

- tion to the Librarian. See H. J. Smith, 'Local Reports to the General Board of Health', in L. M. Munby (ed.) *Short Guides to Records*, xxiv (1972).
- [35] See W. B. Stephens, *Sources*, p. 16 (Powell—indicates completeness of holdings at specified libraries), p. 17 (Ford and Ford's select list for 1833–99; Gabine; official indexes); P. Cockton, *Subject Catalogue of the House of Commons Parliamentary Papers 1801–1900*, iv (1988).
- [36] SCA, Arundel Castle Manuscripts, S384, notebooks 1824–1850.
- [37] MCA, L516e, third annual report.
- [38] MCA, M/c 790, list, 21 March 1864.
- [39] See G. Green, 'Title Deeds: A Key to Local Housing Markets', *Urban History Yearbook*, 1980, pp. 84–91.
- [40] See F. Sheppard, V. Belcher and P. Cottrell, 'The Middlesex and Yorkshire Deeds Registries and the Study of Building Fluctuations', *London Journal*, 1979, v, pp. 179–217.
- [41] A. B. Granville, *Spas of England*, i, p. 275.
- [42] J. Hole, *Homes of the Working Classes, with Suggestions for their Improvement* (1866), p. 185.
- [43] SCA, Wentworth Woodhouse Manuscripts, F121/11, letter from Charles Bowns, 12 Jan 1792.
- [44] SCA, Arundel Castle Manuscripts, S185/18–54, Vincent Eyre's accounts, 1777–99.
- [45] See W. B. Stephens, *Sources*, pp. 21–2, for a short guide to classification, and M. Bond, *Guide to the Records of Parliament* (1971) for more detail.
- [46] HLRO, Original Act, 32 Geo III no 172 (cap. 30).
- [47] SCA, Fairbank Papers, CP-2-(71), CP-2-(41), CP-2-(44).
- [48] SCA, Fairbank Papers, AB 3, accounts, c1779–88.
- [49] MCA, Misc. 803/3–4, bill from T. Sandbach for houses in Cupid's Alley, 29 Aug. 1789, and letter from J. Mills, 29 Dec. 1789.
- [50] L. S. Pressnell & J. Orbell, *A Guide to the Historical Records of British Banking* (1985) gives locations.
- [51] See, *Guide to the Contents of the Public Record Office*, i (1963) for a full list of records.
- [52] PRO, C12/202/30, bill of J. Lowder, 29 Nov. 1794.
- [53] PRO, C13/723/11, bill of E. Eyes, 17 Nov. 1818.

Abstracts of Periodical Literature

SIMON PEPPER

DAVID ANDREWS & BRENDA WATKIN, **A Timber-Framed Building at Bocking, Essex Archaeology and History**, 19 (1988), pp. 215–22. The paper reports the recent excavation and reconstruction of an early 16th-century building in Church Street, Bocking, together with an 18th-century gambrel-roofed wing. An excellent set of drawings illustrates the timber framing, mouldings, and some construction details.

SALLY A. KITT CHAPPELL, **A Reconsideration of the Equitable Building in New York, Journal of the Society of Architectural Historians**, XLIV (March 1990), pp. 90–5. Conventional opinion has it that the Equitable Building (1912–1915) at 120 South Broadway in New York was the embodiment of all that was wrong with skyscrapers, and was thus a major cause of the 1916 zoning ordinance which restricted the height, size and arrangements of buildings in the city. A closer look at the evidence reveals that a blueprint for the zoning regulation was complete in 1913 when the Equitable had just been begun. In the clash of conflicting ideologies surrounding the zoning movement, the Equitable was more a convenient symbol than a principal cause of the new ordinance. The earlier misjudgement has obscured the building's place in two other areas in the history of architecture: elevator engineering, and the adaptation of management techniques to building construction.

WILLIAM B. FRIEDRICKS, **A Metropolitan Entrepreneur Par Excellence: Henry E. Huntington and the Growth of Southern California, 1898–1927, Business History Review**, 63 (Summer 1989), pp. 329–55. Henry E. Huntington, according to this article, placed his imprint on the development of his region, the Los Angeles basin, to an extent unique among urban entrepreneurs. His great wealth and foresight, and especially his interest in street railways, real estate development, and hydroelectric power, enabled him to become a *de facto* city planner for one of the most important metropolitan regions in the USA.

ANDOR GOMME, **Stoneleigh after the Grand Tour, The Antiquaries Journal**, LXVIII (1988) Part II, pp. 265–86. Examination of the account books and other papers, now chiefly deposited in the Record Office of the Shakespeare Birthplace Trust, Stratford-upon-Avon, has enabled a chronology to be prepared of the long-drawn-out construction and decoration of the eighteenth-century west range of Stoneleigh Abbey. The contributions of the four architects principally involved—Fran-

cis and William Smith, William Hiorn and Timothy Lightoler—have been assessed, together with those of the more prominent craftsmen. Together with much data on costs and conditions of employment, Gomme publishes drawings showing the framing of the hall ceiling and Lightoler's details for the first floor truss-partition.

GEORGE F. W. HAUCK, **Conference Report: Civil Engineering during the Enlightenment, the ICOHTEC Symposium, Madrid, September 5–9, 1988**, *Technology and Culture*, 31, 1 (January 1990), pp. 114–20. This was the 15th symposium of the International Committee for the History of Technology, concentrating on civil engineering between 1750 and 1850. The rationale for the theme was predicated on the significance of civil engineering developments in that era, and on the coincidence of the bicentennial of the death of Carlos III, the “enlightened despot” who ruled from 1759 to 1788 and played a vital role in the development of technology and science in Spain. George Hauck's report provides a good review of the themes and topics explored at the conference.

J. G. JAMES, **Some Steps in the Evolution of Early Iron Arched Bridge Designs**, *The Newcomen Society Transactions*, 59 (1987–88), pp. 153–87. In every country except the UK, the large-scale adoption of iron bridges was directly related to the mid-19th century railway construction boom and contemporary developments in large-scale iron production and manipulation. As these countries adopted iron bridges, so they turned to wrought-iron truss types, which were rightly seen as the future mainstream. In the UK, however, things were totally different. By the time of the railway boom of the 1830s, there had been half a century of cast-iron arched road bridge construction and Britain was recognised as leader in this technology. This article provides a general historical review of the early evolution of cast iron arched bridge design from Coalbrookdale to the 1830s. The sheer momentum of Britain's early technical superiority, it is argued, meant that it was not until the 1860s that it became apparent that Germany and the USA were beginning to leave the British far behind in the structural field.

J. G. JAMES, **Thomas Paine's Iron Bridge Work 1785–1803**, *The Newcomen Society Transactions*, 59 (1987–88), pp. 189–221. The prolific pamphleteer Thomas Paine (1737–1809) may be compared in some respects with other controversial figures on the iron bridge scene at the end of the 18th century, such as John Nash, Robert Fulton and Ralph Dodd. All undoubtedly had a compelling ambition to make their mark and possessed great entrepreneurial ability, but in no case did they display any personal technical originality. Historically their achievements were to advance progress by persuading investors to back practical projects rather than to improve technology *per se*. Paine's political notoriety ensured his celebrity, but in this article the author disputes the engineering genius attributed to him by non-technical biographers.

MICHAEL JONES, GWYN I. MEIRION-JONES, FREDERIC GUIBAL & JON R. PILCHER, **The Seigneurial Domestic Buildings of Brittany: A Provisional Assessment**, *The Antiquaries Journal*, LXIX (1989), Part I, pp. 73–110. This paper presents provisional

results of a 10 year survey of seigneurial domestic buildings in Brittany, reporting work carried out between 1983 and 1987 in the departments of Côtes-du-Nord and Ille-et-Vilaine. The principal objectives are to survey and identify the elements of the Breton *manoir*, to trace and explain the evolution of the ‘manor-house’ and the attendant buildings including their number and function; to establish the function of rooms within the house and their degree of specialisation; to establish a chronology and typology of house type from the ‘descent from the motte’ to c.1700; to study the changing social position, economic and legal status of owners; to investigate the extent and nature of fortification; and to establish an evolutionary and chronological sequence for the site plans of the *ensembles*. Secondary objectives include the dating of as many buildings as possible, tracing the sequence of decorative details, and establishing a typology and chronology of roof structures.

J. W. LAUGHTON, **‘The House that John Built’: A Study of the Building of a 17th century House in Chester**, *Journal of the Chester Archaeological Society*, 70 (1987–88), pp. 99–132. This article provides a very detailed account of two houses in Chester built by John Garrett, master carpenter, in the early 17th century. Thomas Whitby, an attorney and civic official, kept a careful record of all the expenditure incurred in the construction of his own impressive and costly house in Northgate Street, and the substantial reconstruction of a speculative rental property owned by him in Parson's Lane. Records of building town houses in this period are rare, and the survival of Whitby's notebook is of considerable interest. Its value is increased, moreover, by the fact that it includes not one but two accounts, close together in time and space, but far apart in status and design.

H. LOUW, **Of Ancient Rights & Privileges: Demarcation Disputes between the Companies of Joiners and Housecarpenters, Millwrights and Trunkmakers of Newcastle upon Tyne, c.1580–c.1740**, *Archaeologia Aeliana*, Fifth Series, XVII (1989), pp. 93–115. The boom in house and shipbuilding which followed in the wake of the rapid expansion of the Newcastle coal trade from the mid-16th century onwards transformed the prospects for the woodworking trades, encouraged specialisation between the different branches of the trade, and laid the basis for their official separation as independent companies. The Newcastle division was an acrimonious affair from the beginning. This article charts the early struggle connected with the establishment of independent guilds for each trade towards the end of the 16th century, and an extended running battle which commenced c.1670 and lasted well over 60 years.

JOHN MCCANN, **The First Cottage of Clay Bats?** *Proceedings of the Cambridge Antiquarian Society*, LXXVI (1987), pp. 113–21. It is commonly believed that the technique of building with earth which is called *clay bat* in Cambridgeshire, and *clay lump* in Norfolk, is a vernacular tradition extending back at least 300 years (q.v. Barley, Clifton-Taylor, Mercer). Early 20th century writers such as C. F. Innocent, Clough Williams-Ellis and Claude Messent encountered a verbal tradition relating how such buildings were constructed, and assumed an ancient folk tradition. In this paper John McCann concludes that the technique was evolved in Scotland in the 1790s and

employed in East Anglia in the early 19th century, in the special conditions of an agricultural boom in an area deficient in other building materials. The first cottage of the title is a well documented example, built in Great Shelford, Cambridgeshire, in 1801.

R. MCNEIL & R. C. TURNER, **An Architectural and Topographical Survey of Vale Royal Abbey**, *Journal of the Chester Archaeological Society*, 70 (1987–88), pp. 51–79. The Cistercian abbey of Vale Royal, in Cheshire, was founded by Edward I in 1270 and was intended to be the grandest of that order's buildings in this country. Dismantled and then partly reconstructed as a farm following the dissolution of the monasteries, the house was further adapted at the end of the 18th century. The survey reported in this paper was carried out in 1984 when restoration was contemplated by the HBMC. It has yielded valuable data on the medieval and early modern construction, and a very well illustrated study of the roof structures.

DONALD G. PATERSON & RONALD A. SHEARER, **Terminating Building Societies in Quebec City, 1850–1864**, *Business History Review*, 63 (Summer 1989), pp. 384–415. In discussions of the history of real estate markets a key role must clearly be assigned to financial institutions, yet our knowledge of their various structures, particularly before the late nineteenth century, remains sketchy. One organisation created to facilitate real estate purchases in the absence of other institutional sources of mortgage loans was the building society, either permanent or terminating. This article gathers together the information available about terminating building societies in mid-nineteenth century Quebec City. After an explanation of the societies' objectives and regulations, the article examines the difficulties that these societies faced as a result of general economic fluctuations and of the changing desires of members, who often wished to use the societies to place savings at interest rather than for home purchase.

CHRISTOPHER POWELL, **'Widows and Others' on Bristol Building Sites: Women in Nineteenth-Century Construction**, *The Local Historian*, 20, 2 (May 1990), pp. 84–7. The contribution of women to the nineteenth century construction industry is not always appreciated. This paper, based on a detailed study of Bristol's building industry, identifies a number of women building operatives and principals of firms. Although small numbers are involved in each case, the author argues that they would often play a useful role in a flexible and fluctuating labour market, and—in the cases of the principals—frequently ensured the survival of small building firms following the death or incapacity of a husband or brother.

MARK SAMUEL, **The Fifteenth-Century Granary at Leadenhall, London**, *The Antiquaries Journal*, LXIX (1989), Part I, pp. 119–53. Excavation and observations from 1984–86 on the Leadenhall Court site in the city of London revealed elements of the fifteenth century market known as 'The Leadenhall' (the upper floor of which served as a granary or 'garner'). The truncated foundations were located in various areas of the site; 177 medieval moulded stones were found re-used in later cellar walls; and a fragment of the west wall survived to its full height of 11.7m encased between

Victorian buildings. The recording and subsequent study of these features, together with a reassessment of such plans and drawings of the building as have survived, established the ground plan of the quadrangle and chapel, and made possible a complete reconstruction of this important civic building.

FRANK B. SEAR, **Vitruvius and Roman Theater Design**, *American Journal of Archaeology*, 94, 2 (April 1990), pp. 249–58. Because few, if any, Roman theatres were designed as Vitruvius (*De Architectura* 5. 6[1]) prescribes, attempts have been made to deduce how Roman architects did in fact lay out their theatres. This paper is prompted by one such attempt (D. SMALL, *AJA*, 87, 1983, 55–68) and argues that its method is invalid. The Vitruvian theatre is examined in its historical context and the conclusion is reached that architects of the early Empire modified but did not abandon Vitruvius's method. The author tentatively offers a method of designing theatres that accords with the archaeological evidence and is close to the Vitruvian model.

TODD SHALLATT, **Building Waterways, 1802–1861: Science and the United States Army in Early Public Works**, *Technology and Culture*, 31, 1 (January 1990), pp. 18–50. Between 1802 and 1861 (the first year of the Civil War) the US Congress spent about US\$43 million on waterway projects—the cost of six Erie canals. This expenditure opened a vast civil works jurisdiction for the Army Corps of Engineers and its sibling organisation, the US Topographic Survey. It funded half a century of hydrographical investigation and allowed about 70 top graduates of the US Military Academy at West Point to manage water resources, to survey every major river, identify hazards, propose improvements, hire contractors and supervise construction. Todd Shallatt's paper not only provides an overview of this programme—massive for its time—but addresses some important questions in technological history: the relationship between the construction craftsmen and the academy-trained engineers; the transfer of technical knowledge by word of mouth versus the role of books.

PATRICIA BURGESS STACH, **Real Estate Development and Urban Form: Road-blocks in the Path of Residential Exclusivity**, *Business History Review*, 63 (Summer 1989), pp. 356–83. Many real estate developers in the USA consciously attempted to shape residential neighbourhoods, but their success in determining the spatial and social structure of communities was mixed. This article describes the methods available to land developers and realtors and examines the application of these tools to a section of Columbus, Ohio. It demonstrates that the intentions of deed restrictions and other private means of land use control were often undermined by construction delays, general economic conditions, and outmoded requirements, as well as by the timing of annexation and the subsequent application of public zoning ordinances.

DAVID TOMALIN & ROB SCAIFE, **The Excavation of the First Piped-Water System at Newport, IW and its Associated Urban Palynology**, *Proceedings of the Isle of Wight History and Archaeology Society*, VIII, Part 2 (1987), pp. 68–71. This paper reports the excavation of parts of an elm water main system, attributed to named

Stuart building contractors during the period 1618 to 1623. Sections of wooden pipe recovered showed trunks of 30–35 cm diameter, with internal bores of 10–13 cm, bored off-centre to avoid the heartwood. Connections were of the male-to-female type, with the exposed end-grain protected by a flanged collar formed from a crimped lead sheet.

PETER WAY, **Shovel and Shamrock: Irish Workers and Labor Violence in the Digging of the Chesapeake and Ohio Canal**, *Labor History*, 30, 4 (Fall 1989), pp. 489–517. The Chesapeake and Ohio Canal experienced at least ten significant disturbances and virtually-continuous labour unrest between 1834 and 1840, necessitating the state militia to be called out five times and Federal troops once. Although Irish immigrants worked throughout the North East, nowhere else experienced the endemic disorder that plagued the canals, early railroads and roads. The author identifies the roots of these disturbances on major public works projects in their organisation of work (their financing, recruitment, discipline and poor working and living conditions) and in the Irish tradition of secret societies and collective violence, which were imported to the New World and adapted to its nascent capitalist social system.

MARC A. WEISS, **Real Estate History: An Overview and Research Agenda**, *Business History Review*, 63 (Summer 1989), pp. 241–82. As perhaps the first comprehensive historiographic and bibliographic essay on real estate history to be published, this article casts a wide net, offering a review of the literature and suggestions for research opportunities in the many and varied streams of academic endeavour that flow into the new specialism of real estate history. Moving away from anecdotal personal and company biographies, the field is maturing and expanding toward more sophisticated and analytical studies that interest a variety of disciplines. The exhaustive analysis of both traditional and innovative work provided in the text is complemented by a selective bibliography of the publications discussed in the article. This is the keynote article in a special issue of *Business History Review* dedicated to real estate history (see also the articles by Friedrichs, Stach, and Paterson & Shearer).

Book Reviews

Hagia Sophia: architecture, structure and liturgy of Justinian's Great Church

ROLAND J. MAINSTONE, 1988
London. Thames & Hudson
288pp, illust., £35
ISBN 0 500 34098 6

Hagia Sophia is the third church of that name on its site, both the first two having been burnt down. Built by the Emperor Justinian and begun in 532, it was completed in less than 6 years, a remarkable achievement for a building of its size. The central space enclosed is over 80m long by 30m wide and with a height of over 50m under the centre of the dome. When it was built it was the principal church of Constantinople and therefore of the Byzantine empire. With the end of that empire it became a Catholic church until Constantinople fell to the Ottoman Empire in 1453, whereupon it was promptly converted to a mosque. During its life it has been damaged by earthquakes and partially rebuilt on a number of occasions, the most important being the reconstruction of the dome which collapsed in 558. Since it became a mosque it has had a number of additions, the most noticeable being the minarets, and it has lost whatever Christian furnishings it may have had. Secularised in 1935 it is now preserved as a museum, so that what the visitor to modern Istanbul sees is a building that was a major feat of construction in its day and which then enjoyed some 1400 years as a place of worship; a building of stone columns and brick and tile walls roofed by a dome and semi-domes that are still decorated in the Christian mosaics that have survived its use as a mosque.

Roland Mainstone's association with this building goes back over many years and his knowledge of its fabric is based upon careful, detailed observation and accurate surveying. From this he has been able to build up a history of the construction, chronicling the changes that have been made in repairs and alterations, and showing the way that it has responded to the forces within it. Here he uses this work to present more than just an account of the building's history. The book is a model of the way in which the detailed history of an individual building may be studied, showing the kind of evidence that is assembled and the way that it can be used.

What then are the questions that may be asked of the construction of an historic building and what are the techniques that we may use to answer them? Giving an account of a building of this scale is inevitably a major undertaking but the questions became more complex, and the evidence needed to provide the answers more difficult to unearth, when we are dealing, not with a single building campaign, but as here with the third major building on the site and one which has suffered structural damage and