THE
GEORGIAN
GROUP

Johanna Roethe, 'William Ranger and his artificial stone at Ickworth', *The Georgian Group Journal*, Vol. XXI, 2013, pp. 181–196

WILLIAM RANGER AND HIS ARTIFICIAL STONE AT ICKWORTH

JOHANNA ROETHE

William Ranger, a prominent builder from Brighton, is best known for his patent 'artificial stone', a type of lime-concrete which was used by architects such as Sir Charles Barry and George Ledwell Taylor. However, its success was cut short when doubts were cast on its structural performance. Ranger's alterations and additions to Ickworth Church and House for the first Marquess of Bristol led to his working as architect for two churches in Suffolk. This article situates Ranger's work at Ickworth in the context of his varied career in the fields of building contracting, engineering and architecture.

William Ranger (1799–1863) had a varied career in the fields of building contracting, concrete manufacturing, civil engineering, and architecture. He started young in private practice and quickly rose to become one of the most important builders in Brighton. Because of his versatility, his work has been covered only in piecemeal fashion in specialist literature focusing on the different aspects of his career. So far, no comprehensive account of his life and work has been written, and many of his works, especially those using concrete, remain unidentified and underappreciated. Recently one hitherto unknown work came to light: in the 1830s Ranger designed and built significant additions and alterations to Ickworth Church, using his patented concrete blocks. This provides an important context for his later works in Suffolk under the patronage of the first Marquess of Bristol, including Ranger's more famous church, St Mary, Westley, built entirely from concrete.

The first half of this article attempts to set Ranger's work in context, while the second half focuses on his works at Ickworth and Suffolk.

WILLIAM RANGER AT BRIGHTON

Ranger probably trained with his father, Richard Ranger (1770–1839), a surveyor and builder who briefly was surveyor to the Brighton Town Commissioners from 1828 to 1831.[1] Richard was originally from Laughton, Sussex, but was living with his family in Ringmer, near Lewes, when William was born. By 1820 the Ranger family had moved to Brighton, in time to benefit from the building boom there in the early 1820s.[2] By about 1821 father and son practised as 'Ranger & son, builders'.[3] Shortly afterwards, William seems to have started his own private practice. In the early 1820s, he completed drainage and coastal defence works at Pevensey and Worthing, as well as building the approaches to Brighton's Royal Suspension Chain Pier (*c.*1823, designed by Samuel Brown: demolished).[4] He established himself as one of Brighton's most important builders by working for the young Charles Barry. Their collaboration started with the construction of St Peter's church (1823–8), which led to several other projects including work to 47 Grand Parade for Mrs Dulaney (1826–8) and the Sussex County Hospital, Brighton (1826–8).[5] Ranger also executed the first section of the Kemp Town esplanade (1828–30) to designs by Henry Edward Kendall, junior; as well as additional buildings and

lodges for the Royal Pavilion (1831–2) under Joseph Henry Good.[6]

Even before the development of his patent lime-concrete, Ranger was an inventor seeking to improve on construction processes. In 1826, the *Brighton Gazette* published a description of his model for a novel form of scaffolding for building church towers. Instead of a complete scaffold, only a frame was built from which a smaller scaffold could be suspended and moved up and down as the tower was constructed.[7]

But Ranger also worked beyond Brighton. In 1827, he made alterations to the church of St James the Less in Lancing, Sussex, and in 1830–3 he completed a suspension bridge (designed by William Tierney Clark) over the river Adur at New Shoreham, Sussex.[8] In 1831–2, Ranger designed and built a new stone bridge over the river Eden at Edenbridge, Kent (Fig. 1).[9]

RANGER'S ARTIFICIAL STONE

But it was Ranger's development of an artificial stone which started his career on a larger scale. In the 1820s a section of the sea wall at East Cliff, Brighton, had been built using concrete blocks by Thomas Cooper, with the assistance of the engineer John Wright and the contractor William Lambert. This is generally thought to be the inspiration for Ranger's own experiments with lime-concrete.[10] In December 1827 he announced in the local press that his experiments with artificial stone had been perfected and that he planned to use it in his next building project.[11]

Among the first buildings to contain Ranger's artificial stone was the Belvedere Tower (now known as the Pepperpot), a dual-purpose structure designed by Barry in 1830 as part of a development for Thomas Attree (Fig. 2). Built entirely of concrete apart from the octagonal pedestal, the tower apparently served as an engine-house and observatory. Elsewhere in Brighton (now Queen's) Park – which also included a villa by Barry – two gateways were built to Barry's design using Ranger's stone, of which the southern one was described by *The Architectural Magazine* as 'one of the most beautiful of which the county can boast'.[12]

In 1832, Ranger constructed a garden wall for Lawrence Peel of Kemp Town, Brighton, using two-foot-long concrete blocks (nine and a half inches by eight inches), 'formed on the spot' and of 'the precise appearance and the durability of Portland stone'.

Fig. 1. Elevation of the new bridge at Edenbridge, Kent, by William Ranger, 1831.
(*Kent History & Library Centre, Maidstone, Ch.18 P2/2*)

The wall reportedly attracted the interest of 'several eminent architects from London'.[13]

Ranger registered a patent for his 'artificial stone' on 4 December 1832. According to the patent specification, the composition consisted of aggregates such as 'river or sea sand, skreened [*sic*] shingle [. . .] or broken flints, freestone, copper slag', powdered lime ('stone lime as contains a portion of iron', such as Dorking or Reigate stone, greystone, blue or yellow lias) and heated or boiled water. The proportions were thirty pounds of aggregates, three pounds of lime, and one pound and twelve ounces of water. The hot mixture was poured into a mould from which it could be removed after about ten minutes. After a fortnight of drying and hardening, the blocks were ready to use. While the patent was illustrated with a diagram depicting a simple rectangular mould, Ranger emphasised that 'the moulds will of course vary in their forms and manner of framing them according to the shapes intended to be given to the masses or blocks of artificial stone; as, for instance whether they are to be plain or moulded in flutings or otherwise ornamented or decorated, or whether to be square, circular, or of any other shapes'.[14]

Exactly two years later, Ranger registered another patent which improved on the 1832 specification, drawing on his experience and better understanding of the chemical processes and qualities of the materials involved. Notably, in addition to the hot water he recommended heating the aggregate as well, because 'the said crystallizing or concreting action is very materially expedited'. Furthermore, the lime used should be in its most caustic state. The other improvements concerned the design and construction of the mould, which now also had a top, secured firmly with screws and weighed down. The illustrations of the patent not only depicted the improved design of a plain box mould but also showed a mould for the capital of a fluted Doric column.[15]

Ranger's artificial stone was part of a general 'concrete renaissance' in the early nineteenth

Fig. 2. Photo of the Pepperpot, Brighton. (*Photo: author, 2012*)

century, when concrete increasingly came to be used in architecture, both for foundations and above-ground structures. Previously, concrete had been used predominantly in small-scale underwater engineering works in both France and Britain. Increasingly, however, it came to be used for non-engineering structures and general building, ornamental use, as stucco render, and in superstructures. One of the most widely used mixtures was James Parker's 'Roman cement' or stucco, a 'natural' cement made from powdered stones from the Isle of Sheppey. When Parker's patent of 1796 lapsed in 1810, rival processes quickly multiplied. This was followed by attempts to find alternative artificial mixtures, so-called 'artificial

stones', which were mostly lime-concretes rather than the later cement-concretes. The most significant invention was Joseph Aspdin's 'Portland cement' (patented in 1824), which was initially promoted as stucco but later became the basis of most modern cement and concrete mixes. Ranger's product achieved a certain measure of success and publicity, notably by its application in works by Barry and George Ledwell Taylor, and published reviews repeatedly emphasised its suitability as a cheap substitute for stone. An article in *The Architectural Magazine* even hailed it as a 'truly national invention'.[16] However, the era of abundant inventions and patents came to an end in 1838 when Colonel (later Sir) Charles William Pasley (1780–1861) published the first edition of his *Observations on Limes, Calcareous Cements, Mortars, Stuccos and Concrete*. Pasley was the founder of the Royal Engineers Establishment school at Chatham, where he systematically tested a range of concrete mixes, including Ranger's, for their suitability for engineering works. His book strongly advised against the use of concrete in superstructures – a view shared by other engineers and architects – and led to a (temporary) loss in confidence in the new material and consequently a sharp reduction in the British market for cement and concrete products, other than for use as small-scale features or ornaments. [17]

RANGER IN LONDON

The building boom in Brighton came to an end in the mid-1820s, causing the exodus of many architects and builders.[18] In around 1833 William Ranger moved to London, both to find work and to promote his newly patented artificial stone.[19] Initially, he had an office in Dean's Yard, Westminster, and manufactured his concrete in Stangate, Lambeth.[20] His career as engineering contractor using his patented artificial stone on a larger scale began in the early 1830s with a chance encounter with George Ledwell Taylor (1788–1873). Taylor, civil architect to the Naval Works department (1824–37), recounted the anecdote later in his autobiography. He was on his way to consult the contractor Samuel Baker about repairs to Deptford Dockyard.[21] At Stangate, Taylor met Charles Barry and Ranger,

> '… examining what appeared to me to be a large block of Portland stone, carved and moulded into a noble Corinthian cornice. I ran up to say "How do you do?" &c., and remarked "What a fine block of stone you have there!" at which they both laughed. Mr Barry said "Let me introduce to you Mr Ranger; this block of stone as you think it, is composed of his patent concrete".' [22]

After learning of the composition and properties of Ranger's artificial stone, Taylor recommended its use at Deptford to the Navy Board. This also led to Ranger's use of his concrete, under Taylor's direction, for the underpinning of a storehouse at Chatham Dockyard, the rebuilding of a section of the river wall at Woolwich and the building of a dry dock at Woolwich Dockyard (all 1834).[23] Initially hailed as pioneering applications of a money-saving material, all three projects developed problems: the Chatham storehouse soon required further underpinning; the river wall had to be redesigned by James Walker and, after spalling in the winter of 1837, had to be refaced in brick; and the dry dock, which had been deepened after construction had started, was destroyed by the ingress of ground water.[24]

The Board of Ordnance also showed interest in the capabilities of Ranger's artificial stone. In order to ascertain its suitability for casemate arches, a model vault was constructed in February and March 1835 on the Woolwich Marshes. Ranger constructed the arch under the superintendence of Lieutenant-Colonel Sir George Judd Harding. It had a span of seventeen feet and a rise of nine feet, and contained a total of 5947 cubic feet of concrete. Despite the fact that the arch had already cracked because of inadequate foundations and although the structure's

Fig. 3. 16–7 Pall Mall in 1908. (*City of London, London Metropolitan Archives, SC/PHL/01/501-42*)

core was still soft, the model stood up well under bombardment and Harding recommended the material's use for small magazines and casemates due to its strength and economy. However, there is no evidence for the implementation of these recommendations.[25]

Ranger's other applications of his concrete during the mid-1830s included an 'Early English' building at Regent's Park for Sir H. Taylor; the guardhouses in front of the Wellington Barracks; and a section of the Brighton sea wall.[26] His collaboration with Barry continued in this period and together they used Ranger's concrete for the façade of Nos. 16–17 Pall Mall, a building with shops on the ground floor and living accommodation above (1833–4: demolished 1913) (Fig. 3). Its classical façade with a rusticated base, heavy cornice and balustrade clearly demonstrated the decorative possibilities of Ranger's artificial stone. In fact, the Corinthian cornice admired by Taylor at his first meeting with Ranger was destined for this building.[27] And in 1835–6, Barry remodelled the façade of the Royal College of Surgeons at Lincoln's Inn Fields, again using moulded blocks of Ranger's stone.[28]

Despite the problems experienced with the concrete at the dockyards, Taylor continued to work with Ranger and his stone. In 1835, Taylor built the New Proprietary School at Blackheath, Kent, using concrete blocks composed of local gravel.[29] The same year, he proposed using Ranger's patent stone for the nave columns of Holy Trinity, Sheerness. However, this was rejected by Joseph Henry Good, surveyor to the Commissioners for Building New Churches, on the grounds that 'although much recommended and getting into general use' it had not been sufficiently been tested by time; Ranger acted as contractor for the eventually brick-built church.[30] Other architects were also using Ranger's lime-concrete as demonstrated by Edward Blore's proposal of 1838 to build Holy Trinity church at Barkingside, Essex, using this material. [31]

In 1836, Ranger signed four contracts with the Great Western Railway (GWR), three at the Bristol end of the line and one in the area of Reading. He was unable to fulfil them, however, partly due to financial difficulties on his part. In 1838, the GWR seized his machinery and tools and decided to re-let the contracts. This was followed by a lengthy series of court cases, which were only resolved in 1855.[32] In 1837, Ranger had also taken out a contract with the Bristol & Exeter Railway, from which he was, by mutual release, relieved a few months later.[33]

The beginning of the chancery proceedings coincided with the publication of Pasley's book, in which he stated that Ranger's artificial stone was inferior 'not only to all the natural building stones in common use in this country but even to sound well-burned bricks'.[34] These two events combined to bring an end to Ranger's career in concrete construction.[35]

WILLIAM RANGER, CIVIL ENGINEER

When Pasley published the results of his tests, he expressed his hope that Ranger's career as 'builder of skill and reputation' would continue, even if his career in concrete should end.[36] However, Ranger only continued to work for a few more years as a building contractor and architect on a much diminished scale and was soon looking for alternative employment.

By 1846, he was working as 'Lecturer on Architecture and General Construction' at the College for Civil Engineering at Putney.[37] Two years later, he published a *Syllabus of Lectures on Civil Engineering* for use by his students.[38] At the same time, he was also lecturing at the Royal Engineers' Establishment at Chatham.[39]

Following this interlude in teaching, Ranger found employment with the newly formed General Board of Health. Established by the Public Health Act of 1848, the Board was to improve the sanitary conditions of towns after various cholera epidemics. The Board supervised the implementation of the Act and the operation of the local boards of health. Ranger was appointed as one of the five superintending inspectors, apparently selected by the Board's commissioner Edwin Chadwick 'by virtue of their heterodoxy'.[40] The role of the superintending inspectors included the conducting of detailed public inquiries before a local board could be set up, and the approving of plans prepared for the local board. If these were found insufficient, a superintending inspector would instead prepare a suitable design. While this put an enormous workload on the shoulders of the superintending inspectors, it also gave them a monopoly on sanitary engineering.[41]

During his time at the General Board of Health, Ranger thus designed a number of engineering projects as part of his inspector duties, including waterworks at Croydon (1851), at the neighbouring Yorkshire towns of Dewsbury, Heckmondwike and Batley (1852), and at Shipley in Yorkshire (1853).[42] In 1858 the General Board of Health was abolished and replaced by the Local Government Act Office

Fig. 4. Tithe Map of Ickworth, 1850, showing the location of Ickworth House (in red) and the church. (*Suffolk Record Office, Bury St Edmunds, SRO:B/T12/2, with kind permission of the Diocese of St Edmundsbury and Ipswich*)

Fig. 5. Ickworth Church from the southeast in a watercolour of 1784 by Thomas Lyus. (*Colchester and Ipswich Museum Service*)

within the Home Office which administered the local boards. Ranger continued to work there until shortly before his death.[43] By the time he died, he had conducted well over seventy inquiries for the General Board of Health and its successor.[44]

William Ranger died on 12 September 1863 at his house, No. 39 St George's Square, Pimlico. His daughter, Mary Ann Scott, administered his effects of under £450.[45] Ranger seems to have had no formal education as a civil engineer and was never a member of the Institution of Civil Engineers.[46] Yet, he increasingly called himself a civil engineer, taught the subject and practised as such. His obituaries focus mainly on the impressive number of inquiries and reports he prepared for the General Board of Health. His earlier pioneering work with his patented artificial stone is only mentioned briefly in ambiguous terms: while its application in prominent works such as the Royal College of Surgeons and Wellington Barracks had stood the test of time, the obituary writers point out that particularly in ornamental applications its durability was not sufficient. Interestingly, the fault of the concrete here is thought to lie in its ornamental, rather than structural, application, which Pasley had criticised.[47]

Ranger's main centres of activity in the 1820s and 30s were Sussex, Kent and London. In addition, there is a small group of buildings in Suffolk, in the vicinity of Bury St Edmunds, designed and built by Ranger. His church at Westley has perhaps attracted most notice, as an early surviving example of a building erected entirely in concrete. Until recently, these works appeared isolated in Ranger's *oeuvre*, without any indication of how they fitted into his wider career. But recent research has identified his involvement in another church which predates that at Westley and which might have been instrumental in bringing Ranger to Suffolk in the first place.

WILLIAM RANGER AT ICKWORTH CHURCH

St Mary's church originally served the village and estate at Ickworth. [48] During the eighteenth and nineteenth centuries, however, it increasingly took on the role of family church to the Hervey family, the earls and (since 1826) marquesses of Bristol, who had owned the Ickworth estate from the mid-fifteenth century. The church dates in part from the thirteenth and fourteenth centuries, with significant alterations and additions of 1778, the 1830s and 1910–1. Originally situated near the medieval manor house and serving a small village, the context of the church had changed radically by the early nineteenth century. The medieval village vanished at some point, leaving only some farms which were removed in the early 1700s, around the time when the rectory burnt down and the manor house was demolished. Between 1700 and 1731, John Hervey, first Earl of Bristol, turned the agricultural land at Ickworth into a landscape park, with the church as a picturesque feature (Fig. 4).[49] Very little is known about the history and development of the church before the eighteenth century and the earliest known depiction dates from 1784 (Fig. 5). In 1778, the earliest documented restoration was undertaken by the third

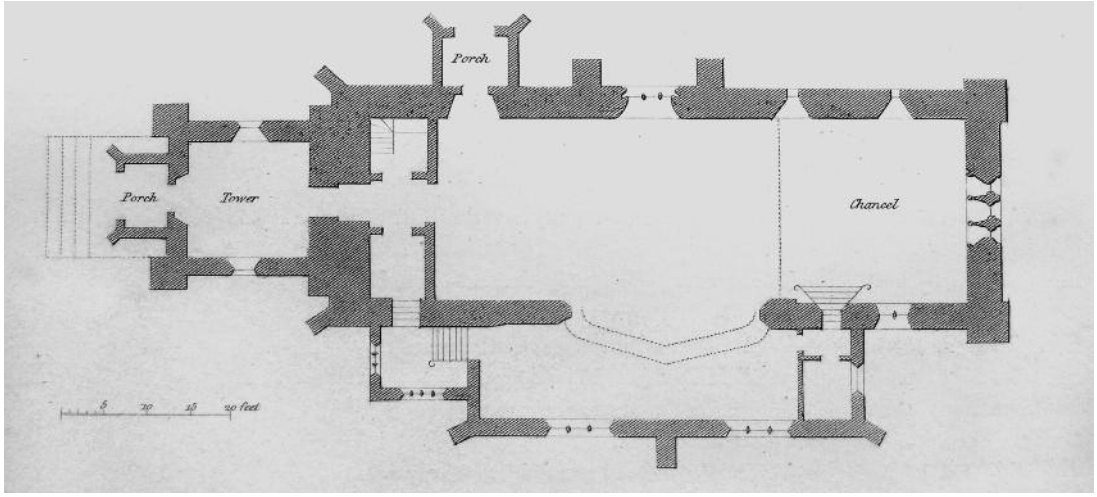

Fig. 6 (above). Plan of the church after the 1833 alterations. (*Gage, History and Antiquities, p. 312, with kind permission of Suffolk Record Office, Bury St Edmunds*)
Fig. 7 (left). South aisle with family pew, looking west. (*Photo: author, 2011*)

Earl. The church was 'beautified', the steeple rebuilt, 'flat marbles' (i.e. ledger slabs) carved 'for the most early ancestors', and a 'Family Burying Place built'.[50] The latter was a family vault of brick whose battlemented entrance abutted the east end of the church (Fig. 5). This marked the beginning of the church's predominant role as a mausoleum for the Hervey family.

In the early 1830s, the first Marquess of Bristol, together with the rector of Ickworth, his fourth son, Rev. Lord Arthur Charles Hervey, made further alterations and additions to the church.[51] The upper stages of the tower were rebuilt (omitting the spire), west and north porches were added, and a south aisle built which contained the family pew and a small vestry, with a brick-built family vault underneath (Fig. 6).[52] The roof may also have been altered or at least repaired.[53] Inside, lath and plaster partitions below the west gallery formed a stairwell at the north and a small lobby at the south which led to the stairs

Fig. 8. Ickworth Church from the southwest in *c.*1869. (*Suffolk Record Office, Bury St Edmunds, SRO:B/K911/1, with kind permission of the Bishop of Bath and Wells*)

up to the family pew in the south aisle (Fig. 7).[54] A single plaster arch framed the view from the family pew into the nave.[55]

Until now, the architect of the 1830s work has not been known, but recent research has shown that William Ranger was responsible. Concrete blocks were used in some of the buttresses, the above-ground portion of the south aisle, and porches at the west and north.[56] The upper stage of the tower also has concrete sills. As the work does not appear in the churchwardens' account books for the period, it is likely that the first Marquess of Bristol paid for the works as his successor did in 1910–1.[57] Unfortunately, no accounts relating to Ranger's work at the church have been found among his papers. But Ranger's involvement is confirmed by the fact that he returned a few years later to execute some small repairs. In July 1841, the churchwardens paid 'Mr Ranger' £1 15s 6d for repairs to the church and £2 2s 2d for repairs to the chancel.[58]

It is possible that the institution of Rev. Lord Arthur Charles Hervey as Rector in November 1832 at Ickworth provided an impetus for the works. The major works to the tower and south aisle were completed by 1833.[59] But works apparently continued on a smaller scale throughout the 1830s and early 1840s. According to the churchwardens' accounts of 1829–44, repairs to the building and its windows were carried out almost annually during that period. Sums higher than normal were spent on work to the windows in 1832 (£5 11s 1d) and 1841 (£6 14s 7d) by the glazier, Mr Frewer. Samuel Fenton executed the regular repairs to the church, including some re-slating in 1839. He was also responsible for 'coloring [*sic*] the church' in 1832 and whitewashing it in 1844.[60]

Perhaps not surprisingly, none of the early nineteenth-century antiquarian accounts comments on the use of the novel artificial stone. In fact, the first mention of the lime-concrete occurs in Lady Bristol's account of the alterations in 1910–1, where she describes the blocks and render as 'Brighton cement'.[61] The concrete blocks, which have a relatively coarse structure, would certainly have been rendered in the interior with possibly a thinner render on the outside. In a photo of about 1869, the concrete blocks of the south aisle and its west lobby are clearly visible (Fig. 8).[62] The blocks may have

been prefabricated in Lambeth and transported to Suffolk, though it would have been cheaper to make the blocks on site, using local materials. Ranger is known to have formed the blocks for the garden wall at Kemp Town on site, as had Taylor with the blocks for the school in Blackheath.

One of the most important furnishings in the church today is a group of sixteenth- and seventeenth-century stained glass roundels from the Netherlands, Flanders and Germany. Their provenance is unknown and they are not mentioned in any of the antiquarian accounts of the church. Their installation may relate to the higher expenditure on the windows in 1832 and 1841. When Lady Bristol researched the glass in 1930, Rev. Sydenham Henry Arthur Hervey (1846–1946), a son of the Right Rev. Lord Arthur Charles Hervey, recalled that it may have been installed by his father's predecessor, Rev. Henry Hasted, who was the incumbent at Ickworth between 1803 and 1832.[63] The roundels may have been provided by a local connoisseur and collector such as Colonel Robert Rushbrooke (1779–1845) who is known to have procured continental European furnishings and stained glass for several churches.[64] There have been attempts to link the roundels to Horace Walpole, who famously installed historic stained glass at Strawberry Hill.[65] Walpole was a family friend who, for example, wrote an epitaph for Mary Lady Hervey (died 1768), which is inscribed on a large ledger in the church.

As part of a comprehensive campaign of restoration and alterations in 1910–1 by Arthur Conran Blomfield (1863–1935), some of the 1830s work was removed or obscured.[66] Apparently the concrete had 'perished to a depth of a couple of inches from the surface' and many concrete details were replaced in stone, such as the tops of buttresses and the tower pinnacles. The north porch was replaced by a new half-timbered one and the west porch was removed. Ranger's decayed stone pinnacles on the tower were replaced by newly carved ones.[67] Most noticeably, once the late nineteenth-century cement render was removed the whole exterior was faced in flint (with the exception of the rendered brick tower), hiding again the rubble construction of the medieval walls and the concrete blocks of the south aisle.

Internally, the vestry steps were altered and the plaster arch to the south aisle was replaced by a double stone arch on a cluster pillar (Fig. 7). The partitions under the west gallery were removed and the gallery supported on an iron girder. The east vault was removed and all the burials transferred to the south vault, making it the principal family vault in the church.[68]

RANGER AT ICKWORTH HOUSE

Shortly after the completion of the main alterations to the church in 1833, Ranger began working at Ickworth House. Between 1834 and 1840 he undertook work to the value of over £3,500, mostly alterations to the recently completed wings and corridors, though none of them is known to have included the use of lime-concrete, and the material is not mentioned in the surviving estimates, accounts and bills.[69] In 1795 the Earl-Bishop had started the building of the new mansion, Ickworth House, one of England's most unusual country houses; it was essentially a central rotunda linked to pavilions by curved corridors (Fig. 4). He had commissioned designs from Mario Asprucci the Younger, based on Ballyscullion, his mansion in Co. Londonderry which had been designed by Michael Shanahan (begun 1787). But in the end, Asprucci's plans were simplified and executed by the architect Francis Sandys. The Earl-Bishop planned to use the central Rotunda as his living quarters, with galleries for his art collection in the wings to the east and west.[70] A few years after his death in 1803, building work stopped. From 1821, work was resumed by his son, the fifth Earl (later the first Marquess), initially on the Rotunda – which was now to house the family's art

collection, as well as reception rooms – and then on the East Wing, which became the family's living accommodation.[71]

The fifth Earl employed the London builder John Field, who had built the Bristols' London house at No. 6 St James's Square in 1819–20. At Ickworth, Field acted as supervisory architect executing Sandys's plans and overseeing several main contractors.[72] The East Wing was built between 1825 and 1829, following which work started on the corridors and the West Wing. In 1834, just as the east wing corridor was being completed, Ranger was paid £1,297 for 'raising' the east corridor and creating additional rooms over its entrance, as well as for coal vaults and smaller works. As part of the same programme of works, a section of the north front of the west corridor was also raised. Further work in relation to 'raising part of the west corridor' in order to '[help] us to form the ground north of [the] portico' was covered in a separate receipt for £66.[73] Curiously, ten years after the completion of the East Wing, Ranger raised its roof by two feet six inches (1839–40). It is possible that several drawings by Ranger of 1839 showing details of columns on a first-floor landing relate to this piece of work as well.[74] Smaller jobs by Ranger at Ickworth include the building of two new waterclosets at the west side of the Rotunda (1834–5), the construction of stables, a summerhouse and alterations to the Flower Garden wall (1836).[75]

Fig. 9. Westley church with its original spire in *c.*1922. (*Suffolk Record Office, Bury St Edmunds, SRO:B/ K997/118/2*)

LORD BRISTOL'S PATRONAGE

While the works at Ickworth continued, Ranger was commissioned to construct a new church at nearby Westley (1835–6), replacing a medieval church on a new site (Fig. 9). St Mary's church, Westley, and the contemporary Protestant church at Corbarieu, France, (1836) by F.-M. Lebrun, are the earliest surviving European churches built with concrete walls.[76] The spire at Westley, with its flying buttresses, gave the church a strong vertical emphasis which was lost when it was replaced by a pyramidal roof in about 1961.[77] The Marquess of Bristol gave the land for the new church, as well as £600 towards its construction, by far the largest donation.[78] It is likely that he also suggested William Ranger as architect.

The Marquess's involvement in the founding of another church seems to have provided Ranger with his last known commission in private practice, again acting as the architect. Ranger won a competition to design the church of St John in Bury St Edmunds, beating Mr Thomas and Mr Kendall into second and

Fig. 10. St John's church, Bury St Edmunds, with the former school in the foreground (later extended). The original spire was replaced in 1872 after the previous one had been struck by lightning. (*Photo: author, 2012*)

third place respectively.[79] St John's church was built in 1840–1, using white Woolpit bricks (Fig. 10).[80] The Marquess gave £100 as well as an endowment of £100 per annum, while the Marchioness donated the communion plate.[81] In 1842, Ranger also designed and built the adjoining infant school (now the hall).[82]

It seems likely that Ranger came to the Marquess's attention in Brighton, where Lord Bristol was a major landowner and benefactor to charitable projects.[83] Ranger visited the Marquess in Brighton in 1836 in order to discuss the construction of stables at Ickworth.[84] Neither Ranger nor his father, however, seem to have been involved in any of the Marquess's building projects at Brighton.

CONCLUSION

William Ranger career was highly versatile, which may explain why so little is known about him. His *oeuvre* included contracts for the Naval Works Department, for Sir Charles Barry, public health inquiries and engineering works for the Board of Health and its local boards. To these three main groups can now be added a number of buildings in Suffolk which were erected or altered by Ranger under the patronage of the first Marquess of Bristol. Although Lord Bristol employed numerous architects and builders on his various building projects in Brighton, London and Suffolk, he clearly appreciated Ranger's design and engineering skills

and put him forward for local church projects, following his work at Ickworth Church and House. More research remains to be done to discover and identify further works by Ranger, which will add to our knowledge of the use of his artificial stone and Ranger's place in the history of early nineteenth-century construction and architecture.

ACKNOWLEDGEMENTS

I would like to thank Sue Berry, Neil Burton, Andrew Derrick, Frank Kelsall and Andrew Saint with whom I discussed aspects of Ranger's work. This article is based on research for a Conservation Management Plan (CMP) for Ickworth Church. The help and assistance of the following people in the preparation of the CMP are gratefully acknowledged: Lord Bristol, Karen Knight, Anna Forrest, Kate Yates, Henry Freeland and Anne Griffiths. While every effort has been made to obtain permission from the copyright holders of the illustrations, it has not been possible to trace the copyright holder of Fig. 9.

NOTES

1 Research into the family history of William Ranger has shown that Howard Colvin erroneously deduced from a subscription list in Horsfield's *History of Sussex* (1835) that William was the son of William Ranger senior. Richard's second son was George Thomas Ranger (baptised 1808) who later worked in Brighton as builder and coal merchant. In 1836, William nominated Richard and George as sureties for his contracts with the Great Western Railway: H. Colvin, *A Biographical Dictionary of British Architects, 1600–1840* (New Haven and London, 2008), p. 843; East Sussex Record Office (ESRO), East Sussex Baptismal Index and parish records for St Nicholas, Brighton; A. Dale, *Brighton Town and Brighton People* (London and Chichester, 1976), pp. 175, 187; Brighton street directories, 1822–48; The National Archives (TNA), RAIL252/657, RAIL252/659.

2 ESRO, parish records for Laughton, Westham, Ringmer, and St Nicholas, Brighton.

3 T.H. Boore, *Brighton Annual Directory and Fashionable Guide* (Brighton, 1822).

4 Metropolitan Sanitary Commission, *First Report: Minutes of Evidence Taken Before the Commissioners [...]* (London, 1847), p. 149; M. Chrimes, 'Ranger, William' in A.W. Skempton *et al.* (eds.), *A Biographical Dictionary of Civil Engineers in Great Britain and Ireland: vol. 1, 1500–1830* (London, 2002), pp. 543–4.

5 A. Saint, *Architect and Engineer: A Study in Sibling Rivalry* (New Haven and London, 2007), p. 511, note 4; N. Tyson, 'Ranger's Artificial Stone', *The Georgian*, 2 (2011), p. 14; S. Berry, 'The Construction of St Peter's Church, Brighton, *c.*1818–1835', *Sussex Archaeological Collections*, 148 (2010); ESRO, AMS6025/27–9, AMS6025/37–8, AMS6025/46, AMS6025/58–61; H. Gaston, *Brighton's County Hospital, 1828–2007* (Newhaven, East Sussex, 2008), p. 9.

6 A. Dale, *Fashionable Brighton, 1820–60* (London, 2nd edition 1967, reprinted 1987), pp. 83–4; H.D. Roberts, *A History of the Royal Pavilion, Brighton* (London, 1939), pp. 162–5.

7 *Brighton Gazette*, 26 January 1826, p. 3.

8 Chrimes, 'Ranger', in Skempton *et al.* (eds.), *Biographical Dictionary*, pp. 543–4; D. Smith, 'Clark, William Tierney', in Skempton *et al.* (eds.), *Biographical Dictionary*, p. 137.

9 Kent History & Library Centre, Ch. 18/P2/1–6; R. Knight, 'The Great Stone Bridge' in *Aspects of Edenbridge*, 1 (n.d.), pp. 46–7; H.L. Somers-Cocks and V.F. Boyson, *Edenbridge* (Edenbridge, 1912), pp. 231–2.

10 J.M. Crook, 'Sir Robert Smirke: a pioneer of concrete construction', in F. Newby (ed.), *Early Reinforced Concrete (Studies in the History of Civil Engineering, vol. 11)* (Aldershot, 2001), p. 5; Chrimes, 'Ranger, William', in Skempton *et al.* (eds.), *Biographical Dictionary*, p. 543.

11 *Brighton Gazette*, 6 December 1827, p. 3.

12 *The Architectural Magazine*, 2 (February 1835), p. 62.

13 *Brighton Gazette*, 25 October 1832, p. 3; G.L. Symes, 'On the Uses of Concrete applied as Artificial Stone', *The Architectural Magazine*, 2 (February 1835), p. 62.

14 British Library, patent number 6341.

15 British Library, patent number 6729.

16 C. Manners, 'Queries and Answers', *The Architectural Magazine*, 2 (December 1834), p. 391.

17 C.W. Pasley, *Observations on Limes, Calcareous Cements, Mortars, Stuccos and Concrete [...]* (London, 1838), p. 144; Saint, *Architect and Engineer*, pp. 207–13; J. Summerson, *Architecture in Britain, 1530–1830* (9th ed., New Haven and London, 1993), p. 439; P. Collins, *Concrete: The Vision of a New Architecture* (London & Montreal, 2004, 2nd edition), pp. 36–7; J. Weiler, 'Army Architects: The Royal Engineers and the development of building technology in the nineteenth century' (PhD Dissertation, University of York, 1987), pp. 60–65.

18 S. Berry, 'Thomas Read Kemp and the Shaping of Regency Brighton, *c.*1818–1845', *Georgian Group Journal*, 17 (2009), pp. 125, 136–7.

19 According to the Brighton poll books, he retained freehold property in Brighton until at least 1837.

20 Suffolk Record Office, Bury St Edmunds (SROB), 941/30/46, 941/30/48.

21 Baker was Robert Smirke's preferred contractor and had worked with him on the concrete foundations of the Millbank Penitentiary in 1816–7. Crook, 'Sir Robert Smirke', pp. 3, 5; Saint, *Architect and Engineer*, p. 209.

22 G.L. Taylor, *The Autobiography of an Octogenarian Architect* (London, 1870), 1, p. 167.

23 Weiler, 'Army Architects', p. 171; Symes, 'On the Uses of Concrete', *Architectural Magazine*, 2 (February 1835), pp. 62–3; P. Guillery (ed.), *Survey of London, vol. 48: Woolwich* (New Haven and London, 2012), p. 102; Taylor, *Autobiography*, pp. 167–70, 179.

24 Guillery (ed.), *Survey of London, vol. 48: Woolwich*, p. 102; Chrimes, 'Ranger, William', in Skempton *et al.* (eds.), *Biographical Dictionary*, p. 543.

25 Weiler, 'Army Architects', pp. 184–6; J. Weiler, 'Chapter 19: Military', in J. Sutherland, D. Humm and M. Chrimes (eds.), *Historic Concrete: background to appraisal* (London, 2001), pp. 371–2.

26 *The Architectural Magazine*, 2 (December 1834), p. 391; obituary, *Gentleman's Magazine*, 215 (December 1863), p. 785; Crook, 'Sir Robert Smirke', p. 5, note 2; *Atchley's Price Book for Architects, Engineers, Contractors, Builders &c.* (London, 1869), p. 276.

27 F.H.W. Sheppard (ed.), *Survey of London, vol. 29: The Parish of St James, Westminster, part 1: South of Piccadilly* (London, 1960), p. 325; Taylor, *Autobiography*, p. 167.

28 *The Civil Engineer and Architect's Journal*, 1 (October 1837), p. 6; obituary, *The Builder*, 21 (19 September 1863), p. 672.

29 Taylor, *Autobiography*, p. 171.

30 Good as quoted in M.H. Port, *600 New Churches* (Reading, 2006), pp. 137, 268, 334.

31 The proposal was rejected by the Incorporated Church Building Society because the walls were too thin and the roof objectionable. Port, *600 New Churches*, p. 135.

32 Chrimes, 'Ranger', in Skempton *et al.* (eds.), *Biographical Dictionary*, p. 543; *The Civil Engineer and Architect's Journal*, 2 (1839), pp. 23–5; TNA, RAIL252/186, RAIL252/188, RAIL252/656–9, C13/393/4, C13/411/1, C13/428/7, C13/447/25, C13/470/13.

33 TNA, RAIL75/162–164.

34 Pasley, *Observations on Limes*, p. 144.

35 Eight years after condemning the use of concrete in the Woolwich river wall, Lieutenant (later Sir) William Thomas Denison changed his opinion. In 1845, he testified to a government commission that the refacing of the wall may have been premature as the concrete blocks had recently been tested and found sound. Sadly, it did not repair the reputation of Ranger's artificial stone. Weiler, 'Army Architects', p. 172.

36 Pasley, *Observations on Limes*, p. 144, footnote.

37 Founded in 1840, the Putney College was one of the few teaching establishments for engineering not based at a university. However, it was not a financial success and closed in 1857: *College for Civil Engineers and of General Practical and Scientific Education. Putney, Surrey* (London, 1846), pp. 5, 11–2; D. Smith (ed.), *London and the Thames Valley (Civil Engineering Heritage)* (London, 2001), p. 273; A.M. Muir Wood, *Civil Engineering in Context* (London, 2004), p. 18.

38 W. Ranger, *Syllabus of Lectures on Civil Engineering for the Use of the Students at Putney College* (London, 1848).

39 Metropolitan Sanitary Commission, *First Report: Minutes*, p. 149.

40 Ranger may have come to Chadwick's notice the year before when he gave evidence to the Metropolitan Sanitary Commission, of which Chadwick was a member: S.E. Finer, *The Life and Times of Sir Edwin Chadwick* (London, 1952), quoted in D. Burfield, *Edward Cresy, 1792–1858: Architect and Civil Engineer* (Donington, 2003), p. 124.

41 Burfield, *Cresy*, pp. 125–8.
42 *The Builder*, 9 (20 December 1851), p. 795; 10 (10 January 1852), p. 28; West Yorkshire Archive Service, QE20/1/1852/5, QE20/1/1853/9.
43 *Kelly's Post Office Directory*, 1862.
44 The British Library holds seventy-seven reports by Ranger relating to inquiries for the General Board of Health.
45 *Kelly's Post Office Directory*, 1863; *National Probate Calendar*, 16 (1867), p. 278; obituary, *The Builder*, 21 (19 September 1863), p. 672; obituary, *Gentleman's Magazine*, 215 (December 1863), pp. 784–5.
46 Information from Carol Morgan, Institution of Civil Engineers. The only institutional membership he held was that of the Royal Society of Arts (from 1856), which is incorrectly rendered as 'Royal Society' in the obituary in *The Builder*. Information from Eve Watson, Royal Society of Arts, and Joanna Corden, Royal Society.
47 Obituary, *The Builder*, 21 (19 September 1863), p. 672; obituary, *Gentleman's Magazine*, 215 (December 1863), pp. 784–5.
48 The church was made redundant in 1984 and is currently being repaired by the Ickworth Church Conservation Trust, with the help of a grant from the Heritage Lottery Fund. Ickworth Park and House have been in the ownership of the National Trust since 1956.
49 M. Hesse, 'The Early Parish and Estate of Ickworth, West Suffolk', *Proceedings of the Suffolk Institute of Archaeology and Natural History* (PSIANH), 39(1) (1997), pp. 20–2; Norfolk Record Office, DN/FCB1, p. 500r; W. Filmer-Sankey, 'The Excavations on the Site of Ickworth Manor', *PSIANH*, 36(2) (1988), p. 71; C. Pusey, *Ickworth, Suffolk* (Swindon, 2011), p. 43.
50 Sir J. Cullum, 'Notes on Ickworth Church, Suffolk', SROB, E2/33/17.1, p. 171.
51 In 1869, Rev. Lord Arthur Charles Hervey was consecrated Bishop of Bath and Wells: W. Hunt, 'Hervey, Lord Arthur Charles (1808–1894)', rev. E. Clewlow, *Oxford Dictionary of National Biography*, online edition, 2004, accessed 29 May 2012.
52 J. Gage, *The History and Antiquities of Suffolk. Thingoe Hundred* (Bury St Edmunds, 1838), p. 312. It is not clear if there was a west porch before the 1830s. None of Gage's illustrations show the east vault, although it continues to appear in outline (without the semi-circular entrance) on maps as late as 1885. It seems likely that the above-ground portion was removed in the 1830s.
53 An investigation of the roof prior to its complete replacement in 1910–1 showed that it had been repaired using deal, possibly in the 1830s. Lady A.F. Bristol, 'An Account of the Restoration of Ickworth Church by the Marchioness of Bristol', unpublished typescript, SROB, microfilm J542, p. 1.
54 Lady Bristol, 'An Account', p. 11.
55 SROB, FL699/5/2.
56 Lady Bristol, 'An Account', p. 1.
57 No application for a faculty has been found in the faculty books for the Diocese of Norwich.
58 SROB, FL669/1/2, FL669/1/3.
59 Gage, *History and Antiquities*, p. 312. The same date can be found on the tower clock by Thwaites and Reed of Clerkenwell. Lady Bristol, 'An Account', p. 4.
60 SROB, FL669/1/2, FL669/1/3.
61 The render, possibly apart from that on the tower, dated in fact to the late nineteenth century. Lady Bristol, 'An Account', p. 1.
62 At some point during the later nineteenth century the entire church was rendered. SROB, K997/117/9.
63 SROB, 941/12/73a.
64 C. Tracy, 'Colonel Robert Rushbrooke, MP, JP (1779–1845): Grand Tourist, Connoisseur, Collector, Amateur Architect and Wood Carver', *PSIANH*, 40(3) (2003), pp. 313–323.
65 A handwritten note inserted between the pages of Lady Bristol's typescript suggested a connection with Horace Walpole. There is no other evidence for such a connection. Lady Bristol, 'An Account'.
66 Lady Bristol, 'An Account', p. 1.
67 The old 1830s pinnacles were moved to the gateposts of the Horringer gate to the Park. Lady Bristol, 'An Account', p. 4.
68 There are two smaller vaults below the nave floor, comprising two coffins each. Other family members were buried in the churchyard.
69 SROB, 941/30/46–52, 941/31/38–9, 941/31/42–3.
70 N. Strachey, *Ickworth, Suffolk* (Swindon, 1998, reprinted 2005), pp. 51–3.
71 National Trust, East of England Regional Office, J. Maddison, 'Ickworth Conservation Plan' (2003), p. 9; Pusey, *Ickworth*, p. 59.
72 National Trust, East of England Regional Office, N. Strachey, 'Supplementary Proof of Evidence of Nino Strachey (Replacement for Sections 1.4.7 and 2.2), Ickworth House, Horringer, Bury St Edmunds', unpaginated.
73 SROB, 941/30/46, 941/30/48; National Trust, East of England Regional Office, D. Adshead, 'The East

Wing, Ickworth, Suffolk: An Outline Building History' (1999), pp. 2, 8.

74 SROB, 941/30/52, 941/31/42–3.

75 SROB, 941/30/47, 941/30/50–1.

76 A. Saint, 'Frank Lloyd Wright and Paul Mueller: the Architect and his Builder of Choice', *arq: architectural research quarterly*, 7(2) (2003), p. 167, note 3. Ranger seems to have built an even earlier concrete church on the Duke of Northumberland's estates which is yet to be identified. *Kentish Chronicle*, 28 January 1834, p. 3.

77 SROB, FL647/5/6.

78 SROB, FL647/5/4; T.C.B. Timmins, *Suffolk Returns from the Census of Religious Worship of 1851* (Suffolk Records Society, vol. 39, Woodbridge, 1997), p. 35.

79 Mr Kendall may be Henry Edward Kendall who built Nos. 19–20 Sussex Square, the Marquess's house in Brighton. SROB, FL544/5/16.

80 The builders were Messrs Bell & Co, Cambridge. SROB, FL544/1/10.

81 SROB, FL544/1/24; FL544/5/15; Timmins, *Suffolk Returns*, p. 42; plaque in the church.

82 Ranger's commission for the church and school was £362 4s. The school was later extended. SROB, FL544/5/15; Colvin, *Dictionary*, p. 843; statutory list descriptions.

83 He donated land and money to the Sussex County Hospital, the Extra Mural Cemetery, St Mary's Hall school and St John the Evangelist's church (1840) and initiated and funded the building of St Mark's church (*c.*1839–49): Dale, *Brighton Town and Brighton People*, p. 34; A. Dale, *Brighton Churches* (London, 1989), pp. 61, 83, 96–7.

84 SROB, 941/30/50.