his friends that all aspects of the interior should be designed in harmony. The Red House announces the theme of the private interior as a psychological retreat from urban realities that would make the house increasingly a site of architectural experimentation.

William Morris

The son of wealthy parents, William Morris (1834–96) was educated at Oxford, where he imbibed antipathy to commercial values by reading Carlyle and Ruskin, took up painting under the influence of Rossetti and Burne-Jones, and learned architecture in the office of G. E. Street, where he met Philip Webb. Together with Webb he designed the Red House, a manifesto for a reunion of architecture with handicraft, which he considered the greatest legacy of the Middle Ages. The notion of the collaborative effort of decorative arts and architecture, a joint set of principles of honesty, handwork, truth to materials, and non-illusionistic pattern, derived largely from Ruskin and Pugin but was now applied to the domestic realm. Morris & Co., with its wallpapers, textiles, and stained glass, was to be the cradle of the Arts and Crafts movement. In 1877 Morris and Webb founded the Society for the Protection of Ancient Buildings. 'Anti-Scrape' was their critique of prevalent practices of restoration which sought minimal intervention in historic buildings, for fear that the loss of original fabric and handwork, precious vessels of genuine and tactile historical records, would extinguish historic architecture's 'lamp of memory' (Ruskin).

spired in its honest brick and asymmetrical expression in massing and fenestration of different functions by the contemporary parsonages of Butterfield and Street, and to design and craft by hand all its furniture—much of it built-in—panelling, wallpaper, and textiles. Not a single thing was to be purchased from the marketplace. Pugin had done as much in his own house at Ramsgate a decade earlier, but Morris and Webb were determined to work with minimal recourse to machines, launching a philosophy that laid the foundations for the British and American Arts and Crafts movements at the end of the century.

For the next 30 years 'the firm'—reorganized in 1875 as 'Morris and Co.' under Morris's sole control—took on numerous commissions, many of them to decorate the country houses designed by Webb—and later William Lethaby, Ernest Newton, and others—for a close-knit clientele of artists and others who shared their disdain for ascendant bourgeois conventions. Increasingly Morris's designs and Webb's architecture drifted from the pronounced medievalism of the Red House towards a self-consciously modest astylar expression which drew considerable inspiration from rural vernacular buildings—notably those of the seventeenth century misleadingly called by Richard Norman Shaw and others 'Queen Anne'—and from the austere utilitarian aesthetic of such Cistercian buildings as the barn at Great Coxwell, 'unapproachable in its dignity, as beautiful as a cathedral', Morris said.[16] In their commitment to honest expression of materials, quest for simplicity, and preference for abstracted natural patterns in decoration, Morris and Webb organized their lives and work in defiance of 'the present system of commercialism and profit-mongering'.[17] Morris had given up architecture when he realized that he could not control the entire design process, although he continued to preach that architecture was



the master art, even expanding the word's definition to embrace everything from teacups to town planning. He defined architecture alternately as 'the turning of necessary articles of daily use into works of art' and as 'the moulding and altering to human needs of the very face of the earth itself'.[18] Along with Dresser, he was one of the first to identify himself professionally as a 'designer', but he refused to conceive of this as part of a chain of command. Morris mastered every step and technique of the successive crafts he took up, from mural decoration and wallpaper to embroidery, dying and the weaving of carpets, tapestries, and textiles, book design, stained glass, and ceramics.

Webb likewise refused to take on more commissions than he could personally supervise, controlling every element of design and construction, and increasingly striving to conceive his buildings from materials found locally—at Smeaton Manor, Yorkshire (1876) the bricks were made from clay on a nearby site—and taking cues both for design and construction from local vernaculars. Like Morris, Webb never relaxed his standards or convictions. Both admitted, in turning to active engagement in socialist politics in the 1880s with hope that some challenge to 'the cash nexus' might be on the horizon, that their practices were fraught with paradox. 'Our architects are constantly trying to find workmen who can use materials with the simplicity and directness of those of earlier times, so that the workmen themselves should be able to ease the *designer* of the unbearable burden of directing the manipulation of all trades from his office,'[19] Webb wrote, even as he maintained an office that never exceeded three employees and continued to provide full-scale drawings and detailed instructions not to leave any element of his designs to chance in a capitalist labour market. Morris lamented that he was never able to produce his designs cheaply enough to reach more than a rarefied market of consumers; indeed they risked becoming precisely the type of commodity he struggled to resist through a painstaking study of Marx and Engels's writings in the 1880s. Gradually Morris came to admit that machines might be used to produce designs provided they remain firmly under the control of the designer: 'It is not this or that steel and brass machine which we want to get rid of, but the great intangible machine of commercial tyranny, which oppresses the lives of all of us.'[20]

Industry and style: Viollet-le-Duc and Gottfried Semper

The burning issues that moved Morris and his followers, symbolized by the Crystal Palace, were to spark two other great undertakings in architectural theory in the 1850s. No less than Ruskin, Eugène-Emmanuel Viollet-le-Duc in France, and the German Gottfried Semper formulated comprehensive theories to guide the search for architectural form in light at once of the historical evolution of society and the challenges of industrial materials and methods. But unlike

Ruskin, whose understanding of architecture remained grounded in his literary métier, Viollet-le-Duc and Semper were practising architects whose quest for universal theories of form—typical of the mid-century's quest for systems of knowledge—was tempered by the realities of construction even as they drew fresh inspiration from developments in the most diverse disciplines, from biology and physiology to anthropology. A theory of style, and of the mechanism which explained the interrelationship of physical, cultural, and aesthetic determinants in its formation, was the keystone of their respective overarching explanatory systems. Jointly their legacy was as important for the subsequent development of art history as a discipline as it was for architects' continued anxiety over the question Viollet-le-Duc put so succinctly: 'Is the nineteenth century condemned to come to an end without having found a style of its own?'[21]

By the time he conceived the project of a 10-volume dictionary of medieval architecture (*Dictionnaire raisonné de l'architecture française du XIe au XVIe siècle* (1854–68))—the format alone betrayed his quest for an objective and systematic theory—Viollet-le-Duc had emerged not only as an adamant combatant for the Gothic Revival but as the leading exponent of structural rationalism. In a serialized history of medieval architecture in the pages of the *Annales Archéologiques*, the organ of the Gothic party of the Catholic Revival, he laid down clearly the foundations of his later work in the 1840s. There he advanced the historical hypothesis that was his most lasting legacy: that in less than a century the architects of the medieval cathedrals of the Ile-de-France had perfected a structural system in which every element contributed to the dynamic equilibrium of the whole, and in which material was reduced to a daring, but reasoned, minimum. The resulting architecture possessed what he called, in his definition of 'style', 'the perfect harmony between the results obtained and the means employed to achieve them';[22] form and structure, in short, were identical. Unlike elements of Classicism learned by rote at the École des Beaux-Arts—in this Viollet-le-Duc paralleled Ruskin's belief that Classical architecture was a form of slavery of the human spirit—Gothic offered flexible lessons of materiality, rationality, and economy as relevant in the nineteenth century as in the thirteenth. 'Cathedrals represent the first and greatest application of the modern spirit to architecture, emerging from the midst of an order of ideas quite opposite to those of antiquity,' he proclaimed.[23] Fiercely nationalist, he believed this rationality to be the genius of the nation that had produced Descartes, the scientific discoveries of the early nineteenth century, particularly the biological work of Cuvier and St-Hilaire, and several generations of engineers whose bridges and roads were the envy of Europe. In the same years that the Comte Léon de Laborde drew up conclusions from his observations on the Crystal Palace jury, proclaiming that it fell to France to

prove that art and industry could be brought into a fruitful alliance, Viollet-le-Duc began to recast himself less the prophet of the Gothic Revival and more the suffragette for the place of French architects in giving form to 'the abundance of means and materials' presented by industrial and engineering advances.[24]

In the 1840s Viollet-le-Duc fought in the trenches with a group of young architects—most notably Labrouste's pupil Lassus—for opportunities to demonstrate that the style of the French thirteenth century was the only conceivable starting-point for a new national architecture and a way of breaching what they considered the fortress of the Academy and the centralized architectural administration, bastions of Classical doctrine. Each new Gothic Revival church was a momentous political battle, from Lassus's design of St-Nicolas at Nantes (1843) to the Parisian church of Ste-Clotilde (1846–57), begun by F. C. Gau and completed by Théodore Ballu, the Gothic spires of which rose defiantly over the Classical portico of the French National Assembly.

In the wake of Guizot's organization of the State Commission on Historic Monuments in 1834, Viollet-le-Duc not only crafted the fabric and the reputation of France's medieval monuments as embodiments of the national spirit, but formulated an influential theory of restoration as an idealist construction of perfect monument 'which may in fact never have actually existed at any given time'.[25] As a historian he considered the cathedral building yards of the Middle Ages crucibles of the national school of rational architecture. As an architect and reformer, he used his restoration projects at Notre-Dame in Paris, Amiens, Carcassonne, and countless other sites to forge a new union of building technique and architectural design and to foster nothing less than a counter-culture to the academic routines of the École des Beaux-Arts. A whole coterie was formed, some of whom worked in the French provinces, notably Eugène Millet, Émile Boeswillwald, Paul Abadie, and Edmond Duthoit, others carrying the doctrines abroad, notably Viollet-le-Duc's son-in-law Maurice Ouradou, who worked in Cracow, and Suréda, who helped set up the Historical Monuments Commission in Spain. In the mid-1840s he prided himself on designing with Lassus a new sacristy and vestry for Notre-Dame Cathedral that could be easily mistaken for medieval work; by the 1850s this life-long atheist was losing faith in the literal imitation of Gothic forms in favour of a position which paralleled the theory of 'development' explored by the English followers of Pugin. As in England an important catalyst was to be the use of iron in architecture.

Fewer than 4 years separate London's Crystal Palace from France's response, the Palace of Industry on the Champs-Elysées to house the Universal Exhibition of 1855, by which France determined to rival England not only in the marketplace but in the showcases of industrial progress. But in those years debate over iron came to the fore, first with

the insistence of Emperor Napoleon III in 1853 that Victor Baltard halt construction of new stone buildings for Paris's central markets [**124**] and replace them with a building in 'iron, iron, nothing but iron',[26] then with the controversy unleashed in the press in 1855 over Louis-Auguste Boileau's (1812–96) St-Eugène–Ste-Cécile, Paris's first cast-iron church. Whereas both of those buildings were predominantly conceived in iron, at the Palace of Industry conception was divided between an architect, Jean-Marie Viel, who styled the Renaissance masonry façades, and an engineer, Alexis Barrault, who was able to exploit this rigid envelope to create a glass and iron vault held aloft with no intermediate supports to subdivide the interior space. The great triumphal arch entry flanked by caryatids symbolizing 'Science' and 'Art' expressed ambitions long at the heart of Saint-Simonian theory—former Saint-Simonians dominated the team entrusted with staging France's 1855 and 1867 exhibitions—and most recently recommended as national policy by de Laborde, namely that it was the destiny of France to effect new alliances between the material and the spiritual, between art and industry. In the heat of these controversies Viollet-le-Duc formulated a challenging theory of contemporary architecture, one in which advances in iron technology would be assimilated to the lessons of rational structure and the principle of dynamic structural equilibrium which were the legacies of French Gothic.

Boileau took up the challenge. In large part prefabricated, St-Eugène [**111**] exploited the lightness of cast iron and sheet metal to create an open cage of structure filled with light. Flying buttresses, which Viollet-le-Duc's academician critics had repeatedly derided as the weak point of Gothic architecture, were rendered unnecessary by light infill walls of stucco over brick, gaining thereby the maximum amount of interior space in a structure built to fill its cramped corner site. A restrained exterior gave way to an interior of iron painted in brilliant colours, emulating the system of abstracted Gothic ornament that Duban, Viollet-le-Duc, and Lassus had pioneered in their restoration of the Sainte-Chapelle a decade earlier. The church was dedicated by the Empress Eugénie, and celebrated in an article by Michel Chevalier, a former Saint-Simonian and economic adviser to the state. Chevalier asked why the system Boileau had already proposed to patent and generalize—Boileau's pamphlet *The New Architectural Form* describing the so-called 'synthetic cathedral' appeared in 1854—had not been adopted for the expensive new churches then under construction by the state.

Above the new steamship ports at Marseille, Vaudoyer was supervising the foundations for a new cathedral which embodied the notion of historical accretion through the chain of continuous progress and the vital lessons to be learned from moments of cultural transition and intermingling, a theory he and his friends Léonce Reynaud and Albert Lenoir had formulated alongside Romantic historians and artists in the



111 Louis-Auguste Boileau
St-Eugène–Ste-Cécile, Paris, 1854–55
The first of a series of all-iron Gothic Revival churches designed by Boileau, this Parisian church catalysed a lively debate over the use of new industrial materials in public architecture. Later examples were constructed at Montluçon and in the suburb of Le Vésinet [**134**]. In subsequent decades iron buildings were exported to France's colonies, notably in the Caribbean.

1830s. In an eclectic but purposeful amalgam Vaudoyer sought to create a building which pictorialized, even as it found its logic in, the role of Marseille as the historical crucible between the east and the west, the place where French culture had continually been provoked to stylistic experiment and advance by contact with eastern Mediterranean cultures from the Greeks to the Byzantines to the Arabs [**112**].

Both the literal imitation of Gothic forms in new materials and the vision of history as a process of eclectic cultural intermingling were concepts Viollet-le-Duc was determined to combat; he lashed out against both Boileau's cast-iron church and Vaudoyer's historicist cathedral. Boileau modelled his cast-iron uprights on the svelte stone columns of the twelfth-century refectory of St-Martin-des-Champs, a building Viollet-le-Duc praised and which Labrouste had taken as a

112 Léon Vaudoyer
Marseille Cathedral, 1852–90
Embodying the philosophy that architectural forms evolve according to laws of historical development and through direct interactions of cultures, the eclectic amalgam renders visible Marseille's historic and contemporary role as 'gateway to the Orient'. Its twin-towered façade and radiating chapels signalled the French medieval tradition; married to this was a cascade of Byzantine domes and marble striping, evocative at once of Italian medieval cathedrals and Cairene mosques.

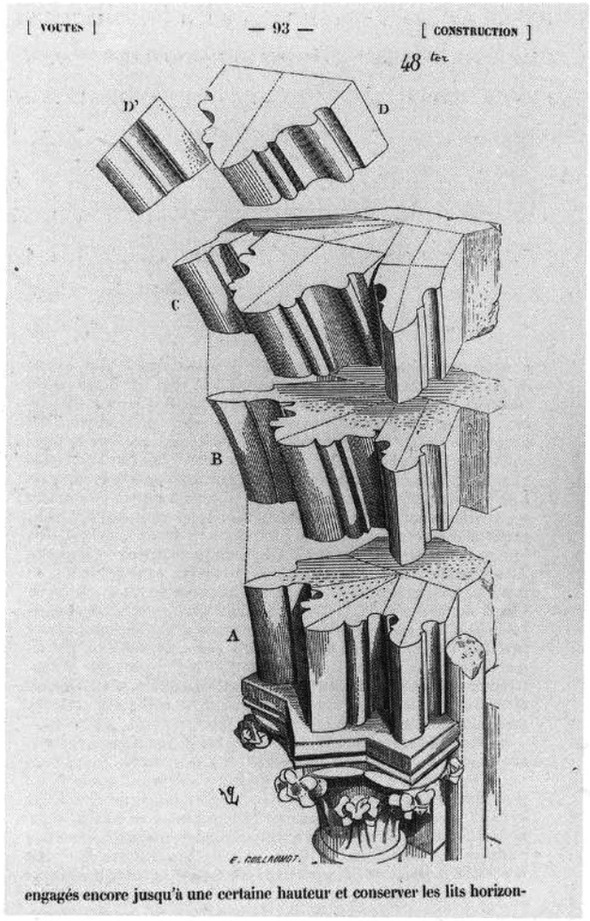
point of departure. But whereas Viollet-le-Duc admired Labrouste's Bibliothèque Ste-Geneviève enormously [**87**], he dismissed Boileau's view of both architecture and history as vulgarly mechanistic. Adopting a line of attack Hübsch had advanced in refuting the notion of the transposition of archaic wooden forms into the stone syntax of the Greek temple, Viollet-le-Duc bemoaned that the rational spirit of Gothic should be defamed by a crude notion of imitation that defied the nature of materials. In a stunning exploded perspective drawing [**113**] for his *Dictionnaire* he demonstrated that Gothic was an organic system in which every component had a structural role and form that was reasoned in relationship to its place in a perfectly functioning whole. In this architecture were paralleled the creative potential and laws of nature, 'her deductions follow one upon the other according to the order of an invariable logic'.[27] Using his pencil as a scalpel to uncover nature's laws he took inspiration from the displays of articulated skeletons by which Cuvier had made visible his 'law of correlation' at the Museum of Natural History and from the stunning sectional dissections in the illustrations of Marc-Jean Bourgery's (1797–1849) seminal *Complete Treatise of Human Anatomy* (1831–54). Rather than copying, architects should imagine what the consummately rational medieval builders would have done if blessed with large sections of iron. Baltard's central markets [**124**], with their frank expression of programme and materials, were more suggestive of a starting-point for finding a modern architectural language.[28] Viollet-le-Duc recommended studying them as a tonic to avoid the pitfall of those



113 Viollet-le-Duc

Springing point of the arch from the article 'Construction' of the *Dictionnaire raisonné de l'Architecture*, 1858

Taking inspiration from both the method and the drawings of contemporary treatises of comparative anatomy, Viollet-le-Duc's exploded perspective technique conveys instantly his theory that in architecture as in nature every part was a uniquely functioning element of a larger organic order. Here he analyses the complex stereotomy of ribbed vaulting at its key structural joint.



Revivalists 'who make one think of those people who believe they are performing their religious duty in reciting Latin prayers of which they don't understand a word'.[29]

Language remained an important metaphor to Viollet-le-Duc as he continued to puzzle over the problem of finding an appropriate formal system for modern architecture. Here his quest for a universal law of form met with his belief in the importance of historical guidance. Although he agreed with Labrouste's generation that architectural forms must change and evolve with society, he rejected their vision of historical hybridization as a motor of progress. 'Why seek to compose a macaronic language when one has at hand a beautiful and simple language all our own?'[30] he remarked, in reviewing Vaudoyer's plans for a Romano-Byzantine-style cathedral at Marseille [**112**]. Taken with the racist theories of the Comte Arthur Gobineau, who preached that racial mixture was the source of cultural decline, Viollet-le-Duc argued increasingly for the national specificity of architecture. As he moved on in the 1860s and 1870s to studies of both the geology and the vernacular architecture of the Alps, he sought to understand the commonality between the evolution of forms and types and the principles that could be extrapolated for the future of architecture. He was fascinated by the coexistence of a limited number of laws in nature and her dizzying diversity of forms, notably in crystals. The capacity of mankind to create, the very nature of art, was to be revealed by the simultaneous study of the science of history and the history of nature. 'Any school that has studied natural flora minutely, and natural fauna as well, and that has succeeded by the application of logical method in creating out of stone an organism with its own laws similar to those of a living organicism'—and by this point Viollet-le-Duc did not even need to identify the Gothic by name—'does not have to be preoccupied with style; these methods, then as always, constituted the very essence of style. The day when artists go out looking for style, that is when art no longer has style.'[31] He disbanded his atelier when his students thought to please him by creating French Gothic designs when asked to imagine a building for North Africa. Solicited for advice on a future Russian architecture, Viollet-le-Duc demonstrated in *L'Art Russe* (1877) how a rational framework of structure had been found in the brick architecture of seventeenth-century Moscow which might serve as a point of departure for integrating the new resources of iron. Universal laws of form and the relativism of culture were, he maintained, not incompatible.

114 Viollet-le-Duc

Concert Hall, *c.*1866

An iron armature resting on eight cast-iron columns is at once independent of, and interacts with, a thin masonry shell in this imaginary building published in Viollet-le-Duc's *Lectures on Architecture*. He was at pains to show that universal principles of form, evident in the equilateral triangles that form the web of ribs over the vaults, could raise iron construction to the highest ideal of architecture.



Viollet-le-Duc's most sustained and influential reflection on the future of architecture came in the wake of student protests which aborted his lecturing career at the École des Beaux-Arts, whose curriculum he had been instrumental in reforming in 1863. In the second volume of his *Discourses on Architecture,* he painted an alarming portrait of a profession rapidly losing ground, not only to engineers but to the larger cultural antagonism between the arts and science and technical knowledge. Was the architect to be reduced to a fashionable decorator? Was the modern city to be composed of nothing but, as he put it, hangars and hypogea, the utilitarian iron and glass markets of the engineers and the public architecture of the academicians nostalgically enslaved to the period of Louis XIV? Modern buildings, like modern societies, were complex organisms, but their envelopes were no more in harmony with the sophisticated systems of heating, ventilation, and gas lighting recently developed than they were with the structural capacities of iron. The cultural spirit of rational inquiry that was the motor of unprecedented progress in science, philosophy, history, even archaeology, was absent in architecture alone, Viollet-le-Duc complained, echoing the Saint-Simonian dream of an organic society. Also Saint-Simonian was his choice of a great hall of secular assembly, a concert hall, as the building to encapsulate suggestions for what forms might result from a modern fusion of architecture and engineering [**114**]. Calling for a mixed system of construction in which cast and wrought iron, brick and stone masonry, and even enamelled tile infill would all be developed to maximize their individual capacities in relation to one another, Viollet-le-Duc called his invention an 'organism' which took its place as the next link in a long chain of architectures for mass gatherings. The hall was a successor to the Roman baths and the Gothic cathedrals, just as nature 'neither forgets nor omits anything of her past … From the polyps to mankind, she follows an interrupted path.'[32] He was at pains to argue that his organism was equally prepared to struggle for survival in the marketplace of construction bids and changing economics of materials.

Gottfried Semper and the problem of representation

'Let the discoveries, machines, and speculation work as hard as they can, so that the dough will be kneaded out of which interpretive science … will be able to shape new form. In the meantime, however, architecture must step down from its throne and go into the marketplace, there to teach and there to learn,'[33] Gottfried Semper (1803–79) wrote in a perspicacious essay on the Crystal Palace. Exiled from Saxony for his part on the barricades of the failed bourgeois revolution of 1848, the former royal architect was keenly aware in London that economically the world was changing at an unprecedented rate, even if challenges to traditional forms of political power had been rebuffed. Even as fellow

Gottfried Semper (1803–79)

Born in Altona, and trained in Munich and Paris, Semper travelled in Sicily and Greece with Jules Goury, and participated in the period's debates over architectural polychromy. As a royal architect in Saxony after 1834 he grappled with stylistic and social ideals in seminal designs. Dresden's opera house and art gallery established the neo-Renaissance—recalling the city states of Italy—as a style for public buildings in modern middle-class urban society.

In the 1844 competition for rebuilding St Nicholas, Hamburg, Semper submitted a *Rundbogenstil* design, an explicit critique of what he viewed as the inherent neo-conservatism of the promoters of the Gothic Revival Cologne Cathedral. Like many Germans who saw career prospects dimmed by the uprisings of 1848–49, in which Semper and his friend Richard Wagner had taken part, he contemplated emigrating to the United States. But in 1849 he accepted an invitation to London, where he worked in the design reform movement led by Henry Cole. In 1855 Semper took up a teaching post in Zurich, and designed a number of important buildings there, including the railway station; and from 1869 he designed key structures for the Viennese Ringstrasse (chapter 8).

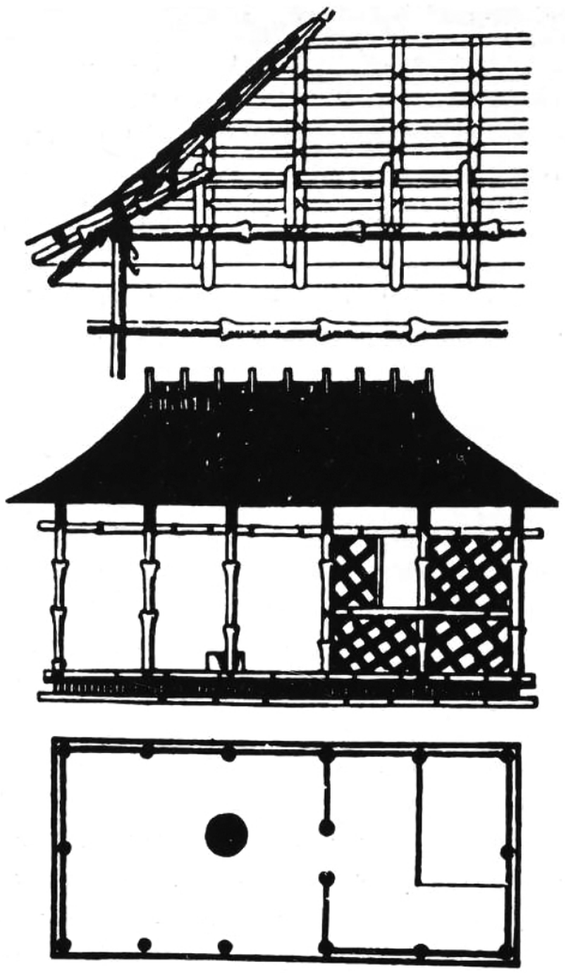
exiles Marx and Engels, whose *Communist Manifesto* had appeared in 1848, sought to formulate the historical laws that could master the sweeping changes under way in the social and economic relations of the factory system, Semper grappled with what he had witnessed in the hothouse of Paxton's 'world market', where both consumers and makers were confronted with a dizzying 'abundance of means … the first great danger with which art has to struggle'.[34]

The Great Exhibition confirmed Semper's belief that the chaos of contemporary architecture resulted from the lack of an integrating 'world view', something earlier societies enjoyed unselfconsciously but which the modern world could only harness through the new science of history. For nearly a decade he had been developing an organizational schema for a comprehensive theory of architecture, one that could complete the work begun by Durand in his famous taxonomic plates of building types, but infuse it with something of the organic unity captured in the great synthetic systems advanced by Cuvier and by Humboldt. His great work, the never completed *Style in the Technical and Tectonic Arts or Practical Aesthetics* (1860–63), grew from this project for a 'Comparative Theory of Building'. Semper reflected continually on the parallels between the inner dynamics of the social art of architecture and the patterns of change in nature, revealing in an 1843 letter to his publisher that he had been drawn in Paris to Cuvier's display of skeletons and fossils 'as if by a magical force'. 'Just as everything there envelops and is explained by the simplest prototypical form, just as nature in her infinite variety is yet simple and sparse in basic ideas, just as she renews continually the same skeletons by modifying them a thousandfold according to the formative stages reached by living beings and the conditions of existence … works of art are also

115 Gottfried Semper

Caribbean Hut, *Der Stil*, 1862

A little more than a century after Laugier [**1**] sought to return architecture to a respect for its origins, the German architect and theorist Semper responded to theories of evolution to propose a completely different interpretation of architecture's origins. Laugier's notion of a template of truth is replaced by a dynamic model of historical process and a vivid demonstration of the interaction of social belief and form-making.



based on certain standard forms conditioned by primordial ideas, yet permit an infinite variety of phenomena according to the particular needs that affect them.'[35] Taken out of context one might imagine this a passage from Viollet-le-Duc, but while the French and German theorists were to develop in similar intellectual environments, they were to develop radically different notions of style and diametrically opposed prescriptions for the present.

Semper's great originality was the centrality of the symbolic or representational role of architectural forms and the belief that those forms, no matter how evolved, could be traced back to fundamental social practices. A history of becoming was fundamental to his unwavering aim to formulate 'an architectural theory of invention … that teaches the way of nature and avoids characterless schematicism and thoughtless caprice',[36] evoking the dual spectres of academic convention and eclecticism. At the Great Exhibition Semper found a building that gave powerful visual form to his theory, not in Paxton's design, which broadcast only the contemporary 'devaluation of meaning', but in the exhibition of colonial Trinidad, one of those 'half-barbaric nations'[37] whose production yielded glimpses of 'earlier stages of cultural

development', before industrial acceleration derailed the slow process by which artistic forms metamorphose. Unlike the novelties of the Crystal Palace produced by an emerging consumer market in anticipation of demand, the full-scale model of a wood and thatch hut [**115**] embodied Semper's conviction that architecture had evolved from handicrafts. Architecture had its origins in the choice of a site to erect a hearth, which as the nucleus for family and social assembly came to organize man's craft activities in the enterprise of shelter. Lifted off the humid ground by a substructure of masonry and shielded from the elements by a roof, the fire is both protected and consecrated in its own space. Finally the whole was hung with textiles to form walls. Both a symbol and a tool, the hearth was the origin of society and—transformed into the altar—of its religious beliefs, of ceramics, and thus of making in general. Architectural meaning and social meaning evolved in tandem: 'Around the hearth the first groups assembled; around it the first alliances formed, around it the first rude religious concepts were put into customs of a cult. Throughout all phases of society the hearth formed the sacred focus centre around which the whole took order and shape.'[38]

It is tempting to recall Laugier's primitive hut of a century earlier [see **1**], and the whole tradition of structural rationalism in France which stemmed from it, but for Semper the hut had the status of a palaeontological artefact rather than an ideal standard. Nor was he willing to allow any single determinant of architectural form, be it laws of structure or materials, to predominate. In lectures at Cole's Department of Practical Art he went so far as to proffer a mathematical equation to symbolize the way in which materials, techniques, climate, society, politics, and even personal taste all acted upon a building's function and thus on the resulting style. On numerous occasions he derided any literal materialist view, even ridiculing Viollet-le-Duc's doctrine of material determinism in the pages of *Style*. Semper coined two terms to underscore the fact that an ongoing process of transformation, and thus representation, remained at the core of the art of architecture, and of its continued fulfilment of both the material and spiritual needs of society. The concept of *Bekleidung*, or dressing, derived from the earlier theories of the Berlin architect Karl Bötticher, who in his dense *The Tectonics of the Hellenics* of 1844 drew an influential distinction between the literal structure of a building, which he called its core form, and its visual expression, or art form. While the theory derived from long-running debates over the use of colour, particularly in Greek architecture, its most lasting legacy was to explain the conventionalized vocabularies of architectural ornament not as simple decoration but as a symbolic language embodying the very essence of architecture. To Bötticher's theory, grounded in the notion of discrete architectural cultures succeeding one another, Semper added a key operative concept, the *Stoffwechseltheorie*,

116 Alexandre Laplanche
Au Bon Marché, Paris, 1872
a) Exterior

Architect Laplanche's stone façades borrowed recognizable motifs freely from recent public architecture, deliberately blurring the boundaries between culture and commerce and pioneering the use of historical architectural forms in the new techniques of advertising and marketing developed by the nineteenth-century department store. The iron frame behind allowed a proliferation of display windows, giving tantalizing glimpses of the full splendour of goods arrayed within.

b) Interior

A veritable pendant to Charles Garnier's contemporary stair at the Opéra [**117**], Boileau's iron stair was likewise as much for seeing the latest in goods, especially new fabrics, as for being seen on. Department stores were among the rare spaces where single women could stroll acceptably in public. The Bon Marché encouraged them to linger by opening a reading room and a buffet with free cakes and refreshments, as the world of private commerce increasingly crafted spaces of public leisure.

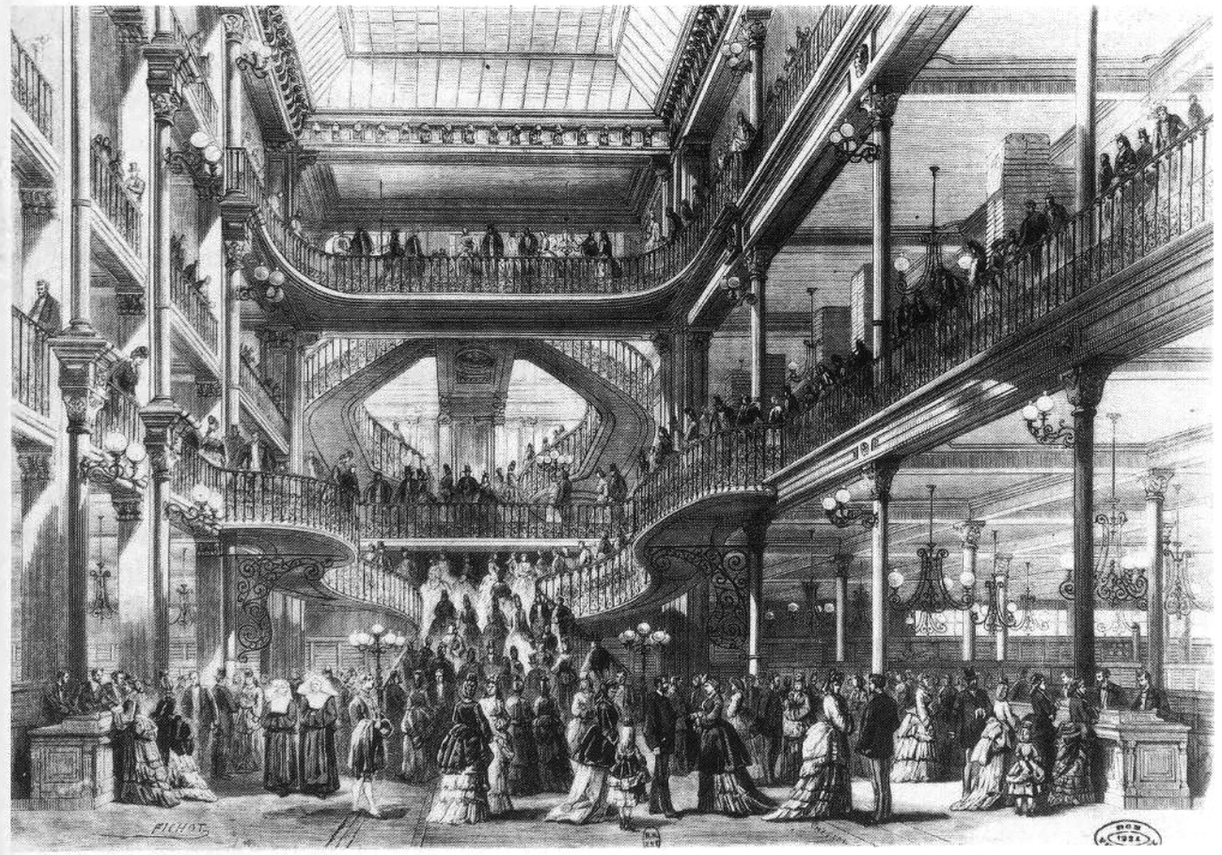
or theory of the transformation of materials, by which he explained that even when the materials of construction changed, the chain of meaning in architecture remained unbroken. The hut again confirmed this notion, for the prime example of primordial motifs and their mutations for Semper was the origin of the wall in the symbolic patterns of the textile arts rather than in the constructive laws of masonry. Once these spatial dividers—and in this he referred also to the tents of the ancient near east—were replaced by more permanent materials, builders continued to recall the patterns of the original textile wall in decorative cladding, be it stucco, paint, or glazed bricks or tiles. In the exhibits of the British Museum and the Louvre Semper found confirmation, noticing that Assyrian glazed brick walls were often patterned on models of wicker mats, such as those used in the Caribbean hut. 'Although architecture produces original formations and is not an imitative art like painting and sculpture, it has over the centuries created its own store of forms from which it borrows the types for new creations; by using these types, architecture remains legible and comprehensible for everyone,'[39] Semper concluded in response to 'the Babylonian confusion of tongues' that he observed at the Crystal Palace. The marketplace was a school for the astute eye, armed with a knowledge of the genealogy or etymology of architectural language, but most makers and consumers would require a more orderly exposition. For this Semper proposed museums as schools of public taste, a project given its most concrete realization in the interpretation of his ideas in the formation of Vienna's Museum of Applied Arts and in Semper's own design for museums as the public forum of Vienna, where he would culminate his long and chequered career as a builder [**131**].

The first department stores

While Ruskin, Viollet-le-Duc, and Semper challenged architects to respond to industrialization and commercialization, the marketplace itself pioneered novel uses of iron and glass to create an architecture of display and consumption that made the ephemeral display of the world fairs a permanent feature of modern urban life. Just a year after the Crystal Palace was dismantled, Aristide Boucicaut opened what historians of mass consumption have labelled the first department store, Au Bon Marché on Paris's left bank [**116a, b**]. By 1874 the shop had grown to fill a city block, and architecture was added to the list of innovations such as fixed prices and no-obligation-to-buy which transformed shopping from a task of provisioning to a leisure spectacle, fuelled by the steady increase of middle-class purchasing power in the second half of the nineteenth century.[40]

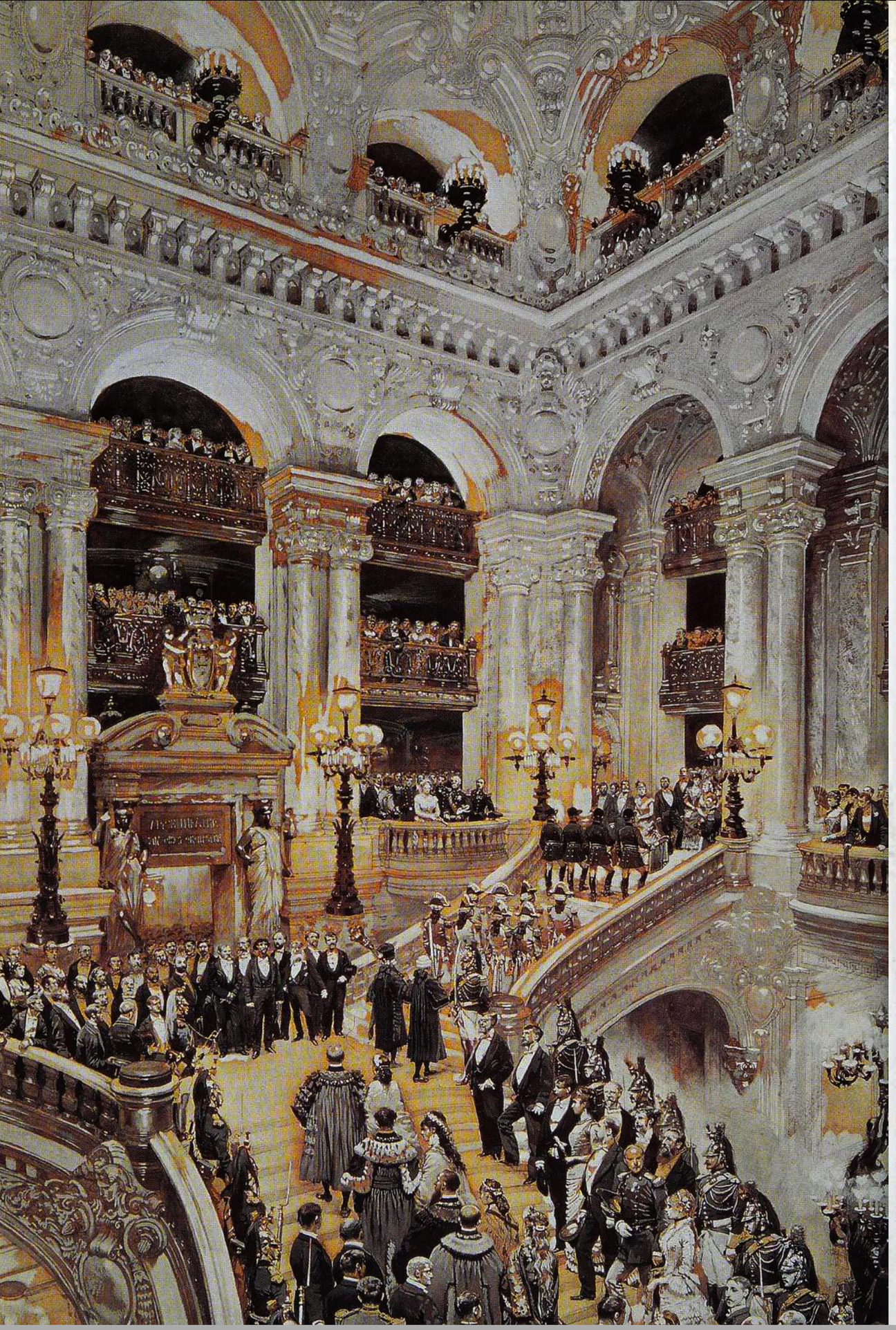
As the store expanded, its exterior took on the form of a veritable public monument [**116a**], its main entrance picked out from the commonplace façades of the rue de Sèvres by an elaborately decorated piling





up of motifs borrowed from the French Renaissance Revival launched a decade earlier by Visconti and Lefuel at the Louvre [**119**] and its corner rotunda adapting a motif much admired in Labrouste's design for the National Library (1859–68) to the brief of attracting customers. The entrances advanced subtly onto the pavement, hoping to ensnare window shoppers attracted by the broad display windows where architecture and merchandise collaborated in making the building a veritable advertisement for the world of goods within. Between 1872 and 1874 the interior was remodelled by Louis-Charles Boileau. He collaborated with the young engineering firm of Gustave Eiffel, whose experience in bridging the landscape with iron railway trusses was now enlisted in the conquest of the deep space of an urban block by new techniques of selling. In place of the open courtyards required to permit daylight into earlier interiors, the new building focused around three skylit atria [**116b**] and remained open at night thanks to a full complement of gas lighting. A swooping metal stairway seemed literally suspended in the space, providing not only ever-panoramic vistas of merchandise, but making the shoppers themselves an integral part of the spectacle of a new world of luxury. A rival department store, 'À la ville de Saint-Denis', offered the thrill of ascending a three-storey skylit atrium on Léon Edoux's hydraulic elevator, unveiled a few years earlier at the International Exhibition of 1867.

Boileau, son of the architect of St-Eugène [**111**], realized that the new material negated all he had learned at the École des Beaux-Arts of the proportions, shadows, and manipulation of mass of grand public architectural design. 'Either we concede that it is impossible to create a monument with metal, or such a monument being unable to withstand serious comparison with stone buildings we should avoid once and for all imitating stone and consider it from an entirely new point of view.'[41] Henceforth, he concluded, architects would compose with voids rather than solids. Whereas Classical and Gothic design alike were based on adjusting solids to sculpt forms in light, in the delicate gossamer of iron-frame construction light itself would become the subject, manipulated to create reflections, sparkling effects, and even luminous clarity, 'like one plays with the lights of a chandelier by cutting differently shaped crystals'.[42] Architecture and commerce had indeed formed a new alliance. The interiorized world of the department store was developed by the next generation of retailers to create ever more fantastic interiors, veritable parallel universes of abundance in which retailing and design explored the manipulation of human desires and fantasies even as the new science of human psychology began to explore the realm of subjective experience. Émile Zola's quip that the department store 'was the cathedral of commerce … made for a population of customers',[43] gained an air of reality in 1874 when the new 'Printemps' department store on Paris's Boulevard Haussmann opened its doors for business after being blessed by the curate of the Madeleine.



117 Éduard Detaille
Opening of the Paris Opera House, 1875

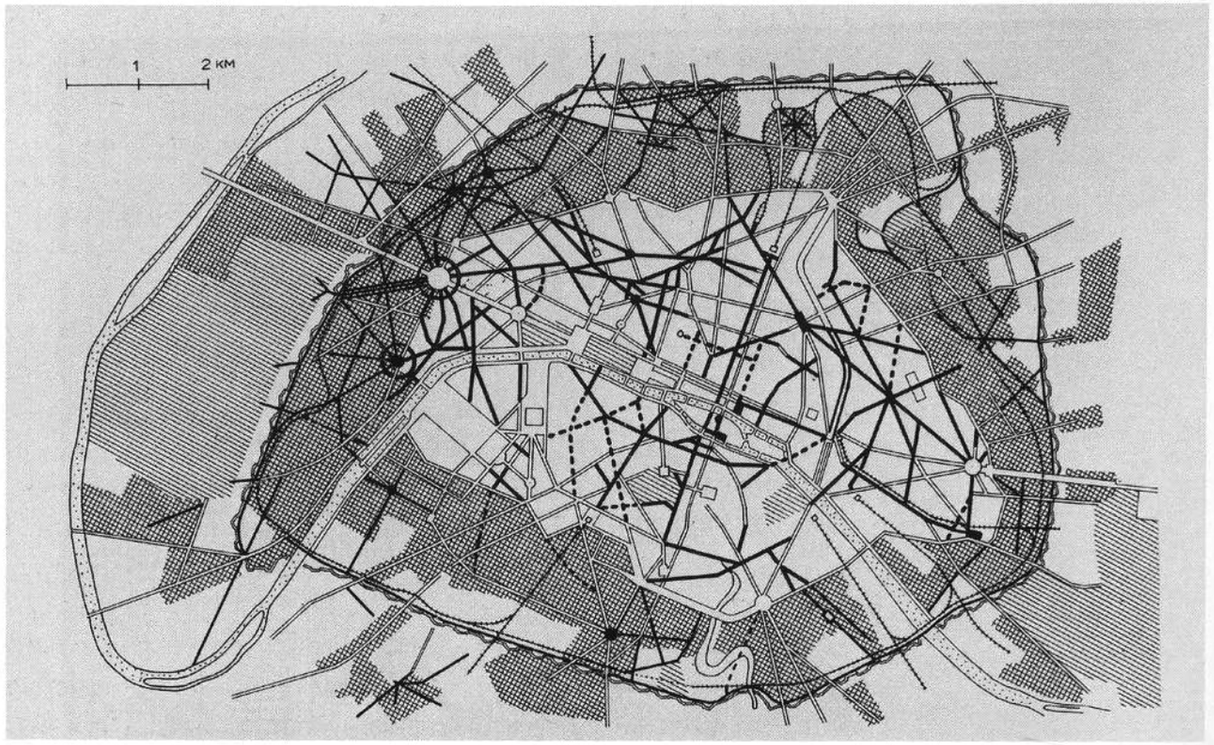
Despite the profusion of ornament and richness of colour, Garnier argued that the Opéra's stairhall was complete only when it served as the prop for the spectacle of a whole society coming together for a moment of intense interaction in the minutes preceding the performance on stage. Unfinished when the Second Empire fell, the building was inaugurated under the regime of President MacMahon. Garnier stands in the centre of the landing, framed by caryatids and receiving the presidential procession.

8 The City Transformed, 1848–90

> One of the effects of civilization (not to say one of the ingredients in it) … is, that the spectacle, and even the very idea of pain, is kept more and more out of the sight of those classes who enjoy in their fullness the benefits of civilization.
>
> John Stuart Mill, 'Civilisation' (1836)

It was not simply the machines in the Palace of Industry on the Champs-Elysées which offered a spectacle of progress in the summer of 1855; Paris itself was being refashioned by new technologies of machinery and capital [**118**]. Under powerful gas lights, over 3,000 worked around the clock to join the Louvre and Tuileries palaces—separated for nearly a century by a dense and decaying quarter—into a grand palace/museum complex centred on a public garden [**119**]. Napoleon I's show street, the rue de Rivoli [**63**], had taken form over decades. His nephew Napoleon III, along with his right-hand man, the Baron Georges Haussmann (1809–91), named Prefect of the Seine Département in June 1853, accelerated the process of reforming the city explored piecemeal by earlier governments. The scale of change introduced by the railway in the countryside in the 1840s was now unleashed on the city, which took a place in European consciousness as never before.

Determined to craft a showcase imperial capital, Haussmann and Napoleon III offered tax exemptions for 20 years to speculators in a bid to complete in time for the 1855 fair the great cross-axis that was to be the backbone for remodelling the city under the banners of circulation, health, and security. The arcaded rue de Rivoli would be subsumed in a great east–west axis bisecting Paris from the barracks at Courbevoie in the west to the Place de la Bastille, perennial centre of insurrection, in the east. The new Boulevard de Strasbourg (today's Boulevard de Sébastapol) would link the railway on the city's northern fringe via the Ile de la Cité to the Porte d'Orléans on the south, clearing some of the city's densest quarters in its projected path. These projects fell short of their deadline, but influential foreign visitors were treated to the spectacle of a city refashioning itself from the Hôtel du Louvre, the largest of a new breed of grand luxury hotels which embellished Europe's large



118

Plan of Haussmann's work in Paris, *c.*1853

The original map which Napoleon presented to the new Prefect of the Seine upon his appointment in June of 1853 is lost, but an 1867 map given by the emperor to the Prussian monarch William II provides the best evidence of the French emperor's own involvement in redrawing Paris's street network to enhance circulation of vehicles, goods, and ultimately capital in a modernized city.

cities as railway travel transported not only raw materials, finished products, and labourers, but a new breed of urban consumers, the tourists, across unprecedented distances. The hotel, designed by Alfred Armand, was a project of the Pereire brothers, bankers and land developers, who had launched their empire in the railway boom of the 1840s and snapped up most of the sites cleared by the state's expropriations along the rue de Rivoli at preferential prices. Like Napoleon III they were steeped in the Saint-Simonian ideology that remapping national territory and freeing up capital would not only modernize the country but promote the general good.

Returning for the second Parisian 'Universal Exposition' in 1867, visitors would be dazzled by the great elliptical building in which Frédéric Le Play had brought the bounty of the world under the control of an ingenious organizational scheme. Radial axes were devoted to different classes of manufactures, while the concentric rings of the great glass and iron structure hosted displays of individual countries, making taxonomic and national comparisons possible. The city, too, with new radial roads connecting railway stations to the commercial centre, gave the impression of being mastered by new standards of order, cleanliness, efficiency, and beauty. Over 165 kilometres of new streets—broad, straight, and furnished with pavements, drainage, gas lighting, and newly planted trees—were punctuated by monumental new churches, markets, and administrative buildings. With a six-fold increase in private construction, apartment houses of unprecedented refinement, of both exterior decorum and interior comfort, rapidly

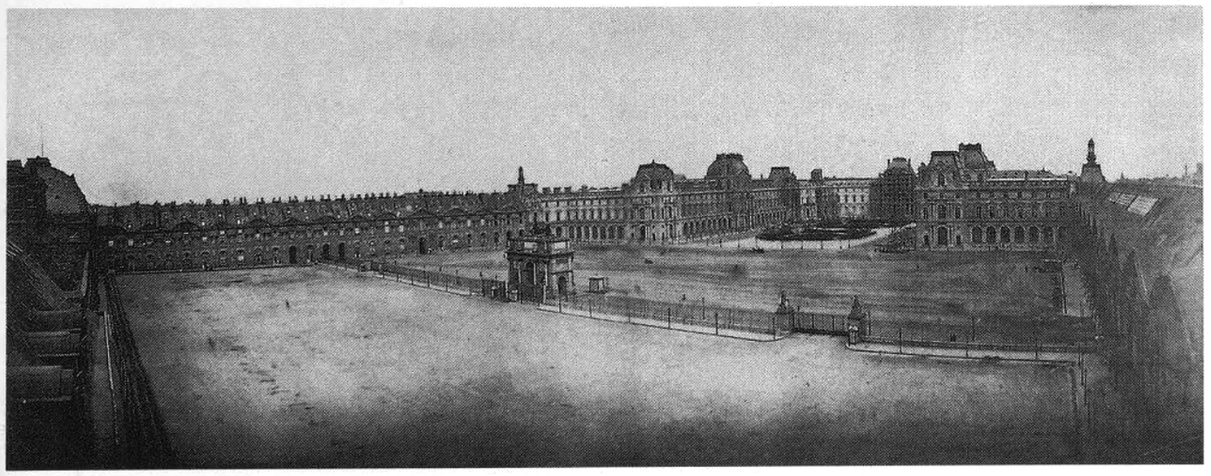
lined the boulevards. The city that reformers dreamed of a century earlier [**20**] now breathed an air of progress so complete that even the municipal sewers were open for tours in specially designed wagons. The working classes had been largely chased from the centre, and thus from middle-class view, by escalating rents. It is estimated that over 350,000 Parisians were displaced in only 18 years.

By the time the Second Empire fell in 1870, nearly every major European capital—and many other cities which had swelled with industrialization and migrations from the countryside set in motion by railway networks—was being 'modernized' in rivalrous emulation. When the 1873 Universal Exhibition moved the spectacle of progress to Vienna, the Austrian capital was ready. The transformation of the old line of fortifications into a broad annular boulevard, the Ringstrasse, offered a model for other cities whose walls, effectively already breached by trains, were now to fall to the forces of development that the railway had unleashed. Increasing ten-fold the land area of Barcelona with a planned extension of gridded blocks, Ildefonso Cerdá coined the term 'urbanism' and authored the two-volume *General Theory of Urbanization* (1867), the first book to offer a body of theory, rather than simply a checklist of tasks, for designing cities. Cerdá's book had little influence outside his native Spain, however; the theory of nineteenth-century city building was encoded more in the language of contracts, bonds, and financial instruments that were the machines of the century's credit revolution. Alongside these invisible inventions, France's determination to remain a model of refinement—announced in the juxtaposition of fine arts and industry at the 1855 fair—succeeded so well that the image of the Parisian street and its architecture, both the grandiose buildings of state and the private architecture of the bourgeois apartment, joined the ranks of the city's luxury exports. By 1900 the prestige of French urbanity was international, imitated perhaps with even greater conviction in Bucharest or Buenos Aires, for instance, than among France's western European neighbours, as the École des

119 Eduard Baldus

The Louvre and Tuileries united, *c.*1855

Paris's transformation into a showplace of urban spatial order was circulated widely by the new technology of photography. At the Louvre the photographer Baldus was charged with recording the construction and photographing hundreds of plaster models considered for the rich sculptural decoration of this palace/museum complex which would celebrate Napoleon III's regime as a high point in the forward march of French culture.



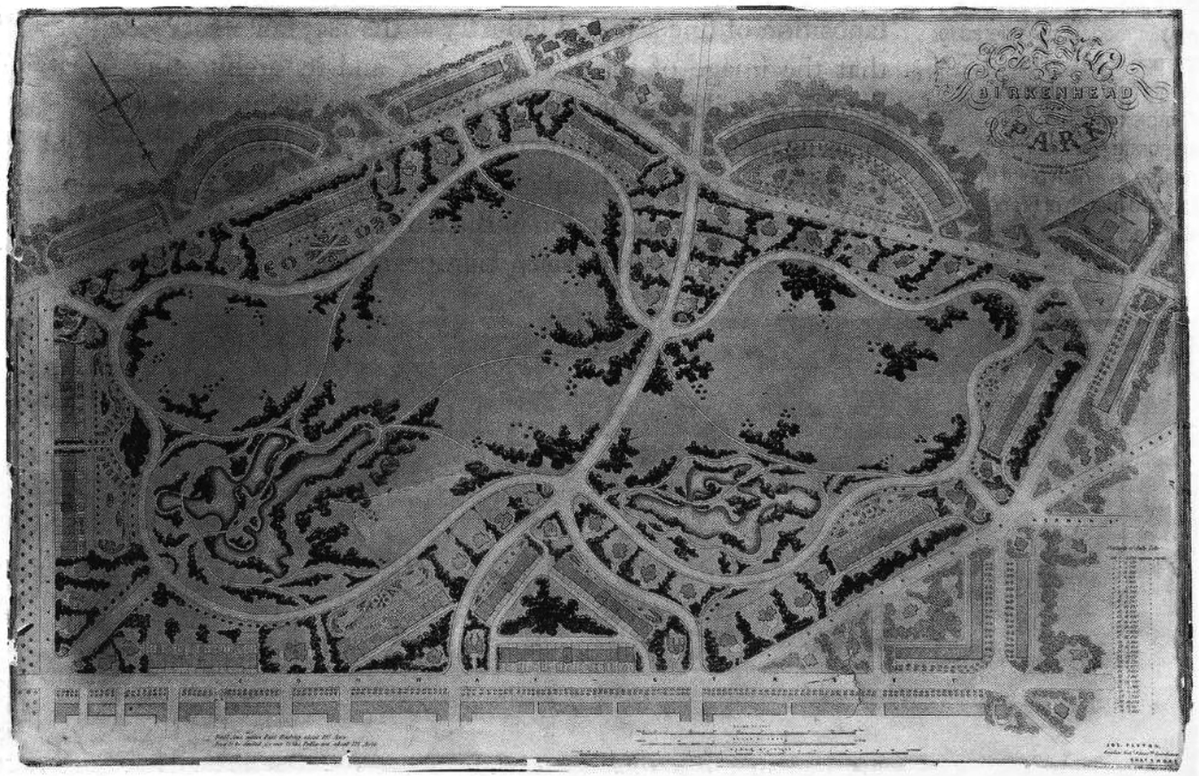
120 Paxton
Birkenhead Park near Liverpool, 1844
Paxton's device of separate paths for pedestrians and carriages which never cross was refined in Olmsted and Vaux's design for New York's Central Park a few years later. The juxtaposition of open lawns for recreation with artfully composed horticulture was a starting-point for the picturesque style systematized by Alphand in Paris for green spaces on every scale from the vast peripheral parks to the design of planted city squares.

Beaux-Arts welcomed an ever greater flood of foreign students into its architectural ateliers.

Urban reform before Haussmann

Like the eclectic architectural imagery of Paris's new skyline, little in the formal repertoire of 'Haussmannism' was unprecedented, beyond the scale and breathtaking speed of the operation. Harmoniously ordered frontages of private dwellings forming geometrically aligned streets focused on a free-standing monument had been an ideal since the mid-eighteenth century [**19, 20, 61, 63**]. Parks as urban lungs and places for the moral improvement and distraction of the working classes from potential social unrest were lessons imbibed during Louis Napoleon's exile in London in the 1840s and imported to France in the wake of the 1848 Revolution. What was new was the sense that an urban whole, and with it a powerfully consistent visual form, could be infused into a city, with overlapping and well-functioning systems of circulation, leisure, and even sanitation. In the wake of the declaration of 1841 that the French rail system should rapidly connect Paris to all French borders, Paris was to be transformed by a network of streets, radiating from a series of *rond-points*, that would connect the ring of new railway stations to the centre and after 1860 integrate the annexed ring of industrializing villages around the city.

'Government is not a necessary ulcer', the future emperor declared in campaigning for election as President of the Republic in 1848. 'It is

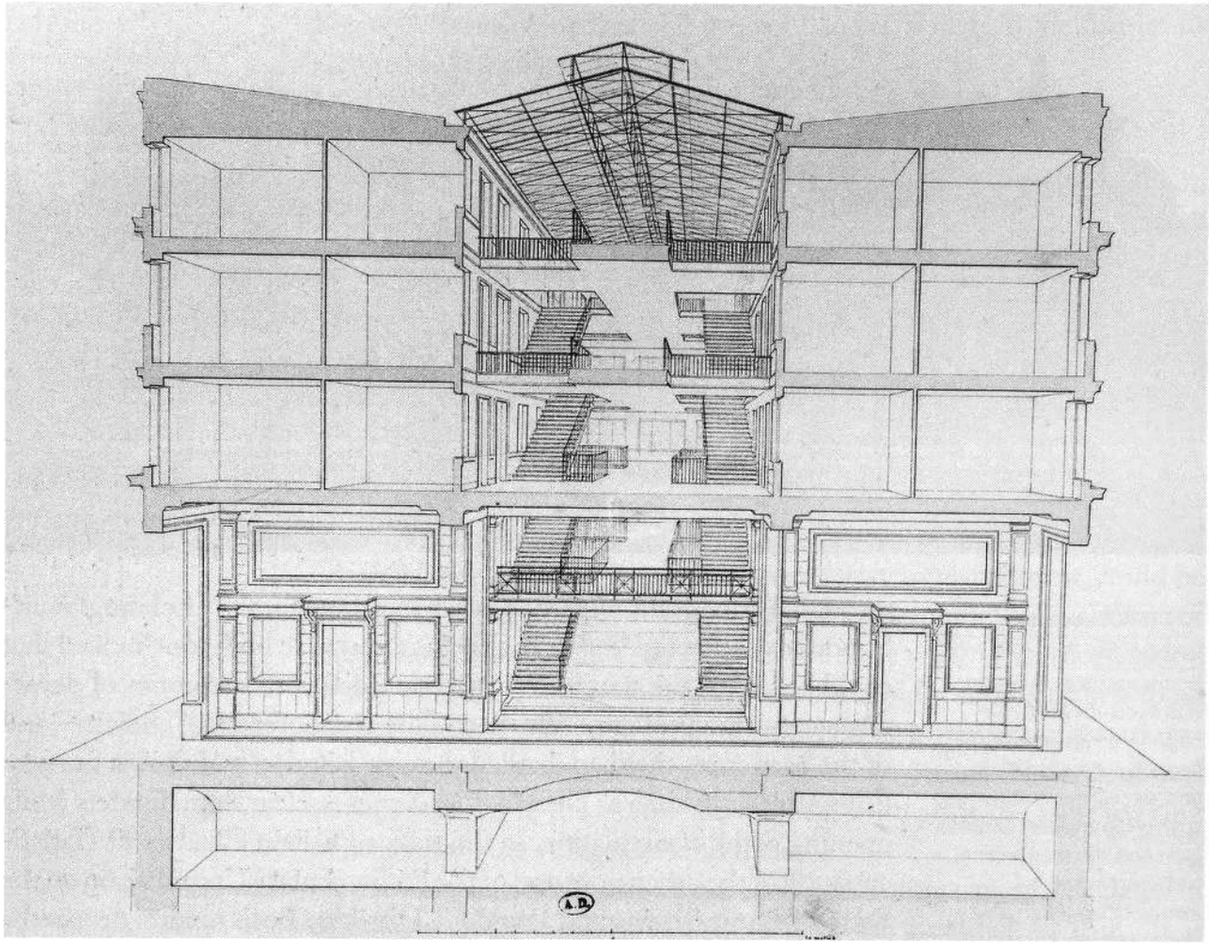




121 F.-A. Duquesny
Gare de l'Est, Paris, 1847–52
Duquesny's station design, with its combination of a masonry pediment and an enormous glass lunette announcing the round arched span of the engineer Sérinet's glass and iron shed behind, was a very influential interpretation of the railway station as a modern portal to the city. The monumental scale of the lunette was intended to dominate a major axial boulevard connecting the station to the heart of the city.

rather the beneficent motive of every social organism.'[1] Echoing Saint-Simonian understanding of the city as a veritable body, one indeed that could be cured, the statement also resounded with memories of devastating epidemics—19,000 had died in the 1848 outbreak of cholera—and of the barricades that had divided the city. London had shown the way, using street cuts such as New Oxford Street to clear slum districts while opening paths of circulation, in the wake of Edwin Chadwick's statistical study of the urban poor and of the Parliamentary Commission on the State of Large Towns and Populous Districts. Both reports declared a correlation between the health, and the morals, of the working classes and the physical environment of overcrowded speculative housing and insanitary streets. Legislation mandated minimum standards for dwellings in terms of sanitation, drainage, and ventilation, set up medical inspections, and launched campaigns of building urban sewers. Chadwick campaigned for public parks, while Engels's descriptions of the working-class slums of Manchester, soon seconded by the social realist literature of Dickens and others, made it impossible for the middle classes to ignore living conditions in working class-districts, even if their daily paths skirted direct confrontation with 'the other half'. In 1842 laws were passed allowing compulsory expropriation of unhealthy dwellings in the name of the greater public good. Two years later the municipality of Liverpool charged Paxton with laying out a spacious park in the working-class suburb of Birkenhead. On the site of a drained swamp, and bordered by houses, this adaptation of English picturesque gardens to public welfare was a direct response to the faith that nature was essential to urban health and a morally uplifting agent, a worthy rival in short to the temptations of the pub or the barricades [**120**].

In France the opening wedge for large-scale intervention in shaping cities was expropriation laws passed to facilitate laying out the railway, even if rail companies' desires to penetrate to the heart of the city were



122 Gabriel Veugny
Cité Napoléon, Paris, 1849–53

The architect Veugny's design for sanitary workers' dwellings, sponsored directly by Louis Napoleon soon after his election in December 1848, was the first adaptation of the utopian socialist ideals of a phalanstry [**83**] to an existing city. Its use of glass and iron skylights to create an interior street was innovative. Critics of the regime claimed it put the workers in barracks, viewed by some as potentially explosive, by others as disingenuously philanthropic.

stopped short at the edge of the historic centres [**121**]. In the 1840s the prefect Rambuteau responded to a debate over whether or not the government should intervene to arrest the westward migration of Paris's commercial and financial centre. Since the mid-eighteenth century the quagmire of narrow streets in the central market district, Les Halles, had been discussed as the city's most pressing need [see **18**]. Now the question was posed in larger political terms. Should the state or the speculative market—and these were years in which economists such as Jean-Baptiste Say were extolling Adam Smith's ideas of a free market as a democratic and natural value—determine the form and destiny of the city? Rambuteau launched a policy of using street improvements as an instrument of the state's remodelling of urban space and its self-conscious channelling of private development. The street that today bears his name was the forerunner of Haussmann's work a decade later, although by comparison with Second Empire boulevards it seems timid in width and length. Not only did the rue Rambuteau markedly improve access to Les Halles, it was the first street in Paris to be festively inaugurated and to sport an inscribed cornerstone—a symbolic threshold of the triumph of ordered open space created by the central power over the marketplace's desire to build urban fabric to the maximum.

During the short-lived Second Republic, Louis Napoleon pursued a two-pronged policy of government-built workers' dwellings and legal and financial incentives to jump-start luxury real estate. The Cité Napoléon [**122**], intended as a prototype for public housing in each of Paris's administrative districts, offered a startlingly original prototype in which glass and iron skylights maximized air and light, even while iron gates, locked each evening, betrayed an overarching concern with reducing the threat of social unrest. But like the contemporary 'Model House for Families' in London, designed by Henry Roberts for the Society for Improving the Conditions of the Labouring Classes, supported by Prince Albert, it remained an isolated experiment. Until the twentieth century 'improved slum dwellings'—as they were called in Britain—would be the province of paternalistic entrepreneurs such as Sir Titus Salt at Saltaire near Bradford in Yorkshire (1851–76), the Krupps manufactory near Essen (1863–75), or the Meunier Chocolate Company at Noisel outside Paris (*c.*1874). After the declaration of the Empire in December 1852 and the dismissal months later of Berger, Haussmann's predecessor, for opposing debt-financed public works, Napoleon III and his advisers put their energies fully into crafting an alliance between the state and specially formed private land-holding and development companies. On the model of the Pereire brothers' company, formed to extend the rue de Rivoli, in which the state's and financiers' interests were mutually served by finely built ashlar masonry apartment houses, transformation was soon under way in the dense cores of Lyon, Marseille, and other provincial cities as well as Paris [**123**].

123 Adolphe Terris
(photographer)
Creation of the rue Impériale in Marseille

As cities throughout France were remodelled on the model of Haussmann's Paris, the works involved a massive reworking of the terrain. In Marseille a whole hill was levelled to create a broad and swift link between new steamship ports and the commercial centre of the city.

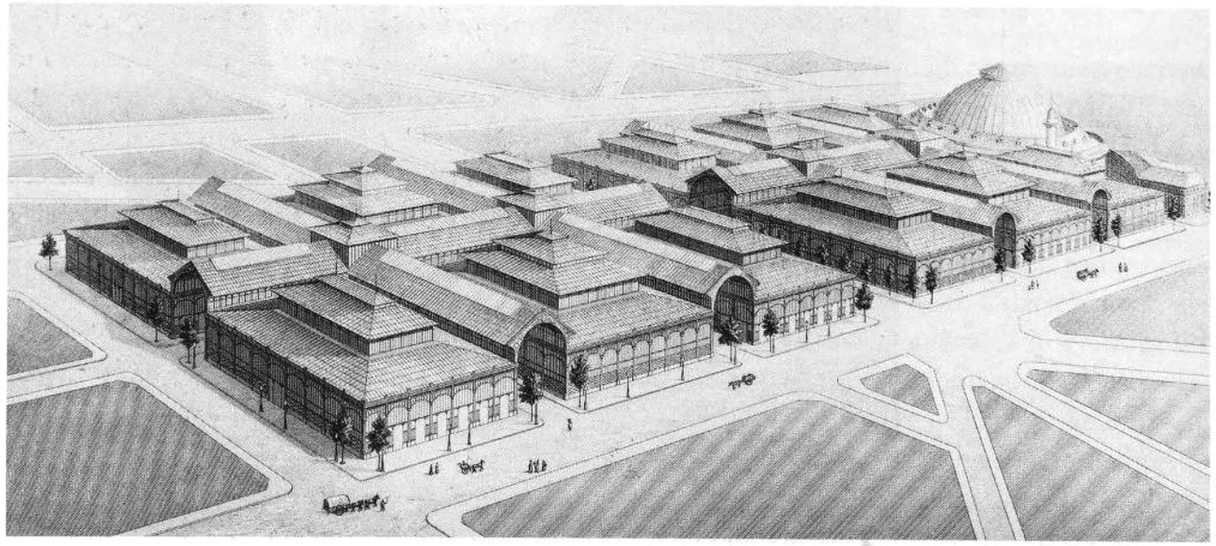


Launched under the banner of creating jobs—by the late 1850s one in five Parisians were working in the building trades—the system of floating loans against future increases in the value of improved land made Haussmann's works a veritable self-financing system of public works. In the 1860s, when liberal and legitimist opponents of the regime questioned the legality of these operations and the legislature annulled the state's right to retain the unredeveloped portions of expropriated properties, Napoleon III's advisers replied that the 'movement of capital ... must be considered as the principal cause of the progress of public wealth in Paris'.[2] But critics had begun to link mushrooming shanty towns on the city's edge with the transformation of the centre of Paris into an elegant backdrop for the very moneyed classes who profited dramatically from urban transformation.

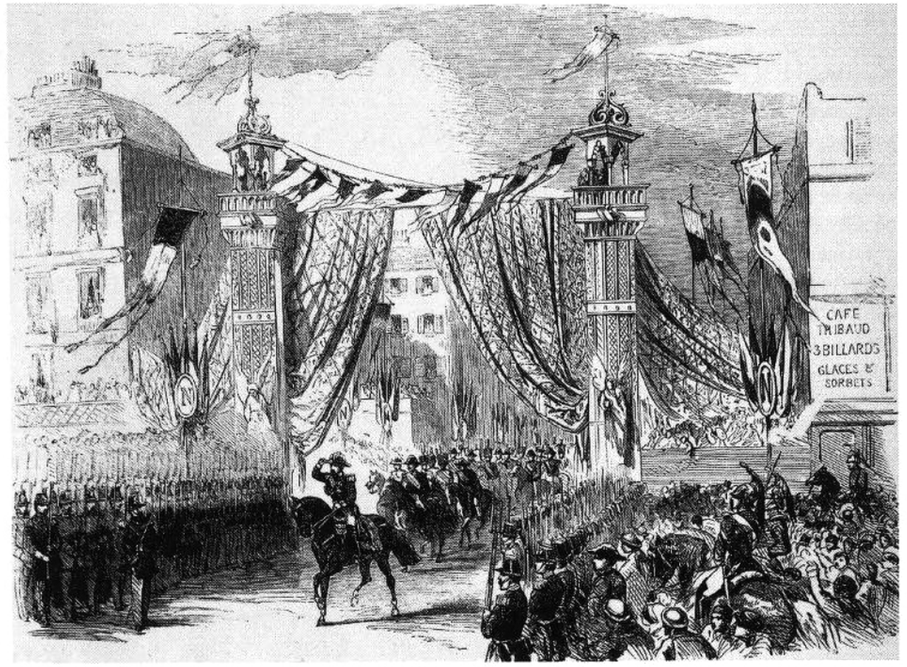
Remodelling Paris: the markets and the Rivoli–Strasbourg cross-axis

Napoleon III anticipated many of these criticisms. Even before the curtain was raised on the first of the boulevards that made movement a part of the urban aesthetic for the first time, the emperor demanded that work on the central markets be given priority over all the other new public buildings he hoped would leave the imprint of his regime on the cityscape [**124, 125**]. The 'Louvre of the People', as he called his vast rationalization of Paris's food supply, was the only major state project completed in time for the 1855 exhibition. In place of the labyrinth of outdoor markets in twisting streets little changed since the Middle Ages, Victor Baltard created a rationalized city within the city. Eight rectangular pavilions of glass and iron, maximizing ventilation and sanitation, were organized around a grid of broad covered streets, providing easy access for carts and pedestrians. Vaulted undercrofts were even provided in hopes of a connection to the main-line railway stations and thus to a national network of goods. The whole was marvelled at by contemporaries; Zola even celebrated the newly ordered spectacle of abundance in his novel *Le Ventre de Paris*.

124 Victor Baltard
Les Halles, Paris, 1852–55
The new markets hummed with efficiency and order, their gridded internal streets poised as a model for the reshaping of the city beyond. Their frank industrial vocabulary provided a new model for utilitarian building in cities throughout Europe and for countless provincial markets in smaller French cities.



125
Unveiling of the Boulevard de Strasbourg, 1858 (today Sébastopol)
Haussmann later admitted that the path of the boulevard had not been determined solely by the axis of the Gare de l'Est, which it connected to the Ile de la Cité over two miles away: 'It was to tear open Old Paris, the district of the riots and barricades, by a wide, central thoroughfare which would pierce this almost impenetrable labyrinth from one side to the other.'

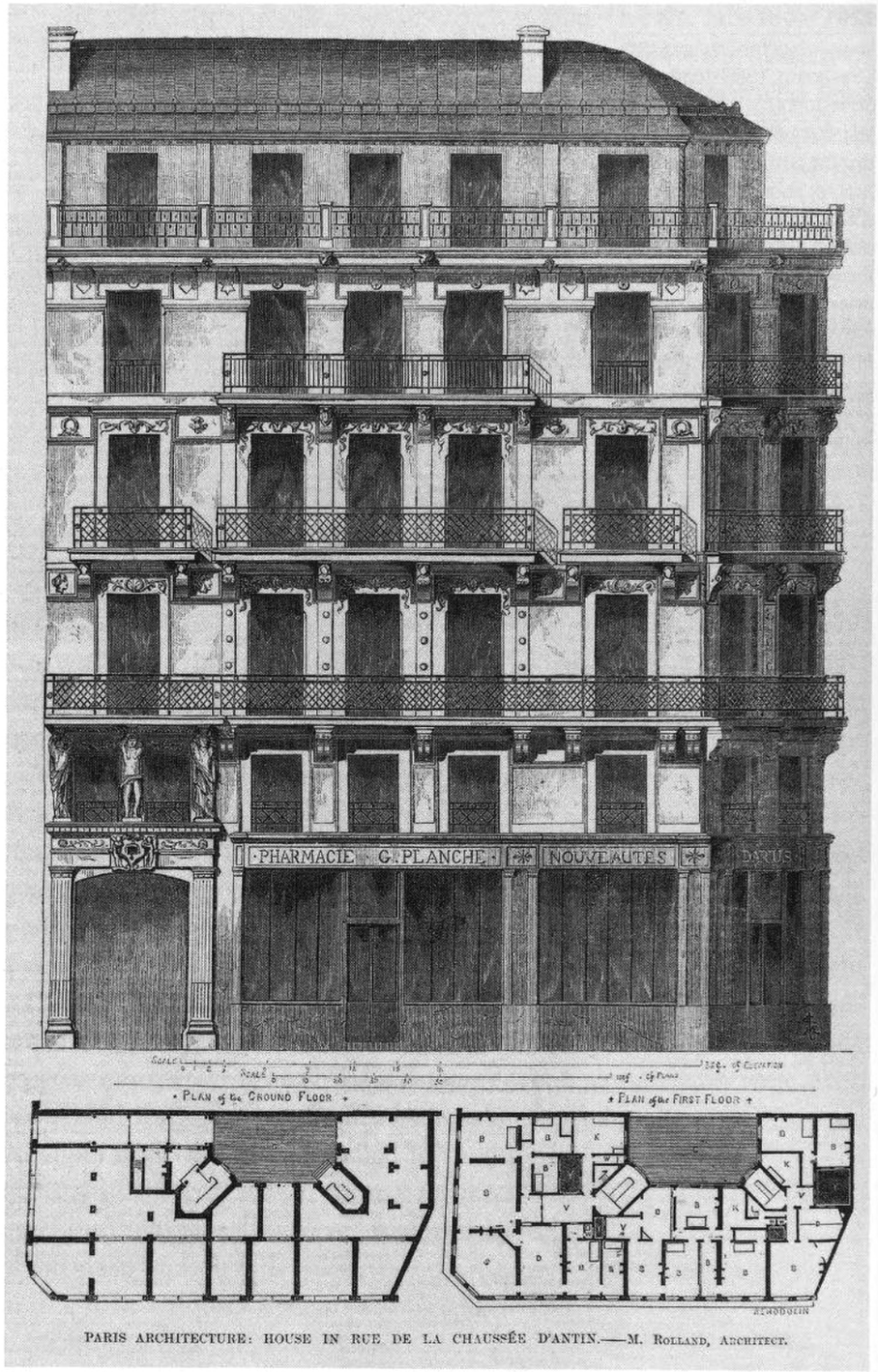


The Second Empire created not only a new alliance between the state and the market in crafting urban space and fostering an understanding of land itself as a commodity; it also negotiated a subtle hierarchy between the great monuments of the state and the residential fabric. Three years after Les Halles was completed, the façades of the Boulevard de Strasbourg (now Sébastopol) were unveiled [**125**] in a ceremony celebrating the dynamism of the private market in creating a harmonious backdrop to public monuments. The simplest legal guidelines governed the relation of façade height to the broad new street, the alignment of balconies, the set-back angle of the mansard roofs, and the use of fine stone on the principal façade [**126**]. These ensured that the work of numerous independent builders would yield those grand sweeping perspectives that endow even the least accomplished of the Second Empire's public buildings with a dramatic monumental presence. When one looks north on the Boulevard de Sébastopol, the trees shading the pavements provide a leafy frame to the vista of the Gare de l'Est, while to the south an even more theatrical view is staged. Unable to align the boulevard with a bridge across the Seine, Haussmann ordered the architect A.-W.-N Bailly, a pupil of Duban, to shift off-centre the crowning dome of his projected Tribunal de Commerce (1858–64) on the Ile de la Cité so that it might serve as a terminus to the vista which greets visitors alighting at the Gare de l'Est some two miles away. Nearly all the major monuments commissioned by the state would be shaped by such scenographic imperatives. At the head of the

126

Apartment house, rue de la Chaussée d'Antin, *c.*1855

Apartment-house living had been pioneered in Paris in the eighteenth century, but under the Second Empire it became the building-block of a new urban fabric. The ground floor was let to shops, while the apartments were arranged to give even multiple dwellings some of the allure of grand living, from the monumentally scaled *porte-cochère* to the contrivance of principal rooms *en suite* along the street façade.



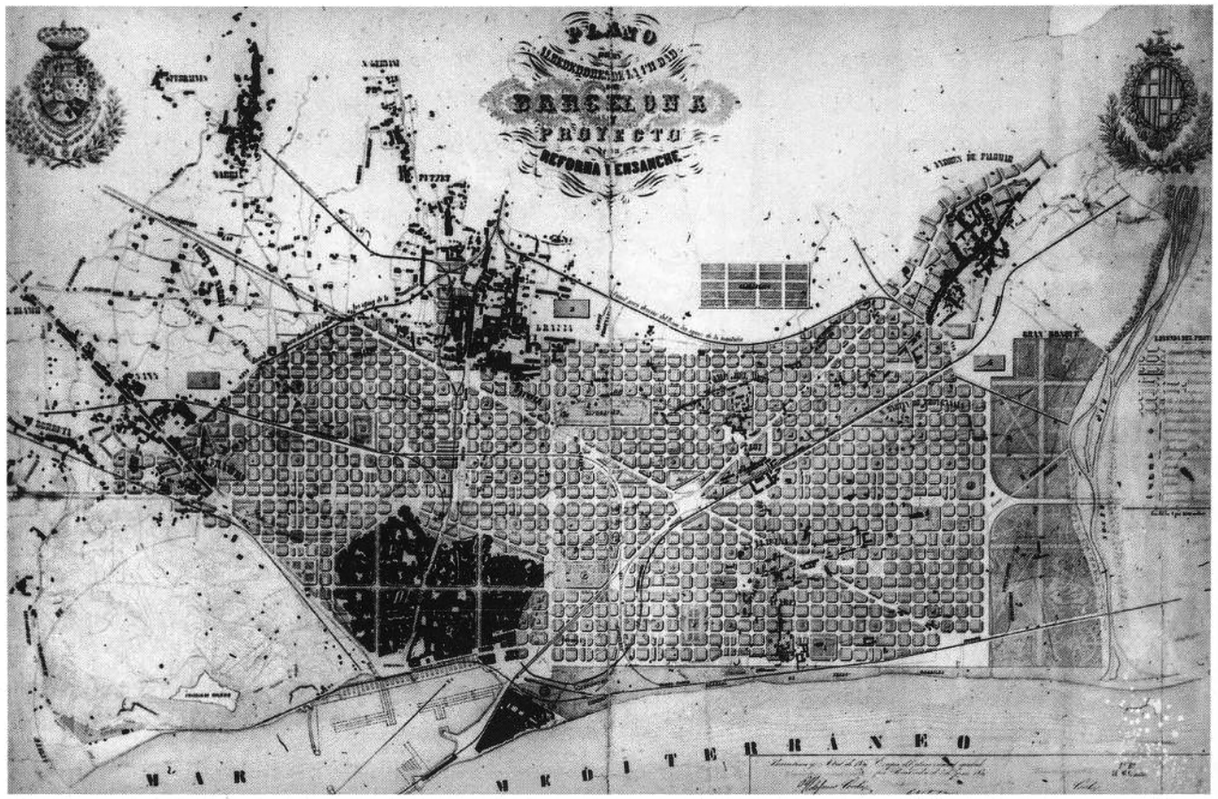
PARIS ARCHITECTURE: HOUSE IN RUE DE LA CHAUSSÉE D'ANTIN.—M. ROLLAND, ARCHITECT.

Boulevard de Magenta, Baltard exploited iron to maximize interior space on one of the awkward polygonal building sites traced by Haussmann's street network. The iron framework of the church of St-Augustin (1860–71) is draped with a thin masonry envelope and supports a monumental dome scaled to the urban vista rather than to this parish church for the luxury quarters developing in the city's north-west. Gabriel Davioud's exuberant monumental fountain on the Place St-Michel (1858–60) was calculated to close the vista on the Boulevard du Palais which crosses the Ile de la Cité and to mask the angled departure of the Boulevard St-Michel, the left bank's grand new thoroughfare. The Boulevard St-Michel in turn was traced to align with a view of the newly recreated flèche of the Sainte-Chapelle. The Paris of postcards was emerging even as photography for the first time became inexpensive enough to compete on the souvenir market. A quip made a century earlier by Voltaire, that Paris would appear a grand city only once its historic monuments had been excavated from haphazard urban fabric, now guided the work of 'liberating' monuments from fabric as history came to reside in the monument, not the texture of the city. With the finishing touches of Alphand's carefully calibrated system of urban 'promenades'—a linked system of greenery on every scale, from single trees planted in traffic islands where boulevards cross to the replacement of the long straight paths of the Bois de Boulogne, a former hunting domain, with a picturesque pleasure-ground—Paris presented the image of the city as a scenic event, background, and destination for an expanding leisured class. Alphand's publication *The Promenades of Paris* (1867–73) detailed the inventions that made this possible, including special machines for transplanting mature trees, and provided models widely followed. It was the only text that set down something approaching a theory of Haussmannization.

Garnier's Opéra

The scenographic masterpiece of Haussmann's Paris, the luxury quarter of hotels, shops, clubs, and banks developed around the new Opéra (1862–75), was completed only after the curtain had fallen on the Second Empire at Sedan, the decisive battle of the Franco-Prussian War. Although Napoleon III would never appear in this building, calculated as a backdrop to his court, Charles Garnier (1825–98) orchestrated a microcosm of the values of an ascendant urban bourgeoisie that had come into its own during his reign [**117, 127**]. In 1869 Haussmann had been chased from the scene by the outcry over what Jules Ferry labelled 'Les Comtes Fantastiques d'Haussmann', a play both on the dual meaning of 'Comtes' in French—stories and accounts—and on Offenbach's popular opera *Contes d'Hoffmann* (*Tales of Hoffmann*).[3] Yet nothing testifies more to the durability of Haussmann's urban system than the harmonious relations—of scale, materials, and architectural language—of the urban archipelago of apartment, office, and hotel blocks, and the monumentally composed Beaux-Arts island of Garnier's Opéra. It was a model of urbanity imitated as much for its forms as its finances, a system ultimately eclipsed only after the First World War.

There is a fascinating counterpoint between the Opéra and the urban fabric, much of which was planned before Garnier's project was selected in 1861 in a particularly contested public competition. The sur-



133 Ildefonso Cerdá
Ensanche of Barcelona, plan as adopted in 1860
Cerdá conceived of all streets as part of an endless communication system, insisting that all be straight and equally wide. Individual residential quarters were to be the same throughout the city, not only to accommodate all social classes but to forge a model of a city of infinite expandability.

study cities to that moment, declaring that 'the application of steam as a locomotive force marked for humanity the end of one era and the beginning of another'. He returned to Spain with the writings of Léonce and Jean Reynaud, former Saint-Simonians who postulated that the railway would promote the abolition of artificial boundaries, restructuring spatial relations in terms of networks of time and exchanges of goods, and of the anarchist philosopher Pierre-Joseph Proudhon, who had pronounced private property to be 'theft' when it was held by those who did not work.[12]

Barcelona's port was booming with the arrival of the first commercial steam-ships even as the city's population had more than doubled in a century within its walls. Cerdá joined his voice to growing popular demand for demolishing the fortifications, whose only defenders by mid-century were property-owners enjoying escalating rents on scarce urban land. The social uprisings of July 1854 provided the final impetus to convince the city fathers, who ordered the walls to be demolished and agreed to organize a competition to solicit plans for city expansion and beautification. Launched in 1858, but a few months after the announcement of Vienna's Ringstrasse competition, the Barcelona plan attracted little attention outside Spain. But from the first the programme, as well as the proposed projects, was far more radical in responding to the request that the city be allowed to expand to its natural topographical boundaries. Rather than designing an ideal urban quarter of monuments, contestants were invited to consider how planning

might be conceived as a process to last several generations. Cerdá did not enter the competition, but his lobbying in Madrid in favour of ideas he had long been formulating for his native Catalonia as a critique of what he viewed as the entrenched conservatism of local property-owners found support. His plan was adopted in 1860.

On lengthy visits to Paris between 1856 and 1858 Cerdá examined Haussmann's work with the same statistical completeness he had already applied to diagnosing Barcelona's ills, measuring street and pavement widths, noting distances between benches, trees, and even urinals. But although he was to be an advocate of an ideally dimensioned grid of spaces and services in the modern city, he insisted that a plan divorced of a social calculus could never serve more than the interests of a narrow class. 'No-one had even considered the question of providing comfortable accommodation for the great number of families who would be mercilessly evicted,' he complained of Haussmann's work, advocating in turn that planning a city must comprise both streets and houses.[13] 'The family house is an elementary city,' he noted, insisting that neither could be abandoned to the uncontrolled speculative market.[14] Cerdá imagined the city as an organism whose dynamic growth must be mastered rather than as an ideal form to be composed. Speaking of the city as Viollet-le-Duc was in those same years speaking of buildings, Cerdá introduced his *General Theory of Urbanization* with a promise: 'more than the materiality, I want to speak of the organism, the life, I should say, which animates the material city's material parts'.[15] Like any organism, a city is a constant interchange between principles of movement and stasis, terms that came both from his training in mechanical engineering and his readings in French positivist theory. Discussing the great square that Barcelona's city administration thought should serve as the link between the old town and the newly laid-out quarters, Cerdá proposed instead a grand railway station linking all lines at a single nodal point—a critique of the circle of individual stations that ringed Paris, London, and Vienna by the 1860s. Reflecting Jean Reynaud's idea of the city as a nodal point on a territorial grid, formulated in the Saint-Simonian *Encyclopédie Nouvelle* as early as the 1840s, the modern city would be a place of interchange in a world dissolved of borders and walls. At counterpoint to the streets as transportation corridors was the careful design of districts. With all blocks chamfered, the intersections of streets in Barcelona's plans provide places of assembly which Cerdá imagined as the community squares of the modern large city. In some places several blocks could be combined to form large public gardens—a correction of the grid introduced in these same years in the creation of Central Park in New York—but Cerdá's proposal was even more radical in that he proposed that each block be built on only two sides and then only with rows of houses no more than 24 metres (99 ft) deep; all the remaining area was to be developed as gardens, parks, or open space. The

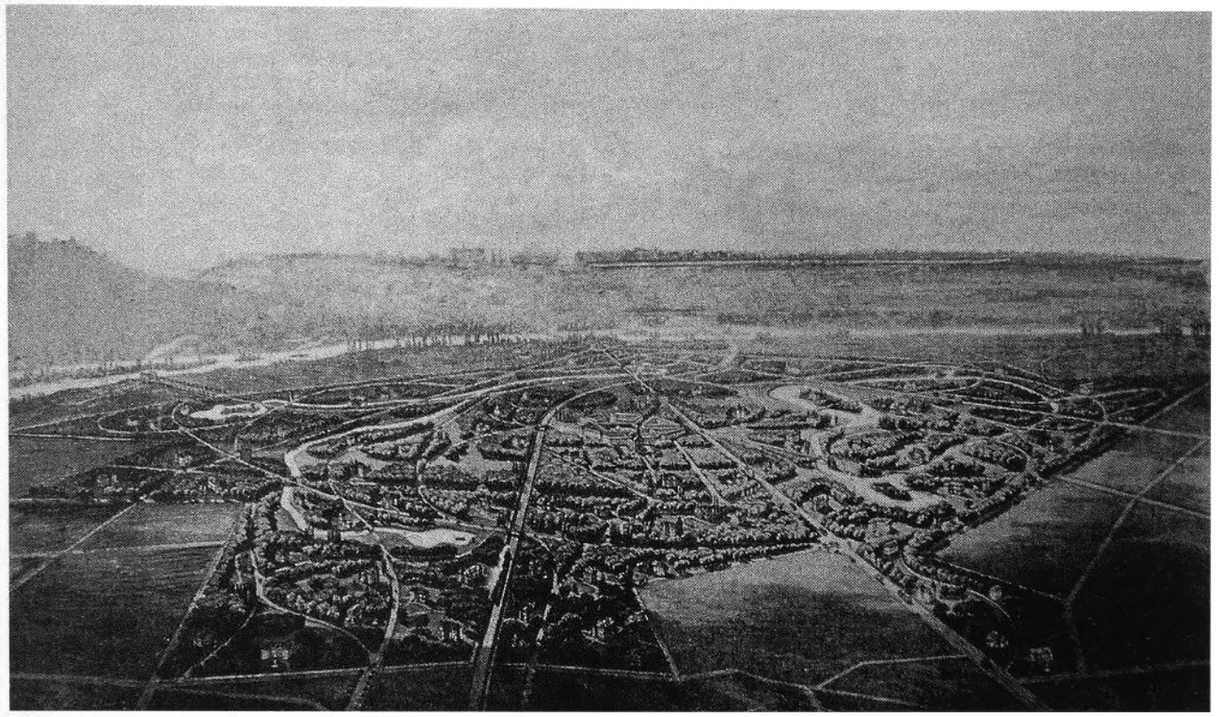
two rows could either be parallel or set at right angles, varied to create different patterns, introduce hierarchies of neighbourhoods, and create localized focal points around schools, churches, and market halls. In some cases, up to eight blocks might be combined to accommodate industry; but Cerdá condoned no radical separation of zones of work and living, as in the industrializing cities he had visited in France and England. While the formal aspects of Cerdá's plan served as models for other Spanish city 'expansions', including those of Madrid, Bilbao, and San Sebastian, even in Barcelona the market ultimately triumphed. City blocks were densely filled with apartment houses, mansions, and even blocks of flats for workers, all of which are closer to large-scale blocks of late nineteenth-century Berlin or Vienna than the controlled garden metropolis envisioned by Cerdá. By the time of his death in 1876 Cerdá was at work on a synthesis of his earlier theories of 'urbanization' and 'ruralization' into a global theory of national spatial planning, a veritable colonization of Spain's interior. This work served as a point of departure for the Madrid architect Arturo Soria y Mata's 1884 prototype of a linear city in which the new technologies of tram and train travel organized urban space in a model freed of traditional images of city form.

The rise of suburbs

In 1858 a 436-hectare site on the main route west from Paris to St-Germain was developed as a planned suburb, a veritable haven of domestic life from which most forms of trade and industry were banned. In emulation of the suburbs proliferating on the railway lines out of London, Le Vésinet [**134**] was a verdant nodal point on Paris's emerging suburban rail network. Around a small gridded 'village centre' with

The English suburb

The separation of middle-class residence from the commercial urban core was already characteristic of London's western and northern growth in the eighteenth century, but it was only in the nineteenth century that the suburb became associated with the aesthetic of free-standing buildings. J. C. Loudon became the most vociferous advocate of individual 'villas' of the type pioneered by Nash in the Park Villages [**62**] and Loudon's own 'semi-detached' villa at Porchester Terrace, Bayswater (1823–5), publishing numerous articles and handbooks, notably his widely used *The Suburban Gardener and Villa Companion* (1836–38). This appeared at the same time as the first railway lines out of central London began transforming patterns of the daily commute to work. Loudon believed that suburban life could accommodate both responsible citizenship and the crafting of a private universe set in the illusion of open nature. As Dyos and Reeder noted, 'the middle-class suburb was an ecological marvel. It gave access to the cheapest land … to those having most security of employment and leisure to afford the time and money spent travelling; it offered an arena for the manipulation of social distinctions … to those most adept at turning them into shapes on the ground …' ('Slums and Suburbs', in H. J. Dyos and Michael Wolff (eds), *The Victorian City: Images and Realities*, vol. 2, London, 1973, p. 369).



134
Panoramic view of the projected suburb at Le Vésinet, 1858

Minutes from St-Lazare railway station and all the modern urban functions around the Opéra, the nineteenth-century suburb was the dialectical opposite of the rationally planned city, set in a contrived nature which even obscured the boundaries of individual properties, although here houses sought a diversity in style and personality quite distinct from the anonymity of the Parisian apartment house.

church, market, and post office, ample house plots were laid out on curvilinear streets and set in picturesque landscape developed to create the illusion of living in ample countryside even while discreet hedges and garden walls denoted property lines. The first houses borrowed their imagery and forms from the French rural vernacular, especially the half-timbered Norman cottage destined for a long career in suburbs and seaside resorts, notably at Arcachon on the Atlantic coast, developed by the Pereire brothers in conjunction with new railway lines. The ideal of the suburb, pioneered by John Nash and others on the edge of London [**62**] around 1820, had its first heyday in direct connection with the dispersal and specialization of space made possible by new modes of transport. 'Villa quarters' rose on the fringes of nearly every European city, in particular in Germany where walls were progressively dismantled, as the setting of home life was increasingly distinguished from sectors of the city given over to the burgeoning world of the office, of places of entertainment, and of department stores—located on omnibus routes and near main-line stations—which drew customers from the city and beyond. New architectural types and the new distribution of urban activities went hand in hand in the nineteenth century.

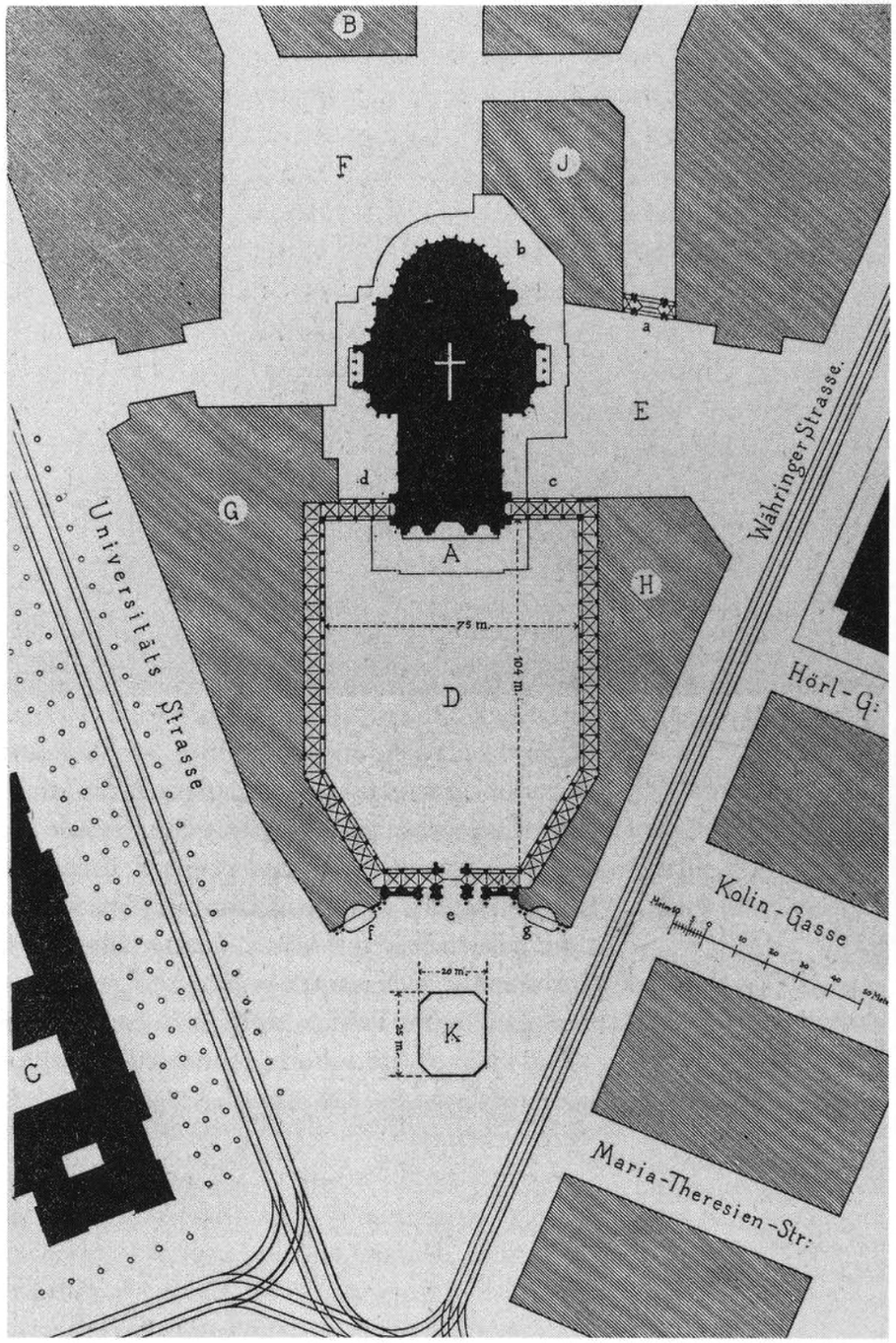
Critics and the planned city

City modernization was codified as a 'science' in influential manuals by Reinhard Baumeister (*City Expansion in its Technical, Legal and Economic Aspects*, 1876) and Josef Stübben (*City Planning*, 1890), whose winning project in the 1880 competition to replan Cologne's former

135 Camillo Sitte

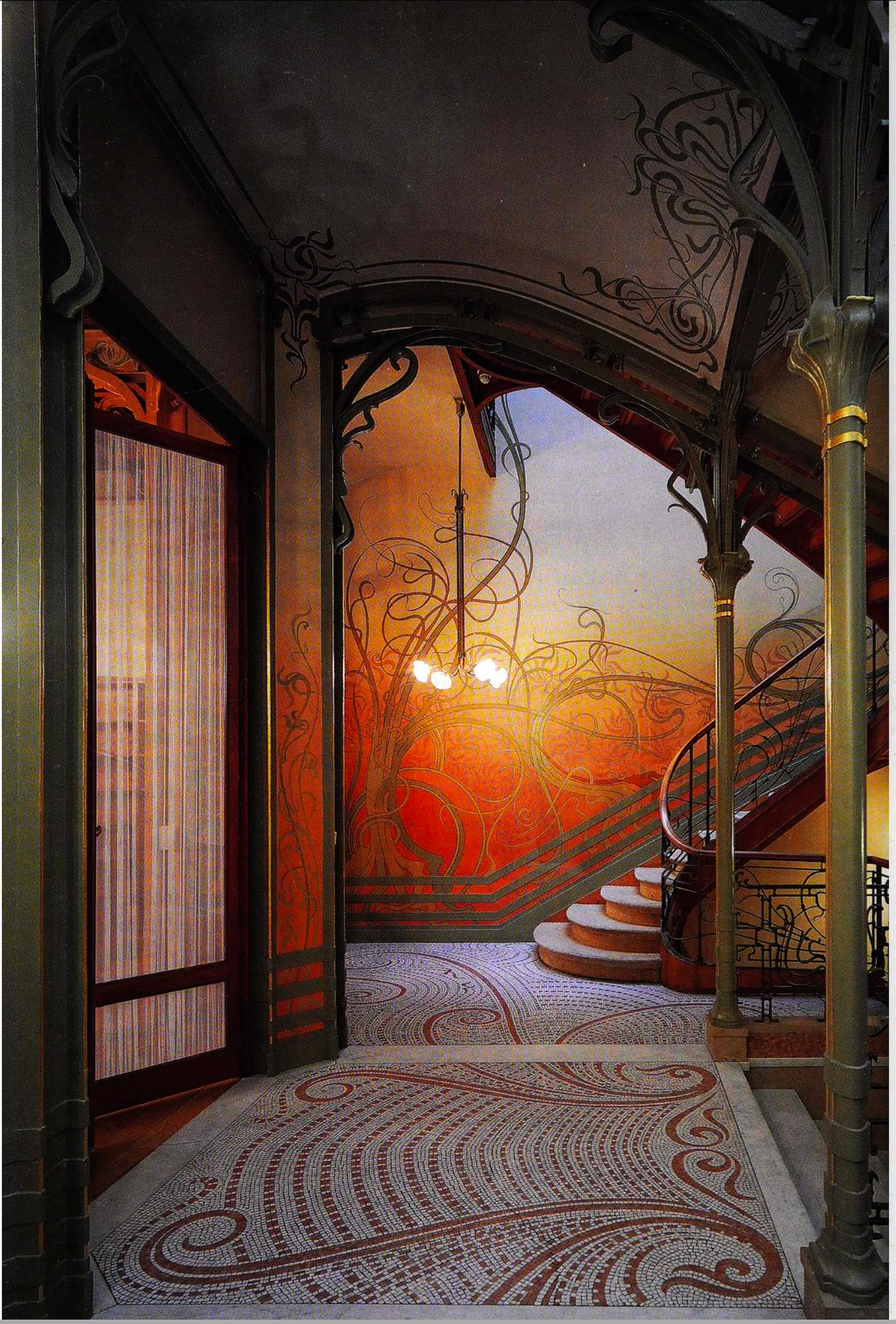
Project for the transformation of the Votive Church Plaza, Vienna, from *City Building According to Artistic Principles* (1889)

To integrate free-standing monuments into the city fabric and to reform the vast open spaces of the Ringstrasse, Sitte drew up concrete proposals such as this one to flank the Votivkirche by lower buildings filling out to the street line and creating a sequence of outdoor spaces, including a great cloistered arcade.



fortifications led to a career in planning urban expansions in cities from Naples to Warsaw and Helsinki. Stübben praised Paris, noting that 'The city lies … transparent before us … it is just as easy to find one's way about as is a clearly designed house. This gives us a feeling of security and pleasantness … something that the visitor in an unsystematically designed city will always miss.'[16] By then critics had launched an attack on the planned city, holding it responsible for that national and personal degeneration which became a common complaint of the *fin de siècle*. Scepticism of geometric order and regularity, already expressed in cartoons and spoofs on the monotony of Haussmann's works in the 1860s, found support in two influential works published at the height of nineteenth-century urban expansion, Camillo Sitte's *City Planning According to Artistic Principles* (Vienna, 1889) and Charles Buls's *The Aesthetic of Cities* (Brussels, 1893). Both the Viennese architect and the former mayor of Brussels—a city that had undergone a radical 'Haussmannization' in the 1860s and 1870s—attacked the systematic application of rational formulas in defence of the distinct artistic wholeness of individual cities as the work of time and generations. Sitte studied medieval and Baroque town plans throughout Europe, not to reform them but to learn their secrets, chief among them the idea of bounded and enclosed spaces as both aesthetically and psychologically more pleasing, and the appreciation of varied and unexpected viewpoints as adding interest and a sense of distinctive place. While he admitted that it was impossible to recreate in modern times what had grown up over time, he insisted none the less that public buildings and diverse functions should be integrated into the fabric of the town.

Sitte and Buls alike attacked architectural restoration in that spirit of Viollet-le-Duc which 'liberated' historical monuments from surrounding fabric, arguing that the fabric was as important to both memory and modern well-being as to individual monuments. While Sitte's visual categories are reminiscent of the English picturesque tradition, with its emphasis on the empirical, the originality of his work—and its resonance with contemporary concerns—was its preoccupation with the psychological resonance of urban space. Responding to theories formulated by the emerging field of psychology that the modern city posed dangers to the nervous state and mental health of its inhabitants, Sitte prescribed learning from historical cities, just as artists learned from nature, to make the new art of city building a therapeutic and restorative practice. For his native Vienna he even drew up proposals for restoring some of the qualities of close-knit, traditional urban fabric, scale, and thus sense of community to the Ringstrasse by adding additional building blocks to fill the voids and reconnect the monuments to the town and the individual [**135**]. Like Morris, Ruskin, and Webb in architecture, Sitte opened the debates on tradition and innovation, on art and community, and on the role of art in the psychic sense of the individual in society which were to be prominent themes of the art nouveau and the early modern movements.



136 Victor Horta
Tassel House, Brussels, stairhall, 1892
The daring celebration of iron in a domestic interior was accompanied by a new flowing conception of interior space. Space, light, decoration, and bodily movement through the house merged as rarely before. The 'whiplash' line, a signature of Belgian art nouveau, infused everything from wall painting to the design of light fixtures and structural iron, as Horta took up the idea of a total interior pioneered in England by Morris and his followers.

9 The Crisis of Historicism, 1870–93

The cult of the monument vs the cultivation of the interior

An impassioned critique of historicist culture was voiced as early as 1874 by Friedrich Nietzsche, who diagnosed 'a malignant historical fervour' as one of the crippling symptoms of a modern culture burdened by archaeological erudition and faith in the laws of historical progression. In his seminal *The Use and Abuse of History*, the German philosopher described the loss of individual and communal subjectivity in the modern urban landscape of historical art and architecture in which man 'is turned into a restless, dilettante spectator'.[1] History had so permeated culture that it had overwhelmed 'the other spiritual powers, art and religion as the one sovereign'.[2] Nietzsche's prognosis was largely ignored in the renewed mandate to official art and architecture in the 1870s and 1880s to endow new political realities with the aura of tradition and permanence in the wake of political upheavals and wars which redrew the map of Europe after 1870. The unification of Italy and of Germany (which emerged as an industrial power to challenge the dualism of Britain and France), the strategic dispersal of power within the sprawling Habsburg Empire, and the struggles in France to erect the Third Republic on the debris of the Second Empire, would all enlist the existing arsenal of historicist architecture to fashion new bids for legitimacy.

Yet alongside an official architectural culture of escalating historical rhetoric, a series of new experiments was launched in domestic and commercial architecture which drew on new theories of art's potential to craft a realm for individual realization, a place even for an escape from those very masks of culture which Nietzsche decried as the character of public life in the century where historical consciousness had emptied individuals of subjectivity. The fervent experiments of avant-garde culture of the 1890s—experiments often described as the seedbed of modernism—had been anticipated in many ways in the 1870s and 1880s. Indeed, most of the salient features of the art nouveau had already been explored in the 1880s, from the wide-scale use of coloured glass and floriated decorative treatment of wrought and cast iron, notably in Paul Sédille's Printemps department store in Paris (1881), to the quest for a harmony of interior effects which broke down the distinctions between architecture and the decorative arts in the

work of the English Arts and Crafts movement. What was new in the 1890s was a Europe-wide cult of youthful innovation, variously labelled 'Jugendstil' (youth style) in Germanic Central Europe, 'art nouveau' (new art) in France and Belgium, and 'Liberty' in Italy, where it evoked as much the political notion as an admiration for the Liberty store in London, a shrine of the Arts and Crafts movement and William Morris's philosophy which was to be a building-block of that anti-academicism and anti-historicism which grounded the art nouveau as a protest movement against the status quo.

Urban landmarks and the rhetoric of legitimacy

Europe's capitals were more than ever the arena of conflicting values played out in the built landscape of cities. In France, the political stand-off between secular and religious parties which characterized the return to parliamentary rule under the Third Republic after 1872 was emblazoned by 1889 in the Parisian skyline. The slowly rising domes of architect Paul Abadie's Sacre-Coeur atop Montmartre, a glistening white monument of expiation by which the Catholic church hoped to induce atonement for the materialist decades of the Second Empire, competed with the towering 300-metre (984 ft)-high pinnacle of iron erected with breathtaking rapidity by the engineer/builder Gustave Eiffel—the centrepiece of the Universal Exposition of 1889, the centenary of the French Revolution[**137a**]. The tower was decried by many as a crude work of engineering that broke the harmonious equilibrium of Haussmann's urbanism—notably by Charles Garnier, who spearheaded the campaign of artists and intellectuals against the 'useless and monstrous' tower 'unwanted even by commercial America'[3]—even as its state sponsors and the republican left celebrated it as a veritable crucifix of the secular faith in technological progress. Some even characterized it as the first embodiment of a new art, an 'art nouveau', echoing Eiffel's own claims that he had allowed forms without precedent to emerge from the demands and possibilities of construction in undisguised iron. Unlike the Sacre-Coeur, which skilfully combined a multitude of stylistic references to the past to imply that a medieval matrix of styles could sponsor a modern style, the great iron tower was freed from all references to the past, its forms determined uniquely by lines of tension, compression, and wind resistance.

No less a monument to the capacity of positive engineering science to rival history was the great hall of machines which stood next to the tower on the 1889 fairground. Ferdinand Dutert and Victor Contamin's Galerie des Machines offered with the broadest span yet achieved in iron construction not only proof positive of the Exposition Universelle's mandate to celebrate a century of progress since the French Revolution, but a sublime spatial experience that rivalled the Crystal Palace of 1851. Yet while historians of modernism





137
View of the Exposition Universelle, 1889, Paris **a)** *previous page*, the Eiffel Tower **b)** The Palais des Beaux Arts

Centrepiece of the 1889 World's Fair, Eiffel's tower's original function to commemorate the centenary of the French Revolution soon gave way to a host of other messages, from celebrating French economic and technical achievement to advertising Eiffel's own company. Formigé's Palace, with its rich polychromatic effects achieved by exhibiting a palette of other industrial materials, most notably ceramic tile, was to have a more immediate impact on public building.

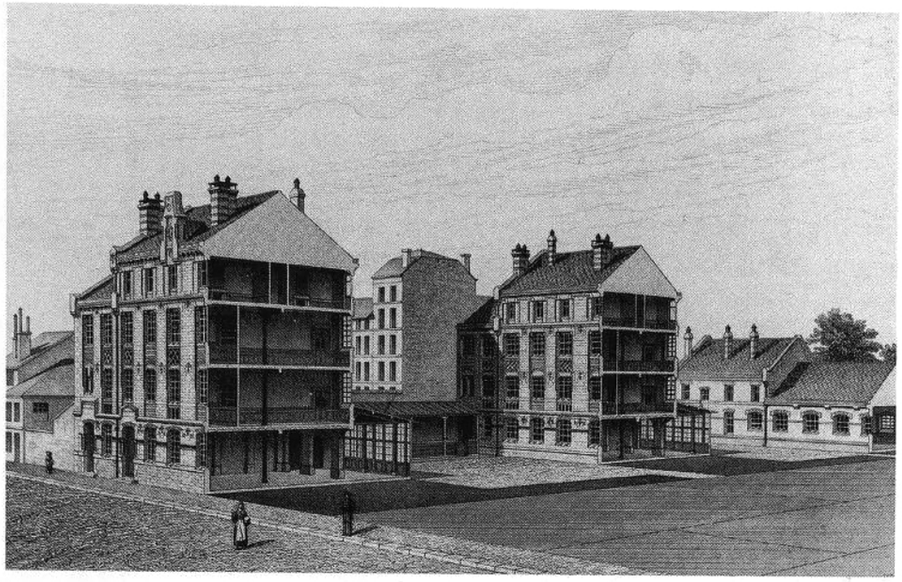
long ago extracted these buildings from their context as landmarks in the rise of a modern architecture freed from nostalgia and incorporating the daring of engineering developments, the 1880s and 1890s were much more affected by architectural innovations in a host of other buildings on the fairground. Jules Formigé's Palace of the Fine Arts, which combined a metallic frame with a colourful mixture of materials, including polychrome brick and glazed terracotta, offered a hybrid palette which combined industrial progress with the Semperian notion that architectural meaning could derive from a modern 'dressing' of structure and was more suggestive for integration in a host of new urban building demands [**137b**].

Schools and the ideal of secular municipal administration

In less festive interpretations this vocabulary of mixed materials served as the architectural grammar of the school-building programme launched by the Third Republic, and even exercised a great influence on American architects who were just then devising the first 'curtain walls' for enclosing the iron framework of commercial office buildings. While this colourful palette would influence a new generation of commercial structures in France, its most visible application came in the hundreds of schools which, by 1900, had transformed the daily landscape of cities and villages across France. The passage in 1882 of the law requiring universal secular education (the *Loi Ferry*, after the minister Jules Ferry) gave a new focus to the rationalist programme of Viollet-le-Duc's disciples,

138 Félix Narjoux
Rue de Tanger School, 1875–77

Even before state law required universal secular education, Viollet-le-Duc's followers had defined a new vocabulary for the school-building programme of the city of Paris. Narjoux, whose publications of municipal buildings ensured an international influence for French utilitarian architecture, created this dramatic sectional perspective to celebrate the maximization of light and ventilation in buildings clad with thin, sheer piers of polychromatic brick, punctuated with windows, and opened by ample structural iron.



who quickly made the ubiquitous schoolhouse with its clear conjugation of materials and construction into a triumphant expression of the secular democratic spirit of the industrial age, a fulfilment in a sense of the programme announced a half-century earlier by Saint-Simonianism (see chapter 6) [**138**].

France was not alone: programmes of school construction announced the triumph of secular and rational municipal administration in London, where by 1895 over 400 schools had been built in response to the Elementary Education Act of 1870, and Berlin, where the rational style of Schinkel's Bauakademie was adapted to provide elementary and secondary schools as well as a host of other municipal utilities with the stamp of rationality that heralded a new conception of government as a progressive force. In London E. R. Robson, architect to the School Board, adopted both the flexible stylistic language of the 'Queen Anne', pioneered in house architecture by Richard Norman Shaw and W. E. Nesfield, and its progressive associations. A major component of what came, by the end of the century, to be called the 'free style' on account of its relaxed attitude towards historical precedent and its celebration of individual sensibility, the Queen Anne style had been associated with progressive social attitudes first in Shaw's designs of the garden suburb of Bedford Park (1877–80) and then through its use for Cambridge's first women's college, Newnham College by Basil Champneys (1874–1910).

Public architecture in newer nations

Ideological battles between architecture as the instrument of a national consensus and a vision of the state as rational provider gave new potency to historical architectural styles in shaping the national agenda, particularly in politically 'young' countries where stylistic choices not



139 Giuseppe Sacconi
Rome, Monument to Victor Emmanuel II, 1884
The veritable embodiment of bombastic state representation, Sacconi's monument to the young Italian state's concern to assert the antiquity of its culture would rapidly become the target of avant-garde critiques. For Le Corbusier this modern Classicism—'the horrors of Rome' he called it in his seminal *Towards a New Architecture* of 1923—was a parody of the original.

only involved an editorial choice about the past, but offered a bid to suppress rival presents. After the capital of the new Italian state was moved from Florence—its role as capital from 1865 to 1870 coincided with extensive works of urban renewal—to Rome, the Italian architectural profession's energies were focused on crafting monumental images of the secular state to rival traditional Christian symbols. At the same time architects responded to the imperative to help craft a national identity from a mosaic of regional cultures; many adopted the notion that all of Italy shared a heritage of '*Romanità*' or Romanness, giving monumental Neoclassicism a new impulse. Great publicity surrounded the open competitions for a new Palace of Justice (1883) to be raised on a marshy site on the banks of the Tiber and a national monument to Victor Emmanuel (1882 and 1884) [**139**] on the edge of the Forum, both intended as secular rallying points for a new Italian consensus and as elements on the Roman skyline which could rival the prominence of the dome of St Peter's. Alternative views which looked to the medieval past were offered by architects such as Camillo Boito in Lombardy and the Veneto and Alfredo d'Andrade in Piedmont, but their styles soon took on the aura of regionalist rebuttals to the centralization of state culture and imagery in the Roman capital.

The closing decades of the century bore witness to numerous ambitious projects for central courts and national museums, aimed at providing highly visible institutions to focus national identity around the secular activities of justice and culture. Few efforts to secularize the cityscape could rival Joseph Poelaert's Palace of Justice (1866–83), which reorganized the cityscape of Brussels and responded to the efforts of Belgian politicians to foster a workable unity of Flemish and Walloon populations. Poelaert gave a brilliant personal and emotive interpretation of the official preference for a monumental Classicism, a style which deftly sidestepped the ongoing debates over national style, with partisans of Gothic and Renaissance pasts, in this young country where historical narrative was too easily partisan. In newly united Germany, Ludwig Hoffmann and Paul Dybwad's National Law Courts in Leipzig (1887–95) took up the monumental Classicism introduced with Paul Wallot's Berlin Reichstag as a style that could likewise transcend local traditions to forge a national cosmopolitan imagery. A contrary approach was pursued in the Amsterdam Rijksmuseum (1876–85), whose architect P. J. H. Cuypers, one of the most rigorous and inventive of Viollet-le-Duc's disciples, turned to the Dutch Renaissance for a stylistic matrix, evoking a period when national greatness and identity had first come to fruition. This refusal of both the Gothic and Classical Revivals in the first monumental building to rise in Amsterdam for centuries offered a monumental secular imagery that sidestepped troubling rifts between Protestants and Catholics. Style in this period, when regional identities were in rising tension with centralizing efforts, could be as much an instrument of diplomacy and consensus-building, such enterprises suggested, as of overt political dominance.

Stylistic rhetoric and the rise of advertising

By the end of the century it was not only national consensus that was being pursued through stylistic signs and historical associations in architecture. Business and industry also began to assert claims through the manipulation of architectural imagery, exploiting the urban prominence of buildings such as factories and warehouses with a nascent sense of advertising. It is no coincidence that the 1880s and 1890s, associated with the heyday of graphic invention in posters and handbills—one of the media that ensured the rapid dissemination of the fashion for the art nouveau after 1893—also gave birth to some of the most memorable uses of stylistic imaging for commercial architecture. Orientalizing architecture, with its rich colours and exotic forms of Moorish and Arab derivation, had long been exploited to connote luxury, notably in the famous engine-house for the waterworks at Sanssouci in Potsdam (1841–42) by Schinkel's pupil Ludwig Persius, where the smokestack is treated as a monumental minaret set at the cusp between the Classical town and the picturesque gardens of the royal domain. By the late nineteenth century even factories, long governed by a pragmatic utilitarianism, adopted historicist strategies for the economic potential of image recognition and salesmanship.



140
Templeton's Carpet Factory in Glasgow, 1889–92
By the 1890s the exotic languages of an expanded knowledge of world architecture was co-opted by the burgeoning art of advertising. Here references to the near east and Byzantium are used to connote the luxury of modern carpets.

Examples are particularly to be found in breweries, distilleries, and tobacco factories, where buildings served as advertising not only in the landscape but as images on product labels. In France vineyards built Revivalist châteaux to figure on bottle labels and give the aura of pedigree and antiquity as architecture became a medium of vintage! But few buildings are more spectacular in this regard than Templeton's Carpet Factory in Glasgow (1889–92) with its exuberant colour and jagged skyline and reminiscences of the Doge's Palace in Venice and the newly discovered polychromy of Assyrian and Persian architecture [**140**]. Here the wall as carpet was not so much a homage to Semper's theory of the textile origins of architectural ornament as an advertisement for the oriental origins of luxurious carpets! By the end of the century historical reference, on the wane in the world of official representation, was enjoying a renaissance in commercial architecture, where the period's exploration of the capacity of architecture to affect human behaviour was now to be exploited more for profit than for social engineering or national identity. Belatedly architecture joined the arsenal of the burgeoning art of advertising, which quickly exploited even the newest findings of the young field of visual psychology to fine-tune its message and appeal.

The domestic realm and the refuge of the psyche

One of the most salient shifts in the entire discussion of architecture in the decades after 1870 was a growing interest in exploring the psychology of form through the new disciplines of experimental neurological medicine and psychology. While late eighteenth-century sensationalist ideas (see chapter 3) were common currency by the early nineteenth century, the relation of form to states of mind was given a whole new emphasis and scientific grounding at the end of the century in two widely diverging areas. One was the rise of medical research on the nervous system, which allowed an increasingly direct correlation between external stimuli and the physical and emotional reactions of human subjects; the other was the emergence of empathy, and by 1890 Gestalt psychology, as a pursuit of aesthetic theory, particularly in Germany where a scientific basis for aesthetic judgement became a predominant concern of philosophical inquiry. Something of the renewal of interest in Baroque architecture in the 1880s and 1890s, particularly in southern Germany and Austria, must be attributed to the explorations by Robert Vischer, Heinrich Wölfflin, and others of the emotive powers of Baroque movement and space in a series of widely read works. Perhaps most suggestive of all was the theory that space rather than style was the fundamental link between the formal qualities of architecture and the overall character of any given moment in civilization. Whereas eighteenth-century sensationalism rapidly came to serve as a support for exploring the persuasive power of public buildings and for the discourse on reformative institutions, the emergence of modern physiological study coincided with a whole new attention to the realm of the private interior as a necessary retreat from the pressures of public life in the overlapping social, religious, and cultural discourses of the closing decades of the nineteenth century.

In France the public lectures of Jean-Martin Charcot at the Salpêtrière Hospital in the 1880s gave broad currency to concepts of individual and even national nervous health. The theory that the sensory overstimulation of the modern metropolis was a factor in the widely discussed fears of national degeneration, particularly acute in France in the wake of the Paris Commune and the defeat at the hands of the Prussians, was countered by proposals that the private interior should—as Deborah Silverman has argued in an innovative study of the origins of art nouveau design—'take on a new role as a soothing anaesthetizer of the citizen's overwrought nerves'.[4] Reinforced by the discourses on individuality as a means of achieving personal freedom in a modern society, the conception of the domestic interior was transformed in but a few years from a place primarily to assert status or historical ancestry—of the type pioneered in the eighteenth century by Walpole—to a place expressing personal feeling and fulfilment. In parallel, architectural history itself began to shift its focus from the history of church design as

the paradigm for stylistic development to a fascination with the house as the most accurate mirror of the social development of specific cultures. Tinged with colonial discourses, this would inform the displays of ethnographic villages and panoramas of the history of human habitation that were among the most popular displays at the World's Fairs at the end of the century, notably the street of nations designed by Garnier in 1889 in the shadow of the very Eiffel Tower he reviled. By the 1890s developments in house design, in particular the innovations both technical and stylistic in the country and city houses of Shaw, Webb, Lethaby, and other 'free-style' practitioners in Britain, were to be singled out as the forerunners of a critique of reigning historicism. For Hermann Muthesius, an outspoken critic of official architectural culture in Germany, writing in *The English House* (1904), the English house offered not only a model for reforming the interiors and lifestyles of individual Germans, but a veritable paradigm of a new way of thinking about architecture that could break the pattern of historicist thought Nietzsche had so potently criticized in *The Use and Abuse of History*. The stage for the modern movement's preoccupation with the domestic realm as the true field for exploring the nature of modern consciousness, as well as its profound distrust of public architecture as an increasingly hollow exercise in rhetoric, was set. Its first great flourish came in the interiors of Antonio Gaudí in Barcelona, of Victor Horta and Henri van de Velde in Brussels, the early work of Hector Guimard in Paris, and by the end of the century the first designs of Josef Maria Olbrich in Vienna and of Charles Rennie Mackintosh in Glasgow.

Paradoxically it was the great publicity given to the freedom from convention in private interiors such as Horta's Tassel House of 1892, often seen as the veritable threshold of the art nouveau, that allowed architecture seen only by invited guests to be celebrated almost overnight as the makings of the first modern art with true freedom from historical reference. Behind an extraordinarily discreet façade, Horta exploited the technology of glass and iron construction he had learned from the great greenhouse structures built for the royal family at Laaken in the 1880s by his master, Alphonse Balat, to create an interior of unprecedented spatial fluidity. Here was a celebration of the fact that even within metropolitan conventions the individual psyche could be unleashed in the world of the interior. The famous staircase [**136**] revealed both Horta's willingness to free the imagination and to pursue the cues offered by such mentors as Viollet-le-Duc about the search for a new organic style. The tensile strength of iron is for the first time given an iconographical expression in Horta's combination of cast and wrought iron to *express* the fluidity of iron; and the whiplash line points to the numerous calls for architects to study the underlying generative principles of nature so that an architecture might be found that is at once freed from historic precedent and tied to a larger order.

Art nouveau

Art nouveau's heyday lasted a scant 10 years, between Horta's Tassel House of 1892 in Brussels and the Turin World's Fair of 1902, in which the excesses of art nouveau ornament were broadly criticized. But it proved immensely popular and represented the first architectural style without historical precedent.

Earlier architects had turned to nature for inspiration, notably Ruskin's followers, but art nouveau architects took interest in the organic world of form as a principle of both structural form and spatial design. Viollet-le-Duc was another major source of inspiration, and accounts for many architects' celebration of revealed construction in exposed ironwork. The whiplash line was a superficial sign of style that could be traced from poster and book design in the 1880s to the decoration of Horta's houses in the early 1890s to furniture design, but more important was a shared set of principles and attitudes which infused even work whose rectilinear and abstract geometric exploration seem at odds with the organic. Charles Rennie Mackintosh was a pioneer in this regard, soon followed by the Viennese Secessionists. Mackintosh's Glasgow School of Art (1896) was tinged still with elements of the Scottish baronial tradition, evidence too that art nouveau often merged with elements of regionalism and national Romanticism. In Hungary and Poland, for instance, art nouveau quickly incorporated elements of a revival of interest in folk culture.

Art nouveau was a short-lived fashion, its forms exhausted within a decade by their commercial overexposure and aesthetic reaction. Yet this vibrant movement forms a bridge to the twentieth century, when the legacy of nineteenth-century design theory mingles with the culture of the avant-garde desire to celebrate a break with tradition. By the late 1890s the domestic interior had emerged paradoxically enough as a prime focus of public debate on the relationship between environment and modern consciousness, and it was here that art nouveau was to make its greatest challenges to convention.