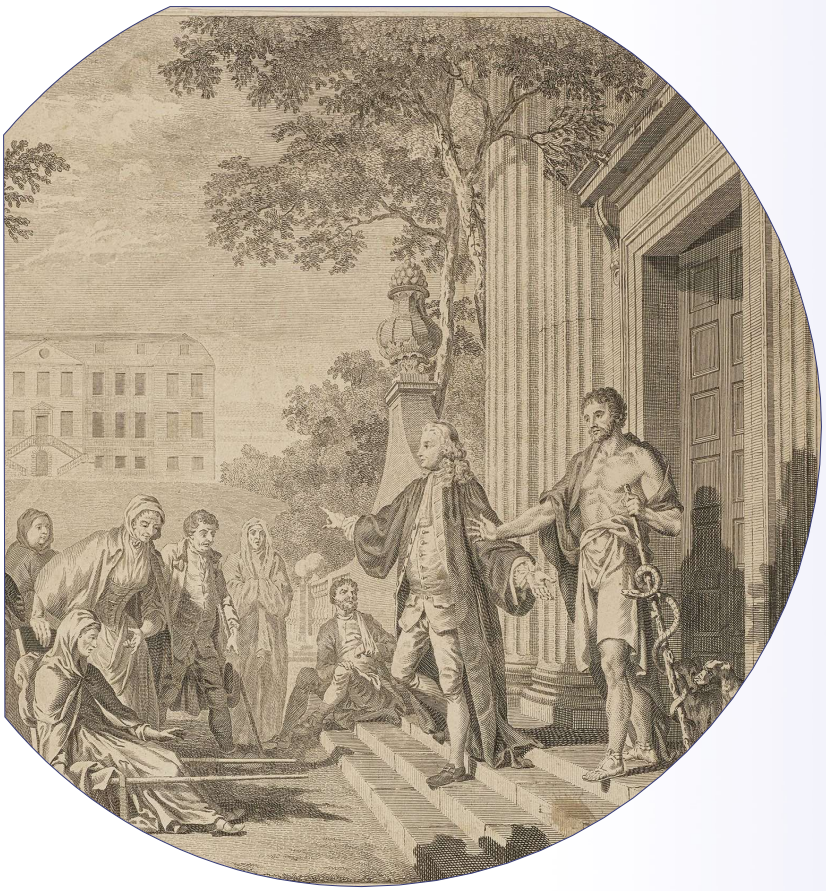

The Patients' Story: Dr Radcliffe's Legacy in the Age of Hospitals. Excavations at the 18th–19th Century Radcliffe Infirmary Burial Ground, Oxford

Specialist analysis reports

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The Patients' Story: Dr Radcliffe's Legacy in the Age of Hospitals. Excavations at the 18th–19th Century Radcliffe Infirmary Burial Ground, Oxford

Specialist analysis reports

Contents

Summary

The material in this document accompanies the following published report:

Loe, L, Webb, H, Simmonds, A, and Poore, D, 2021 *The patients' story: Dr Radcliffe's legacy in the age of hospitals. Excavations at the 18th–19th century Radcliffe Infirmary burial ground*, Oxford, Oxford Archaeology Monograph 32, Oxford

The material comprises supplementary tables relating to the documentary evidence (chapter 2 of the published monograph) and the scientific analyses of the human remains, osteology and stable isotopes (chapter 5) and full specialist analysis reports on the Iron Age and Roman pottery, non-ceramic small finds and glass, worked stone and faunal remains, each of which is presented in a summary form in the published monograph. The analysis report on the coffins is presented in full in the monograph, which also includes reports on the medieval and post-medieval pottery, ceramic building material, wig curler and clay tobacco pipes taken from the post-excavation assessment with no further analysis. In addition to this, there were small quantities of oyster shell and slag, which were not analysed as they were deemed to have no relevance to the aims of the project.

The monograph describes the results of archaeological investigations at the site of the old Radcliffe Infirmary burial ground, undertaken between 2013 and 2014. The Radcliffe Infirmary was founded in 1770 in the parish of St Giles with funds from the estate of the royal physician, landowner and MP, Dr John Radcliffe. Like other English urban hospitals established at this time, the Radcliffe was a voluntary hospital and a teaching hospital, opened to treat the sick poor. Run by a board of governors, it is among a limited number of voluntary hospitals to be set out with its own formal burial ground, used between 1770 and 1855, to bury those dying in the hospital who were unclaimed by their families or whose families could not afford to transport them back to their home parish for burial. Following its closure, the burial ground became a garden for convalescence and, apart from some relatively limited post-war disturbance from the construction of the Eye Hospital and laboratories, it has remained virtually intact until present times.

In 2013 Oxford Archaeology was appointed by the Estates Department, University of Oxford, to excavate the burial ground prior to the construction of the Blavatnik School of Government. The work was undertaken in accordance with a Faculty issued by the Diocese of Oxford and was carried out between June and September 2013 with further watching briefs during March and July and August 2014. This resulted in the excavation of 336 graves, in addition to which were two graves that had been fully excavated during the evaluation stage and were not re-excavated, as well as the recovery of additional remains including isolated limbs from grave backfills and from

shallow pits that had been dug specifically for their burial. In all, 388 discrete individuals were recovered as well as material from charnel pits. Also involved was recording of the burial ground's south-western boundary wall, which fronted onto Walton Street, and a small number of earlier features which pre-date the cemetery, including an Iron Age pit, an Anglo-Saxon ditch and 17th/18th-century quarry pits.

The volume primarily focuses on the burial evidence. A rare collection, it presents the unique opportunity to examine 18th/19th-century hospital practice as reflected in the physical remains of the patients themselves and to consider the findings in the context of the hospital's extensive archives.

Most of the extent of the burial ground (*c* 66–78%) was excavated, allowing its physical organisation and development to be traced for the first time. The burials comprised 351 discrete articulated individuals in earth-cut graves, generally aligned SW–NE and formally laid out in regular rows, in two distinct groups, either side of a footpath. This was in addition to 40 sets of articulated body parts, representing surgical waste, recovered from the backfills of graves and discrete pits, and a quantity of disarticulated human bone, primarily resulting from disturbance to burials during the construction of the Eye Hospital and laboratories. Documentary evidence suggests that those burials lying north-west of the footpath may date between 1770 and 1821 and those south-east of the path to between 1821 and 1855, after which the burial ground was closed.

Two groups of dense intercutting burials dug into disused quarry pits were found and are in stark contrast to the otherwise generally well-organised nature of the burial ground. The reason for their presence is unclear, but they may relate to the need to dispose of a larger than normal number of bodies, perhaps as the result of an epidemic. Evidence of the cause of death was not visible on the skeletons from these contexts.

The graves contained metal fixtures and fittings and traces of wood, all from coffins, and, in one case, a coffin plate bearing biographical details. However, in keeping with post-medieval funerary tradition, grave furnishings were otherwise largely absent apart from a few items of jewellery, shroud pins and dress fastenings. No grave markers were found and there are no surviving plans of the burial ground. Although a transcript of part of the burial register provides some information on individuals, this cannot be related to specific skeletons. Therefore, except for the individual with the coffin plate, the burials are unidentified.

The skeletons themselves were generally well preserved, allowing detailed information to be obtained on the demography, physical attributes, health and disease of the group. The majority of skeletons were adults and, in keeping with the burial register, there were more males than females. The presence of children below the age of seven and individuals with certain diseases (for

example, syphilis and tuberculosis) confirms the documentary evidence which suggests that the hospital's admissions policy, which did not allow these groups, was not always observed. Evidence for trauma was notable, especially among males, and is testament to the hazardous nature of working-class lives in late 18th/early 19th-century England.

Around 15% of the individuals showed evidence of medical intervention, including surgery, autopsy and anatomisation. Evidence for surgery reflected a focus on procedures which were quick and accurate (primarily amputations), in keeping with the practices of the era prior to the introduction of antibiotics and anaesthesia, when prolonged invasive surgery was uncommon. Also observed was a sacrectomy (removal of a section of the sacrum), a remarkable example of surgical intervention and possibly the earliest physical example to be discovered archaeologically. It reflects advanced medical intervention for its time.

Compared with other hospital burial grounds, evidence for anatomisation was limited, this activity primarily being observed on human remains arising from surgery and post-mortems. This evidence is consistent with the historical records, which reflect a hospital that upheld a high duty of care towards its patients, both pre- and post-mortem. It also supports historical research which has previously argued that the hospital mortuary played an important role in the advancement of teaching and medicine at the Radcliffe. Dissection was not performed for the sake of it, but surgical material and post-mortems were used as teaching opportunities. Thus, the operating theatre and mortuary played an important, hitherto unrecognised role in the development of a hospital which, by the late 19th century, had gained a reputation for medical education.

Much has been written about the Old Radcliffe Infirmary during the 18th and 19th centuries, but the focus has been on medical advances and key individuals. The work presented here offers a new perspective. More specifically, it provides an insight into the physicality of hospital treatment, surgery, teaching and working lives. Quite literally, it is the patients' story.

1 DOCUMENTARY EVIDENCE – SUPPLEMENTARY TABLES

Table 1: Patient recommendation by type (based on data retrieved from Apothecary Register of Outpatients (1837–9) [OHA RI 24 B1 1]. n = total number of entries)

Medical Outpatients 1837–9		
Combined [n = 1630]	**Female [n = 1067]**	**Male [n = 580]**
672 = 41.2% = Radcliffe surgeon	423 = 39.6% = Radcliffe surgeon	219 = 43.1% = Radcliffe surgeon
392 = 24.0% = Individual	260 = 24.4% = Individual	122 = 24.0% = Individual
303 = 18.6% = Reverend	201 = 18.8% = Reverend	094 = 18.5% = Reverend
143 = 08.8% = Radcliffe physician	103 = 09.7% = Radcliffe physician	039 = 07.7% = Radcliffe physician
052 = 03.2% = Oxford college	035 = 03.3% = Oxford college	015 = 02.9% = Oxford college
024 = 01.5% = Company	018 = 01.7% = Company	009 = 01.8% = Parish
024 = 01.5% = Parish	012 = 01.1% = Parish	006 = 01.2% = Company
013 = 00.8% = Freemasons	011 = 01.0% = Freemasons	002 = 00.4% = Emergent
007 = 00.4% = Emergent	004 = 00.4% = Emergent	002 = 00.4% = Freemason

Table 2: Patient admissions in years (based on data retrieved from the Annual Reports (1770–1851) [OHA RI 1 A1]. n = total number of entries. There is no information from this evidence regarding differences between males and females)

Inpatient				Outpatient			
1770–1851 [n = 58,137]				1770–1851 [n = 43,106]			
Mean	Median	Mode	Range	Mean	Median	Mode	Range
735.9	657	612	265–1054	546	363	327	35–1838

Table 3: Patient admissions, broken down from 1837 regarding medical and surgical admissions, in the Annual Reports (1770–1851) [OHA RI 1 A1]. (n = total number of entries. There is no information from this evidence regarding differences between males and females)

Medical								Surgical							
Inpatient				Outpatient				Inpatient				Outpatient			
1837–51 [n = 4077]				1837–51 [n = 11,248]				1837–51 [n = 8308]				1837–51 [n = 7619]			
Mean	**Median**	**Mode**	**Range**	**Mean**	**Median**	**Mode**	**Range**	**Mean**	**Median**	**Mode**	**Range**	**Mean**	**Median**	**Mode**	**Range**
291	657	612	102–377	763	777	N/A	527–935	593	612	N/A	439–796	544	564	N/A	404–695

Table 4: Patient distance travelled (in miles). Based on data retrieved from the following documents: Register of All Operations of a Higher Order Performed at the Radcliffe Infirmary (1838-1855) [OHA RI 10 B1 1], Case Notes on In Patients (1796-1830) [OHA RI 10 A1 1] and Apothecary Register of Out Patients (1837-1839) [OHA RI 24 B1 1]. n = total number of entries. f = total number of female entries. m = total number of male entries. ? = entry either has no gendered information or no information pertaining to this entry type. Also note, whilst there were surgical out-patients, there is no specific document relating to these cases in the archive

	Medical								Surgical			
	Inpatient				Outpatient				Inpatient			
	1796–1830 [n = 99 / f = 42 / m = 56 / ? = 1]				1837–9 [n = 1649 / f = 1075 / m = 514 / ? = 0]				1838–55 [n = 231 / f = 53 / m = 138 / ? = 40]			
	Mean	Median	Mode	Range	Mean	Median	Mode	Range	Mean	Median	Mode	Range
Combined	9.4	6.2	6.3	0.2–68.6	5.7	2.2	0.2	0.1–276.7	10.68	8.42	2.71	0.24–56.82
Female	10.1	5.3	0.4	0.2–68.6	5.6	2.4	0.2	0.1–222.2	11.86	9.73	3.69	0.49–52.39
Male	9.0	6.27	6.27	0.2–46.1	6.1	1.6	0.7	0.2–276.7	10.23	7.89	2.71	0.24–56.82

Table 5: Annual emergencies for all types of patient. Based on data retrieved from the Annual Reports (1770–1851) [OHA RI 1 A1]. n = total number of entries

Annual reports			
1770–1851 [n = 6702]			
Mean	Median	Mode	Range
85.9	80.5	77	22–142

Table 6: Patient emergent cases. Based on data retrieved from the Register of All Operations of a Higher Order Performed at the Radcliffe Infirmary (1838–55) [OHA RI 10 B1 1]. n = total number of entries

Surgical Inpatients 1838–55		
Combined [n = 231]	Female [n = 61]	Male [n = 170]
n= 044 = Emergent = 19.0% Emergent Range = 11–73 yrs Emergent Mean = 33.5 yrs Emergent Median = 30 yrs Emergent Mode = 14 yrs n = 187 = Non-Emergent = 81.0% Non-Emergent Range = 1.5–77 yrs Non-Emergent Mean = 33.5 yrs Non-Emergent Median = 25 yrs Non-Emergent Mode = 20 yrs Total emergency rate = 19.0%	n= 007 = Emergent = 11.5% Emergent Range = 23–70 yrs Emergent Mean = 50.4 yrs Emergent Median = 54 yrs Emergent Mode = 54 yrs n = 054 = Non-Emergent = 88.5% Non-Emergent Range = 3–60 yrs Non-Emergent Mean = 25.6 yrs Non-Emergent Median = 21 yrs Non-Emergent Mode = 19 yrs Total female emergency rate = 03.0%	n= 037 = Emergent = 21.8% Emergent Range = 11–73 yrs Emergent Mean = 29.6 yrs Emergent Median = 25 yrs Emergent Mode = 19 yrs n = 133 = Non-Emergent = 78.2% Non-Emergent Range = 1.5–77 yrs Non-Emergent Mean = 31.5 yrs Non-Emergent Median = 27 yrs Non-Emergent Mode = 35 yrs Total male emergency rate = 16.0%

Table 7: Patient recommendation by type. Based on data retrieved from Apothecary Register of Outpatients (1837–9) [OHA RI 24 B1 1]. n = total number of entries

Medical Outpatients 1837–9		
Combined [n = 1630]	**Female [n = 1067]**	**Male [n = 580]**
007 = 00.4% = Emergent	004 = 00.4% = Emergent	002 = 00.4% = Emergent

Table 8: Patient sickness duration in days. Based on data retrieved from Case Notes on In Patients (1796–1830) [OHA RI 10 A1 1] and Apothecary Register of Out Patients (1837–9) [OHA RI 24 B1 1] documents. n = total number of entries. f = total number of female entries. m = total number of male entries. ? = entry either has no gendered information or no information pertaining to this entry type)

	Medical							
	Inpatients				Outpatients			
	1796–1830 [n = 99 / f = 42 / m = 56 / ? = 1]				1837–9 [n = 1649 / f = 1065 / m = 514 / ? = 70]			
	Mean	**Median**	**Mode**	**Range**	**Mean**	**Median**	**Mode**	**Range**
Combined	302	90	365	5–2190	173	60	60	2–1460
Female	241	90	90	14–1095	159	60	60	2–1460
Male	348	120	60	5–2190	196	60	60	2–1460

Table 9: Surgeries. Based on data retrieved from the Annual Reports (1770–1851) [OHA RI 1 A1]. n = total number of entries

Annual reports			
1837–51 [n = 223]			
Mean	**Median**	**Mode**	**Range**
16	16	16	7–27

Table 10: Patient anaesthetic rate. Based on data retrieved from the Register of All Operations of a Higher Order Performed at the Radcliffe Infirmary (1838–55) [OHA RI 10 B1 1]

Surgical Inpatients 1838–55		
Combined [n = 13]	**Female [n = 6]**	**Male [n = 7]**
	Chlor = 1848 = Amp = 31yrs = Died Ether = 1848 = Amp = 40yrs = Lived Chlor = 1849 = Amp = 29yrs = Lived Cblor = 1849 = Amp = 22yrs = Lived Chlor = 1849 = Amp = 19yrs = Died Chlor = 1850 = Amp = 45yrs = Lived	Ether = 1847 = Amp = 50yrs = Lived Chlor = 1848 = Amp = 35yrs = Lived Chlor = 1848 = Amp = 31yrs = Lived Chlor = 1848 = Amp = 13yrs = Lived Chlor = 1848 = Amp = 14yrs = Lived Chlor = 1848 = Amp = 19yrs = Died Chlor = 1853 = Amp = 28yrs = Died
Anaesthetic Mortality Rate: 30.8% After first use in 1848, anaesthetic used in 13 out of 75 amputations = 17.3%	Female Anaesthetic Mort Rate: 33.3% After first use in 1848, anaesthetic used in 6 out of 28 amputations = 21.4%	Male Anaesthetic Mort Rate: 28.9% After first use in 1848, anaesthetic used in 7 out of 47 amputations =14.9%

Table 11: Average length of patient overstay in days. Based on data retrieved from the Annual Reports (1770–1851) [OHA RI 1 A1]. n = total number of entries

Annual reports			
1837–51 [n = 223]			
Mean	Median	Mode	Range
95.6	91	140	35–182

Table 12: Patient length of stay in days. Based on data retrieved from the following documents: The Register of All Operations of a Higher Order Performed at the Radcliffe Infirmary (1838–55) [OHA RI 10 B1 1] and Case Notes on In Patients (1796–1830) [OHA RI 10 A1 1]. n = total number of entries. f = total number of female entries. m = total number of male entries. ? = entry either has no gendered information or no information pertaining to this entry type

	Inpatient							
	Medical				Surgical			
	1796–1830 [n = 99 / f = 42 / m = 56 / ? = 1]				1838–55 [n = 231 / f = 61 / m = 170 / ? = 0]			
	Mean	Median	Mode	Range	Mean	Median	Mode	Range
Combined	32	23	16	1–188	50.1	43	30	1–199
Female	36	32	13	4–106	52.0	40	30	14–147
Male	28.4	21	10	1–188	49.3	43	2	1–199

Table 13: In- and outpatient annual deaths (surgical and medical patients combined). Based on data retrieved from the Annual Reports (1770–1851) [OHA RI 1 A1]. n = total number of recorded deaths of total number of entries

Inpatient				Outpatient			
1770–1851 [n = 1908 of 58,137]				1770–1851 [n = 484 of 43,106]			
Mean	Median	Mode	Range	Mean	Median	Mode	Range
3.28	23	23	0–55	6.22	0	0	0–73

Table 14: Surgical inpatient deaths: Based on data retrieved from the Register of All Operations of a Higher Order Performed at the Radcliffe Infirmary (1838–55) [OHA RI 10 B1 1]. n = total number of entries

Surgical inpatients 1838–55		
Combined [n = 231]	**Female [n = 61]**	**Male [n = 170]**
n= 190 = Cured = 82.3% Cured Range = 1.5–77 yrs Cured Mean = 29.0 yrs Cured Median = 25 yrs Cured Mode = 19 yrs n = 41 = Died = 17.7% Died Range = 4–73 yrs Died Mean = 37.4 yrs Died Median = 38 yrs Died Mode = 38 yrs Total death rate = 17.7% (41/231)	n= 56 = Cured = 91.8% Cured Range = 3–60 yrs Cured Mean = 27.8 yrs Cured Median = 25 yrs Cured Mode = 19 yrs n = 5 = Died = 8.2% Died Range = 15–70 yrs Died Mean = 35.6 yrs Died Median = 31 yrs Died Mode = 31 yrs Total female death rate = 02.2% (5/231)	n= 134 = Cured = 78.8% Cured Range = 1.5–77 yrs Cured Mean = 29.5 yrs Cured Median = 26 yrs Cured Mode = 14 yrs n = 36 = Died = 21.2% Died Range = 4–73 yrs Died Mean = 37.7 yrs Died Median = 38 yrs Died Mode = 38 yrs Total male death rate = 15.6% (036/231)

Table 15: Surgical in patient % of autopsies. Based on data retrieved from the Register of All Operations of a Higher Order Performed at the Radcliffe Infirmary (1838–55) [OHA RI 10 B1 1]. n = total number of entries

Surgical inpatients 1838–55		
Combined [n = 41]	**Female [n = 5]**	**Male [n = 36]**
24 = Died, No Autopsy = 57.1% No Autopsy Range = 4–70 yrs No Autopsy Mean = 36.6 yrs No Autopsy Median = 40 yrs No Autopsy Mode = 15 yrs 17 = Died, Autopsy = 40.5% Autopsy Range = 12–73 yrs Autopsy Mean = 38.6 yrs Autopsy Median = 31 yrs Autopsy Mode = 70 yrs	3 = Died, No Autopsy = 60.0% No Autopsy Range = 15–43 yrs No Autopsy Mean = 25.7 yrs No Autopsy Median = 19 yrs No Autopsy Mode = 19 yrs 2 = Died, Autopsy = 40.0% Autopsy Range = 31–70 yrs Autopsy Mean = 50.5 yrs Autopsy Median = n/a Autopsy Mode = n/a	21 = Died, No Autopsy = 58.3% No Autopsy Range = 4–70 yrs No Autopsy Mean = 38.62 yrs No Autopsy Median = 40 yrs No Autopsy Mode = 38 yrs 15 = Died, Autopsy = 41.7% Autopsy Range = 12–73 yrs Autopsy Mean = 37 yrs Autopsy Median = 31 yrs Autopsy Mode = 38 yrs

2 SCIENTIFIC ANALYSES OF THE HUMAN REMAINS, OSTEOLOGY AND STABLE ISOTOPES – SUPPLEMENTARY TABLES

Table 16: Potential isolated, articulated limb matches with articulated skeletons

Skeleton no.	Age	Sex	Amputated limb	Location of cut	Healing status	Potential matches (isolated limb numbers)
3498	Prime adult	M	R leg	Below knee	Healing	3036, 3416, 3446, 3647b, 3770, 4398, 4400
3668	Middle adult	M	R leg	Above knee	Healing	3036, 3037, 3059, 3414, 3416, 3446, 3565, 3647b, 3770, 4398, 4400, 4426
3801	Prime adult	F	R leg	Above knee	Unhealed	3036, 3037, 3059, 3414, 3416, 3446, 3565, 3647b, 3770, 4398, 4400, 4426
3927	Prime adult	?M	L leg	Below knee (just above ankle)	Healing	3447, 3608, 3645, 3647c, 4306
3960	Mature adult	?M	L leg	Below knee	Healing	3447, 3608, 3645, 3647c, 4329b, 4306
4082	Young adult	M	R leg	Above knee	Unhealed	3036, 3037, 3059, 3414, 3416, 3446, 3565, 3647b, 3770, 4398, 4400, 4426
4183	Prime adult	?M	L leg	Above knee	Unhealed	3010, 3237, 3253, 3447, 3608, 3645, 3647a, 3647c, 3766, 4058, 4329b, 4473, 4524, 4306
4329A	Mature adult	?	L leg	Below knee	Unhealed	4329b, 3447, 3608, 3645, 3647c, 4058, 4306, 4329b
4361	Prime adult	F	L leg	Below knee	Healing	3447, 3608, 3645, 3647c, 4306, 4329b
4369	Mature adult	?M	R leg	Below knee	Unhealed	3036, 3416, 3446, 3647b, 3770, 4398, 4400
4440	Middle adult	?M	L leg	Above knee	Healing	3010, 3237, 3253, 3447, 3608, 3645, 3647a, 3647c, 3766, 4058, 4329b, 4473, 4524, 4306
4479	Middle adult	??F	R leg	Below knee	Healing	3416, 3770, 4398, 4400
4542	Adolescent	/	R leg	Below knee	Healing	3036, 3416, 3647b, 3770, 4398, 4400

Table 17: Summary of septic arthritis cases

Joint affected	Side	Skeleton	Age	Sex	Notes
Shoulder	R	3430	Young adult	?M	
		3901	Prime adult	?M	Multifocal septic arthritis (R knee + foot also)
Elbow	L	3063	Adult unspecified	?	Amputated limb
	R	3148	Prime adult	M	
Knee	L	3115	Young adult	?M	
		3221	Prime adult	M	Severe atrophy of L lower limb
		3234	Young adult	?F	
		3237	Adult unspecified	?	Amputated limb
		3253	Adult unspecified	?	Amputated limb
		3766	Adult unspecified	?	Amputated limb
		4524	Adult unspecified	?	Isolated limb (no direct evidence for amputation)
	R	3414	Adult unspecified	??M	Amputated limb
		3901	Prime adult	?M	Multifocal septic arthritis (R shoulder + foot also)
Hip	L	3426	Adult unspecified	?M	Severe atrophy of L lower limb
		3991	Adolescent	-	
Foot	R	3901	Prime adult	?M	Multifocal septic arthritis (R shoulder + knee also)

Table 18: Summary of dislocation/subluxations

Skeleton	Age	Sex	Dislocation/subluxation observed	Notes/discussion
3057	Middle adult	Male	L MT2–PP2 joint (dorsal subluxation) R talo-navicular joint (dorso-lateral subluxation)	Significant joint contour change and osteoarthritis at both affected joints. The subluxations may relate to the healed fracture through the L ilium (malaligned) and abnormality at the L distal tibio-fibular joint (undiagnosed, possibly healed fracture, subluxation and/or soft tissue trauma). ?A single traumatic event, or changes at the ankle/feet secondary to ilium trauma and possibly an altered gait.
3166	Middle adult	?Male	L + R ribs 1 + 2, articular facets for vertebral transverse processes (subluxation)	Significant joint contour change at these joint facets, indicating dislocation or subluxation. Possibly part of same traumatic event causing fractures to the L + R ribs, sternum, L scapula and wrist.
3272	Middle adult	?Male	L + R acetabulum (subluxation, acetabular flange lesions)	Lesions caused by upwards subluxation of the femoral head to the rim of the acetabulum. Thought to arise from transient subluxation, arising from acute stress (Capasso *et al*. 1999, 102). Relating to fractures of the acetabular rim and possibly to a multitude of other fractures.
3498	Prime adult	Male	R knee – proximal tibiofibular joint (dislocation)	Complete dislocation of the proximal fibula anteriorly. A new, pseudo-facet has formed antero-inferiorly to the normal articular facet. Related to the healed spiral fracture of the proximal fibula shaft. (distal

Skeleton	Age	Sex	Dislocation/subluxation observed	Notes/discussion
				part of this limb amputated, lower down the tib/fib).
3608B	Adult unspecified	?	R knee – femorotibial joint (dislocation)	Isolated limb. There is post-mortem damage to the femur and tibia but it appears as though the tibia was dislocated posteriorly, never reduced and subsequently ankylosed at a 90° angle to the femur. The proximal tibia epiphysis region appears to have rotated (indicating either a pre-fusion, childhood/adolescence injury, or a fracture through the metaphysis in adulthood). The tibia appears short, either secondary growth retardation or secondary to fractures (probable mid and distal shaft fractures also present) with overlap of fracture margins. Secondary osteomyelitis also.
3767	Middle adult	Male	L gleno-humeral joint (dislocation)	Anterior dislocation of the humeral head. Secondary OA.
3859	Middle adult	?Male	R knee (tibial subluxation, patellar dislocation)	Lateral rotation of the tibia and lateral dislocation of the patella with pseudo-facet formation between the patella and distal femur, lateral to the normal articular surface. Significant secondary joint contour change and osteophytes (OA). (Figure 5.32)
3893	Middle adult	Male	L hand DIP joint (subluxation)	Distal phalanx displaced laterally, with secondary ankylosis of the joint. Associated with crush fracture to the distal end of the intermediate phalanx.
4036	Middle adult	Female	R elbow (radial head dislocation)	Inferior dislocation of the radial head with pseudo-facet formation inferior to the normal articulation. Associated with Monteggia fracture at proximal ulna. Subsequent growth retardation in radius (significantly shortened).
4394	Middle adult	??Male	R shoulder (acromioclavicular subluxation)	Probable medial subluxation of the lateral clavicle with subsequent elongation of the joint surface. Myositis ossificans traumatica at deltoid muscle origin on clavicle also (see Table 5.24).

Key: L = left, R = right, MT = metatarsal, PP = proximal phalanx, OA = osteoarthritis, DIP = distal interphalangeal joint

Table 19: Summary of myositis ossificans traumatica cases

Skeleton	Age	Sex	Myositis ossificans traumatica location	Notes/discussion
3344	Mature adult	?Male	Sacrum – posterior surface, L + R erector spinae muscles. L femur – anterior surface, proximal shaft (?vastus intermedius)	eDISH also present – possibly associated
3348	Mature adult	Male	R humerus – origin of brachialis muscle	DISH also present – possibly associated. Ossification of interosseous membrane evident on R fibula also.
3376	Mature adult	Male	L humerus – origin of brachialis muscle	Possibly relating to a fracture of the humeral shaft
3758	Prime adult	?Male	R femur – proximal-mid shaft (?vastus intermedius)	
3767	Middle adult	Male	L fibula – proximal shaft, medial surface (fibular origin of tibialis posterior)	Relating to proximal fibula and distal tibia fractures
3777	Young adult	Female	L Fibula – proximal shaft, posterior surface (origin of soleus muscle)	
4051	Middle adult	?Female	L femur – postero-medial surface of mid shaft (?vastus medialis origin, ?adductor longus insertion)	
4065	Middle adult	?Male	L innominate – anterior inferior iliac spine (straight head of rectus femoris)	Multiple healed and healing fractures observed also (thorax, R upper limb, L lower limb)
4075	Prime adult	Male	R fibula – lateral surface of proximal shaft (peroneus longus origin)	
4140	Middle adult	Male	L tibia – lateral surface of proximal shaft (?soleus, ?tibialis posterior origin)	DISH/eDISH also present – possibly associated
4394	Middle adult	??Male	R clavicle – lateral surface (deltoid origin)	Associated with subluxation at the R acromio-clavicular joint
4483	Middle adult	?Male	R femur – lateral surface of distal shaft	

Table 20: Summary of disarticulated bone contexts

Context	Total MNI	Context	Adult MNI	Juvenile MNI	Unaged MNI	Female MNI	Male MNI	Unsexed MNI
3001	1	Fill of Eye Hospital foundation trench	1					1
3004	1	Backfill of MOLA evaluation trench	1					1
3006	5	Modern topsoil overlying burial ground.	4	1				5
3007	3	Fill of earlier gravel extraction pit 3542	3					3
3008	5	Ground surface into which burials were cut	4	1				5
3009	30	Charnel pit 3227	22	8		6	9	15
3017	2	Grave fill	1	1				2
3054	2	Grave fill	1	1				2
3071	2	Grave fill	1	1				2
3086	2	Grave fill	2			1	1	
3199	4	Modern topsoil overlying the burial ground west of the Eye Hospital foundations	3	1				4
3238	1	Fill of pit 3236			1			1
3342	2	Grave fill	1	1			1	1
3480	1	Grave fill	1					1
3515	1	Grave fill	1					1
3531	1	Grave fill	1			1		
3560	1	Grave fill	1					1
3576	1	Grave fill	1					1
3591	4	Backfill of MOLA evaluation trench	4				2	2
3599	25	Grave fill	21	4		3	6	16
3603	1	Grave fill	1					1
3656	1	Backfill of MOLA evaluation trench	1					1
3658	4	Redeposited – backfill of MOLA trench (TR6)	3	1				4
3706	25	Fill of charnel pit 3707	24	1		3	2	20
3783	2	Grave fill	2					2
3821	1	Grave fill	1					1
3849	2	Grave fill	2			1		1
3880	2	Grave fill	2			1	1	
3882	1	Grave fill	1				1	
3970	1	Grave fill	1				1	

Context	Total MNI	Context	Adult MNI	Juvenile MNI	Unaged MNI	Female MNI	Male MNI	Unsexed MNI
4063	2	Grave fill	2					2
4096	3	Modern service trench	3					3
4105	3	Grave gill	2	1				3
4156	1	Grave fill	1					1
4177	1	Grave fill		1				1
4208	1	Grave fill	1			1		
4222	7	Charnel pit 4221	5	2		1	1	5
4224	1	Modern pit		1			1	
4259	2	Grave fill	2					2
4271	1	Grave fill	1					1
4276	2	Grave fill	2					2
4297	1	Grave fill	1					1
4308	4	Fill of charnel pit (4221)	3	1				4
4323	2	Grave fill	2					2
4342	2	Grave fill	1	1				2
4354	1	unstratified	1					1
4356	1	Grave fill	1					1
4359	2	Grave fill	1	1				2
4365	1	Unstratified	1					1
4366	1	Fill of gravel extraction pit 3542	1					1
4373	1	Fill of laboratory construction pit 4375	1					1
4374	4	Fill of laboratory construction pit 4375	2	2				4
4465	6	Fill of earlier gravel extraction pit 4464	6			1	1	4
Total	184		152	31	1	19	27	138

Table 21: Amputations observed in the disarticulated bone assemblage

Context	Age	Bone	Location	Direction	Pathology	Additional cut marks
3001 (fill of Eye Hospital/ foundation trench)	Adult	Femur	Zone 6	Antero-lateral to postero-medial	Not present	Yes
3004 (backfill of MOLA evaluation trench)	Adult	Tibia	Zone 7	Taphonomic damage to the kerf	Not present	
3006 (modern topsoil overlying burial ground)	Adult	Fibula	Zone 3	Anterior to posterior	Not present	
	Adult	Fibula	Zone 4		Not present	
	Adult	Fibula	?		Periostits	
	Adult	Tibia	Zone 8	Change of direction while cutting	Callus and woven bone	
	Adult	Tibia	Zone 8		Septic arthritis and periostitis	
	Adult	Tibia	Zone 9			
	?Adult	Femur	Zone 6	Anterior to posterior		
	Adult	Fibula	Zone 4		Septic arthritis and periostitis	
	Adult	?Femur	Zone 7	Taphonomic damage		
	Adult	Tibia	Zone 10	?	Periostitis	
3008 (ground surface into which burials were cut)	Adult	Femur	Zone 7 and 8	Anterior to posterior	Periostitis	
	Adult	Femur	Zone 7 and 8		Periostitis	
	Adult	Femur	Zone 6		Periostitis	
	Adult	Tibia	Zone 4 and 7	Antero-lateral to postero-medial	Not present	
	Adult	Tibia	Zone 9	Posterior to anterior	Periostitis	
	Adult	Tibia	Zone 7		Periostitis	
	Adult	Fibula	Zone 5	Medial to lateral	Periostitis	
	Adult	Fibula	Zone 3	Posterior to anterior	Not present	
	Adult	Humerus	Zone 7 and 8	Medial to lateral	Periostitis	
3009 (fill of charnel pit 3227)	Adult	Tibia	Zone 7	Posterior to anterior	Not present	
	Adult	Tibia	Zone 7	Anterior to posterior	Periostitis	
	Adult	Tibia	Fragment		Not present	

Context	Age	Bone	Location	Direction	Pathology	Additional cut marks
	Adult	Fibula	Zone 5 and 3 (Double Amputation)	Taphonomic damage	Periostitis (spread past the first amputation site)	Not visible
	Adult	Femur	Zone 7 and 8	Anterior to posterior	Periostitis	
3199 (modern topsoil overlying burial ground)	U	Humerus	Zones 7 and 8		Periostitis. Whole bone is very gracile – unclear if juvenile or atrophied adult bone (suspect the latter)	
	Adult	Femur	Zone 6		Porosity/loss of bone density (macroscopically) on shaft	
	U	Fibula	Zone 4		Not present	
3238 (fill of pit 3236)	U	?Femur	Zone 7 and 8		Periostitis	
3480 (grave fill)	Adult	Femur	Zone 6	Anterior to posterior	Periostitis and probable septic arthritis	
3515 (grave fill)	Adult	Fibula	Zone 5		Periostitis on shaft with concave depressions(?space occupying lesions) on metaphysis and probable septic arthritis	
3560 (grave fill)	Adult	Tibia	Zone 8		Not present	
	Adult	Fibula	Zone 4		Not present	
	Adult	Humerus	Zone 7 and 8		Periostitis	
3591 (grave fill)	Adult	Shaft fragment	?		Not present	
	Adult	Ulna	Zone 5	Postero-lateral to antero-medial	Periostitis	
	Adult	Ulna	Zone 5	Postero-medial to antero-lateral	Not present	
	Adult	Tibia	Zone 7	Medial to lateral	Not present	
	Adult	Femur	Zone 7 and 8		Osteomyelitis?	
	Adult	Tibia	Zone 8	Medial to lateral	Not present	

Context	Age	Bone	Location	Direction	Pathology	Additional cut marks
3599 (grave fill)	Adult	Femur	Zone 7 and 8	Not Identified	Periostitis	
	Adult	Femur	Zone 7 and 8	Anterior to posterior	Periostitis	
	Adult ?	Femur (Taphonomy)	?	?	Not present	
	Adult	Tibia	Zone 10	Possible posterior to anterior	Not present	
	Adult	Fibula	Zone 4	Anterior to posterior	Periostitis	
	Adult	Humerus	Zone 9 and 10	Postero-medial to antero-lateral	Not present	
3658 (Redeposited – backfill of MOLA trench)	Adult	Radius	Zone 6 and 7	Anterior to posterior	Not present	
	Adult	Ulna	Zone 8	Antero-lateral to postero-medial	Not present	
	Adult	Fibula	?	Antero-lateral to postero-medial	Not present	
	Adult	Shaft Fragment	?	?	Not present	
	Adult	MC2	Zone 3	Lateral to medial (diagonal trajectory: lateral margin higher than medial)		
3783 (grave fill)	Adult	Femur	Zone 6		Peri-mortem fracture (zone 3 and 6)	x5 short, fine cut marks on medial and posterior shaft and x2 cuts/chop marks on lateral shaft (zone 6)

Context	Age	Bone	Location	Direction	Pathology	Additional cut marks
	Adult	Tibia	Zone 10	antero-medial to postero-lateral	Small exostosis, lateral border – probable healed soft tissue trauma	
3880 (grave fill)	Adult	Tibia	Zone 9	Anterior to posterior	Not present	
3849 (grave fill)	Adult	Humerus	Lateral half of Zones 1,2 and 11	Longitudinal cut and taphonomic damage to the kerf margins	Not present	
4063 (grave fill)	Adult	Tibia	Zone 7	/	Not present	
	Adult	Femur	Zone 7 and 8	Anterior to posterior	Not present	
	Adult	Tibia	Zone 7	Anterior to posterior	Not present	
4222 (fill of charnel pit 4221)	Adult	Tibia	Zone 8	Anterior to posterior	Periostitis	
	Adult	Tibia	Zone 7	Anterior to posterior	Not present	
	Adult	Tibia	Zone 10	Antero-lateral to postero-medial	Osteitis/osteomyelitis	
	Adult	Tibia	Zone 9	Anterior to posterior	Periostitis and septic arthritis	
	Adult	Fibula	Zone 4		Periostitis	
	Adult	Femur	Zone 6	Posterior to anterior	Not present	
4276 (grave fill)	Adult	Femur	Zone 6	Taphonomic damage to the kerf	Periostitis	
4308 (fill of charnel pit 4221)	Adult	Femur	Zone 7 and 8	Anterior to posterior	Not present	
	Adult	Femur	Shaft fragment	Anterior to posterior	Not present	
	Adult	Femur	Shaft fragment	Anterior to posterior	Periostitis	
	Adult	Tibia	Zone 1, half of Zones 4 and 7	Longitudinal cut and taphonomic damage to the kerf margins	Periostitis	
	Adult	Tibia	Zone 8	Antero-lateral to postero-medial	Periostitis	

Context	Age	Bone	Location	Direction	Pathology	Additional cut marks
	Adult	Tibia	Zone 8	Antero-lateral to postero-medial (diagonal trajectory: medial margin higher than lateral)	Periostitis	
	Adult	Fibula	Zone 5	Anterior to posterior	Periostitis	
	Adult	Fibula	Zone 5	Lateral to medial	Not present	
4323 (grave fill)	Adult	Tibia	Zone 7		Periostitis	
4465 (fill of gravel extraction pit 4464)	Adult	Humerus	Zone 7 and 8	Lateral to medial	Not present	

Table 22: Averaged replicate isotopic values for all samples in this study

Average of replicate				Average of replicate			
Name	C/N Molar	$\delta^{13}C$ VPDV	$\delta^{15}N$ AIR	Name	C/N Molar	$\delta^{13}C$ VPDV	$\delta^{15}N$ AIR
3015 F	3.30	-19.82	12.25	3889 R	3.26	-20.02	13.14
3015 R	3.25	-19.67	11.59	3897 F	3.39	-18.42	10.80
3045 F	3.28	-19.50	10.96	3897 R	3.29	-18.59	11.08
3045 R	3.29	-19.22	10.76	3913 F	3.22	-19.55	10.66
3070 F	3.41	-19.88	10.23	3913 R	3.28	-19.68	12.04
3070 R	3.36	-20.05	10.07	3916 F	3.29	-19.94	10.75
3110 F	3.32	-19.88	11.38	3916 R	3.21	-19.66	10.88
3110 R	3.23	-19.55	11.58	3987 F	3.29	-19.57	11.73
3115 F	3.40	-19.69	11.01	3987 R	3.21	-19.30	11.66
3115 R	3.25	-19.25	11.16	4013 F	3.24	-19.36	11.13
3162 F	3.24	-19.27	11.14	4013 R	3.24	-19.14	10.77
3162 R	3.32	-19.35	10.88	4036 F	3.27	-20.26	10.53
3166 F	3.23	-19.37	10.71	4036 R	3.21	-19.68	11.06
3166 R	3.27	-19.59	12.30	4051 F	3.31	-19.52	11.34
3221 F	3.39	-19.47	10.55	4051 R	3.23	-19.30	11.08
3221 R	3.27	-19.34	9.97	4075 F	3.34	-19.37	10.34
3312 F	3.28	-19.85	11.50	4075 R	3.27	-19.35	10.72
3312 R	3.33	-19.53	12.08	4103 F	3.31	-19.69	9.77
3317 F	3.30	-20.09	10.03	4103 R	3.28	-19.48	10.16
3317 R	3.33	-19.77	11.35	4106 H	3.25	-19.25	11.99
3321 F	3.20	-19.24	11.84	4106 R	3.29	-19.24	12.27
3321 R	3.30	-19.23	11.86	4114 F	3.25	-19.22	8.95
3376 F	3.22	-19.28	9.31	4114 R	3.26	-18.96	9.64
3376 R	3.23	-18.98	10.09	4168 F	3.46	-20.16	12.53
3418 F	3.46	-19.93	12.18	4168 R	3.30	-19.33	12.59
3418 R	3.24	-19.27	11.84	4179 F	3.26	-19.37	11.88
3434 T	3.35	-19.68	11.55	4179 R	3.28	-18.97	12.18
3434 R	3.27	-19.04	11.15	4188 F	3.28	-19.44	11.99
3465 F	3.27	-20.07	12.72	4188 R	3.19	-19.01	12.56
3465 R	3.23	-19.81	12.81	4192 F	3.28	-19.47	11.26
3479 F	3.34	-19.66	10.95	4192 R	3.17	-19.26	11.19
3479 R	3.26	-19.45	10.87	4210 F	3.32	-19.20	13.20
3485 F	3.35	-19.82	10.72	4210 R	3.23	-19.17	13.28
3485 R	3.25	-19.30	11.12	4246 F	3.32	-19.94	11.94
3488 F	3.26	-19.40	10.00	4246 R	3.21	-19.76	12.02
3488 R	3.30	-19.45	11.54	4303 F	3.34	-20.04	9.97
3498 H	3.21	-19.14	11.40	4303 R	3.20	-19.68	10.03
3498 R	3.18	-19.08	11.57	4386 F	3.20	-19.67	12.09
3550 F	3.24	-19.75	11.52	4386 R	3.22	-19.71	11.94

Average of replicate				Average of replicate			
Name	C/N Molar	$\delta^{13}C$ VPDV	$\delta^{15}N$ AIR	Name	C/N Molar	$\delta^{13}C$ VPDV	$\delta^{15}N$ AIR
3550 R	3.21	-19.42	12.27	4391 F	3.23	-19.80	10.25
3572 F	3.22	-19.40	10.77	4391 R	3.30	-19.07	12.40
3572 R	3.18	-19.28	10.45	4419 F	3.18	-20.57	13.06
3578 F	3.34	-19.89	13.74	4419 R	3.21	-18.96	13.70
3578 R	3.23	-19.43	13.86	4429 F	3.22	-19.41	9.95
3632 F	3.19	-19.11	11.83	4429 R	3.23	-19.21	10.86
3632 R	3.20	-18.98	11.86	4457 F	3.22	-19.70	13.12
3660 F	3.24	-19.80	10.25	4457 R	3.21	-19.03	12.94
3660 R	3.23	-19.72	10.58	4524 F	3.33	-20.01	11.09
3755 F	3.33	-19.94	11.35	4524 R	3.27	-19.88	11.12
3755 R	3.19	-19.55	11.71	4532 F	3.23	-19.28	12.35
3889 F	3.22	-19.96	12.78	4532 R	3.35	-19.56	11.53

R = Rib, F = Femur, H= Humerus

Table 23: Femur-Rib isotopic differences for samples where either one or both measured isotopes show a femur-rib difference of greater than +/- 0.5‰

Both δ^{13} C and $\delta^{15}N$ femur-rib difference is greater than +/- 0.5			δ^{13} C femur-rib difference is greater than +/- 0.5		
SK number	$\delta^{13}C$ VPDV	$\delta^{15}N$ AIR	SK number	$\delta^{13}C$ VPDV	$\delta^{15}N$ AIR
4419	-1.61	-0.64	4168	-0.83	-0.06
4391	-0.73	-2.15	4457	-0.67	0.18
4036	-0.58	-0.54	3418	-0.66	0.33
			3434	-0.64	-0.40
			3485	-0.52	-0.40

3 SPECIALIST ANALYSIS REPORTS

3.1 Iron Age and Roman Pottery *by Lisa Brown*

A collection of 12 sherds (176g) from the backfill (4204) of pit 4203 dates to the late Iron Age (*c* 150 BC–AD 50). This well-preserved group of sherds points to activity of this date on or near the site, possibly linked to the evidence of prehistoric settlement (including barrows) found on the Radcliffe Infirmary site during earlier excavations by MOLA (Jeffries *et al*. 2015).

The assemblage consists of handmade sherds, seven of them in fine glauconitic quartz-sand-tempered ware, some with minimal organic content, along with three sherds in a coarser sandy fabric with orange margins below dark grey surfaces. Ten sherds are in the dark grey – greyish brown colour range and two are oxidised to a pinkish colour. Most of the sherds are well-finished, with either a streaky burnish or a high exterior glossy burnish.

Rim forms include an upright rim, possibly from a small 'saucepan pot' form or a straight-sided bowl, and two everted rims. One of the everted rims is a developed form, a late Iron Age style influenced by Romanisation of ceramic production. A single burnished, decorated bowl sherd bears a zone of shallow-tooled diagonal lines contained within horizontal lines above the curving shoulder, a type that developed from the end of the middle Iron Age in central southern Britain (*c* 300 BC) but which persisted until the 1st century BC. The association of the late rim form and the decorated sherd suggest a date in the 1st century BC for the backfilling of the pit.

A single residual worn sherd of Roman grey sandy ware was recovered from context 3621, the backfill of grave 3619, which also produced late post-medieval pottery.

Bibliography

Jeffries, N, Braybrooke, T, Pearce, J and Wardle, A, 2015 Development of the former Radcliffe Infirmary 1790–1900, *Post-Medieval Archaeol* **49(2)**, 238–68

3.2 Non-ceramic small finds and glass *by Ian R Scott*

Introduction

The finds from the Radcliffe Infirmary burial ground include a large quantity of iron objects, comprising for the most part coffin fittings which have been reported elsewhere. This report deals with a small number of non-coffin iron finds, copper alloy finds, a number of non-metallic finds (Table 24) and small assemblage of vessel glass.

Table 24: Summary of non-ceramic small finds by material

Material	Object count	Fragment count
Cu alloy	230	342
Nacre	21	21
Ceramic	7	7
Bone	4	4
Cu alloy & wood	4	4
Iron	2	2
Shell	2	2
Silver	1	1
Cu alloy & Fe	1	1
Glass	1	1
Total	273	385

Assemblage composition and provenance

The finds were largely recovered from grave contexts, whether within the coffin or in the grave fills. Only eight finds were not recovered from within graves and amongst these is silver sixpenny piece of George III dated 1816 from soil 3008.

The grave finds were mainly recorded as from grave fills, although some finds were recovered from within coffins, others directly associated with the skeletons (Table 25). Finds were recovered from 120 graves.

Table 25: Finds from grave fills, from within coffins, and associated with skeletons (object and fragment counts)

	Fills		Coffins		Skeleton		Totals	
Phase	Objects	Fragments	Objects	Fragments	Objects	Fragments	Objects	Fragments
2	10	16	3	3	2	5	15	24
2a	2	3					2	3
2b	97	136	27	36	11	16	133	188
2c	67	96	29	42	19	24	115	161
Total	176	251	59	81	32	45	267	377

Of the 267 objects (377 fragments) from graves, 237 are objects directly associated with shrouds, the body or clothing – shroud pins, buttons, hair pins and lace chapes. Amongst these objects are eleven small rings formed from drawn wire. Of these eleven rings, seven are from grave 3512. Shroud pins form by far the largest group of objects within the graves and many are fragmentary (n=179; fragments=289). Further examples were attached to fragments of shroud found in graves 4034 and 3354. Most of the pins are quite small and just

a little longer than modern dressmaking or sewing pins, but some larger pins, and one pin which was probably originally a hat pin, were found in Phase 2b grave 3354. In addition to numerous shroud pins the grave contained four larger pins from 51–79mm in length. One pin was 60mm long and had a very stout stem (D: 2mm) and a crimped wound wire head, and the longest had a large spherical head and was probably a hat pin. There was also an elongated U-shaped hair pin or grip formed from thin wire from the same grave.

Table 26: Finds from graves (object count)

Phase	Shroud pins	Pins, large	Buttons	Lace chapes	Pins, hair	Pin, hat	Hair comb	Wire rings	Needle or pin stems	Total
2	12			2						14
2a	2									2
2b	111	1	2	2	4	1				121
2c	54	1	30	1			1	11	2	100
Total	179	2	32	5	4	1	1	11	2	237

There are seven white hard ceramic buttons, all from fill 4105 of grave 4108 (Phase 2c). These buttons were made using the process patented by Richard Prosser of Birmingham and date from after *c* 1840. More common are nacre or mother-of-pearl buttons of which 21 were recovered. These came from 15 different graves. Graves 3512 and 3634 each contained four nacre buttons, and grave 3780 had two buttons, but twelve graves had only a single nacre button. All the graves with nacre buttons belong to Phase 2c with the exception of grave 3861 which was assigned to Phase 2b and produced one small mother-of-pearl button. Most of the nacre buttons were of *c* 10m diameter, but the buttons from grave 3634 comprise one small nacre button (D: 10mm) and three larger buttons (D: 15mm). Grave 3634 also contained a plain copper alloy shank button. Grave 4428 was notable because it produced two plain, circular, copper alloy shank buttons (context 4431). From grave 3780 there was a larger shank button with a mounted figure wielding a sword moulded on its face and surrounded by the motto 'Prince of Waterloo'. This was a title granted by the House of Orange to the Duke of Wellington after his victory at Waterloo. Shank buttons are usually used for outer garments and in particular for coats.

Other finds include an iron shoe buckle from grave 4018 (context 4020), a small plain copper alloy wire ring (grave 4555, fill 4558), a post-medieval (*c* 16th-century) book clasp (grave 3150, grave fill 3153), a very worn and eroded 15th-century jeton with a deep punch mark (grave 3097, grave fill 3099), and a late Saxon stirrup mount of 11th-century date (grave 3812, fill 3815). The latter may have been deliberately deposited, but it seems more likely that it was a stray find incorporated into the grave by accident. Most of these items are probably stray finds rather than deliberate deposits.

The lack of personal items, religious medallions or crucifixes is notable, but perhaps in the context of this particular cemetery scarcely to be wonder at. The only certain personal items are a small tortoiseshell comb from grave 4042 (Phase 2c), an elongated U-shaped hairpin from grave 3354, and a probable gilded earing found with skeleton 3789 in grave 3788. A small fragment of a small copper alloy chain from Grave 4475 (fill 4478) might have been from a locket or crucifix.

Finds by phase

Phase 2 graves

Eight graves of Phase 2 produced a total of 15 finds (24 fragments). The finds comprise two lace chapes (one from each of graves 3823 and 3456), 12 shroud pins (21 fragments) spread through all eight graves, although the most pins (n=4) and fragments (n=11) were found in grave 3571. The only other find was a late Saxon stirrup mount from grave 3812, which may well be stray find rather than a deliberate deposit.

Phase 2a graves

There were finds from two graves: grave 3155 which produced a single shroud pin and grave 3764 one shroud pin (2 frags).

Phase 2b graves

There were grave finds from 48 graves of Phase 2b and there were 135 finds (188 frags). These included 111 shroud pins (166 frags) which again were the most common finds and most Phase 2b graves produced a small number. Eight graves (3097, 3105, 3150, 3175, 3338, 3366, 3549 and 368) produced no pins and only a single object. A 15th-century jeton was found in grave 3097, and from grave 3150 a post-medieval book clasp was recovered. Both of these finds may have been accidental rather than deliberate inclusions in the graves. The only find from grave 3105 was a small fragment of iron strip pierced by a small copper alloy tack, and from grave 3175 a rolled fragment of copper alloy strip. The only find from grave 3338 was a plain rectangular iron buckle from a belt or strap, and from grave 3366 a narrow wedge-shaped piece of cut bone 44mm long was recovered. Grave 3549 produced a single lace chape and grave 3681 a solitary small mother-of-pearl button (D: 9.5mm).

Grave 4485 produced the only other button from a Phase 2b grave, again mother of pearl, together with a single shroud pin, and grave 3421 produced the only other lace chape and a single shroud pin. Grave 4235 produced a single, quite plain gilded earring and four shroud pins. Grave 3505 produced a small cast copper alloy pin or pricker with loop head (L: 29mm), the purpose of which is uncertain. Presumably a small chain would have been attached to loop. The grave also contained two shroud pins (4 fragments).

Only three graves (3354, 3367 and 4034) produced more than four shroud pins. Grave 3367 produced 10 shroud pins (12 fragments) but no other grave finds and grave 4034 produced 13 pins (23 fragments) and a fragment of shroud material. As well as 31 shroud pins (44 fragments) and a fragment of shroud material, grave 3354 produced the four larger pins already noted above. Two pins measured 51mm long and another measured 55mm. All three had crimped spherical heads. A fourth pin was 60mm long and had a very stout stem (D: 2mm) and a crimped wound wire head. In addition to these pins there was an elongated U-shaped hair pin or grip (L: 40mm) formed from thin wire from the same grave. Finally, there is the probable hat pin that had a spherical head and measured 79mm long.

Phase 2c graves

Sixty-two Phase 2c graves had some grave finds but the total number of objects is 112 (138 fragments), which is less than the total for the smaller number of Phase 2b graves with finds. A number of points of comparison can be made between the finds from Phase 2b and those

from Phase 2c graves. Firstly, a total of only 53 shroud pins (97 fragments) were recovered from 41 of the graves, and secondly while only single buttons were recovered from two Phase 2b graves, a total of 30 buttons were recovered from 14 Phase 2c graves. Thirdly Phase 2c grave 3512 in addition to producing four buttons also produced seven small rings (D: 14mm to 18mm) formed from drawn copper alloy wire.

Most of the buttons from Phase 2c graves were nacre (mother of pearl) and were *c* 10mm in diameter. The buttons from grave 3634 comprise one small nacre button (D: 10mm), three larger nacre buttons (D: 15mm) and a plain copper alloy shank button. There were also 18 sherds forming most of a large wide-necked jar in green glass, which was almost certainly of early 19th-century date, in the same grave. Grave 4108 produced seven hard white ceramic buttons, all from fill 4105. These buttons were made using the process patented by Richard Prosser of Birmingham and date from after *c* 1840. Grave 4428 was notable because two plain copper alloy shank buttons were found (context 4431), and from grave 3780 there was the larger shank button (D: 21mm) with the mounted cavalry figure wielding a sword moulded in low relief on its face and surrounded by the motto 'Prince of Waterloo'.

Grave 3425 produced a single shroud pin with small spherical head (2 fragments) and larger pin (L: 49mm) with a larger spherical head (D: 4mm). The latter may have been a hat pin although was perhaps not long enough.

Glass

The glass from the Radcliffe site comprises for the most part vessel glass, much of it recovered from grave fills. Of the 110 pieces of glass, 38 are from contexts that either pre-date or post-date the cemetery. There are numerous sherds from wine bottles, including complete bases and necks. Some bottles date to the early 18th century, but most are from the mid to late 18th century or early 19th century. There are 18 sherds from grave 3634 (fill 3631). These include the complete neck and shoulders of a large cylindrical jar or wide-necked bottle with a tooled rim in green glass together with a number of body sherds, all of which undoubtedly belong to the vessel. Very little of the base of the jar survives. It is probably of early 19th-century date. There is surprisingly little window glass in the assemblage. With the possible exception of one or two pieces of window glass, none of the glass need date later than the early 19th century.

There three interesting items amongst glass. Two items of intrinsic interest are a wine bottle seal which reads 'B N C / C R' for Brasenose College Common Room from layer 3008, and a second, broken, wine bottle seal which reads 'All] Souls / [C]oll: / [C]:R' for All Souls College Common Room from evaluation trench backfill 3004. Neither piece is directly relevant to the burials. The third item is potential of relevance to the Radcliffe Infirmary. This is a part of the base of a bottle made in a two-piece mould which has had the initials 'R I' impressed immediately after the bottle had been formed. The letters are impressed over the mould lines and part of the pontil mark. It is possible that the initials are not simply a coincidence and stand for 'Radcliffe Infirmary'. The sherd came from 3515, grave 3512.

3.3 Worked stone *by Ruth Shaffrey*

Five roof stone fragments from the fill of Phase 2 pit 3212. Each is perforated and therefore represents a different stone, but none are complete. All the fragments are made from a sandy limestone typical in Oxford. A few fragments of slate were also recovered but none are complete enough to ascertain that they were certainly used as roofing. A sixth fragment of the same sandy limestone may also have originated as a roof stone as it has an appropriately sized perforation. However, by the time it was deposited in a grave backfill (3223, filling 3226), it had been fashioned into a small disc of which half survives. Such discs are relatively common finds on medieval sites including in urban locations such as Southampton, Winchester and Bristol (Shaffrey and Allum 2011; Shaffrey 2011; 2017) and at ecclesiastical sites such as at Coventry (Woodfield 1981, 105). Such discs are of uncertain function but are likely to have been used as lids for pots, pans or jugs or, in the case of smaller examples, as counters.

Catalogue of worked stone

Disc/reused roof stone. Small roughly semi-circular fragment that is rather thin for a roof stone but might well be formed from one. Has an 8mm perforation and measures 52mm diameter by 7mm thick. Ctx 3223, grave backfill, Phase 2, 1770–1855

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3.4 Faunal remains *by Lena Strid*

The faunal assemblage comprises 957 hand-collected bones from securely dated features. The majority of the bones derive from post-medieval grave fills.

Methodology

The bones were identified at Oxford Archaeology by the author using a comparative skeletal reference collection, in addition to osteological identification manuals. Sheep and goat were identified to species where possible, using Boessneck *et al.* (1964) and Zeder and Lapham (2010). They were otherwise classified as 'sheep/goat'. Mammal ribs, long bone fragments and vertebrae, with the exception of atlas and axis, were classified by size: 'large mammal' representing cattle, horse and deer; 'medium mammal' representing sheep/goat, pig and large dog; and 'small mammal' representing small dog, cat and hare.

The condition of the bone was graded on a 6-point system (0–5), grade 0 equating to very well-preserved bone, and grade 5 indicating that the bone had suffered such structural and attritional damage as to make it unrecognisable (Table 27).

For the calculation of the number of identified fragments per species (NISP) all identifiable fragments were counted, although bones with modern breaks were refitted. The minimum number of individuals (MNI) was calculated on the most frequently occurring bone for each species, using Serjeantson's zoning guide for the post-cranial skeleton (1996) and Worley's mandible zoning guide (Table 28), and taking into account left and right sides. The weight of the bone fragments has been recorded in order to give an idea of their size and to facilitate an alternative means of quantification.

For ageing, Habermehl's (1975) data on epiphyseal fusion for cattle, sheep and pig were used. Three fusion stages were recorded: 'unfused', 'in fusion', and 'fused'. 'In fusion' indicates that the epiphyseal line is still visible. Avian remains were considered 'unfused' if the ends of the long bones had the porous surface typical of juvenile birds. Tooth wear for cattle, sheep/goat and pig was recorded using Grant's tooth wear stages (Grant 1982) and correlated with tooth eruption (Habermehl 1975). In order to estimate an age for the animals, the methods of Halstead (1985), Payne (1973) and O'Connor (1988) were used for cattle, sheep/goat and pig respectively.

Sex estimation was carried out using morphological traits on sheep/goat pelves and pig maxillary and mandibular canine teeth, with data from Boessneck *et al*. (1964), Prummel and Frisch (1986) and Schmid (1972). Horse canine teeth and spurs on fowl tarsometatarsi were used to indicate the presence of male individuals in these taxa (Sadler 1991).

Measurements were taken according to von den Driesch (1976), using digital callipers with an accuracy of 0.01mm. Large bones were measured using an osteometric board, with an accuracy of 1mm. Withers' height of dog was calculated using Harcourt (1974) respectively.

Species

Of the 957 fragments, 388 (40.5%) could be identified to species (Table 29). Most of the bones belongs to domesticates: cattle (*Bos taurus*), sheep (*Ovis aries*), goat (*Capra hircus*), pig (*Sus domesticus*), horse (*Equus caballus*), dog (*Canis familiaris*), rabbit (*Oryctolagus cuniculus*) and

domestic fowl (*Gallus gallus*). It is uncertain whether the duck bones represent domestic duck (*Anas domesticus*) or mallard (*Anas platyrhynchos*), as they are very difficult to distinguish.

Overview of the assemblage

Bone preservation was good to fair in all phases, with only a small number of bones showing traces of dog gnawing or burning (Table 30). This suggests that scavengers had had little access to the bones that ended up in the area that was turned into a cemetery.

Phase 1

Phase 1, the pre-cemetery assemblage, consists of bones from one middle Iron Age pit (4203) and two large quarry pits (3245, 3542) (Table 31).

The middle Iron Age pit contained fragments of a cattle scapula, a pig mandible and a juvenile pig tibia. A rib from a medium mammal had been chopped off mid-rib. Judging from bone surface structure, the cattle scapula and the pig mandible came from sub-adult or adult animals.

The two large post-medieval pits, possibly backfilled gravel extraction pits, contained a total of 144 animal bone fragments but in very unequal proportions. Only 8 animal bones were recovered from pit (3245), whereas pit (3542) yielded 136 animal bones. The species present are animals commonly found in urban contexts: cattle, sheep/goat, pig, dog, domestic fowl and duck.

Only a small number of bones could be aged (Tables 32 and 33) but seem to follow a general trend of contemporary animal bones from Oxford (cf Rielly 2015; Wilson 1984). Cattle and sheep/goat are represented by sub-adult and adult animals. Lambs are absent, but five bones and one mandible come from calves. The presence of calf bones in post-medieval assemblages has been interpreted as a by-product of an important dairy industry in the region (Wilson *et al*. 1989). The avian fauna is almost exclusively from skeletally mature fowl and ducks. Only two bones from juvenile fowl and five bones from fowl-sized juvenile birds were recovered (Table 34).

Sexable remains include two female fowl tarsometatarsi and one male pig mandibular canine. A small number of bones could be measured. They have been summarised in Table 35.

Butchery marks were present on bones from cattle (n:3), sheep/goat (n:2), pig (n:1), domestic fowl (n:2) and duck (n:2), representing portioning at joints and mid-shaft of long bones as well as filleting of meat. A small number of vertebrae from unidentified large and medium mammals had been split sagitally.

Phase 2

The bones from Phase 2 derive almost exclusively from grave fills and bedding trenches. A total of 21 animal bones were recovered from charnel pits (3227, 3735, 4309).

The animal bone is likely to represent bones deposited as part of a fertilizing process, where dung (including kitchen and butchery waste) was spread on fields. While the bones must be older than the establishment of the cemetery, their exact date is uncertain. They probably derive from the post-medieval period, but a medieval date cannot be entirely disregarded.

The ageing of cattle and sheep/goat is similar to that of Phase 1 (Tables 32 and 33), which is expected if they indeed are from the same period. Again, sub-adult and adult cattle and sheep/goat are present. Juvenile animals are represented by five calf bones.

Sexed animal remains include one female sheep/goat pelvis and one female horse mandible. Measurable bones have been summarised in Table 35. A withers' height of 37.2–38.7cm could be calculated on the semi-articulated remains of a dog from grave fill 3876.

Butchery marks were present on bones from cattle (n:7), sheep/goat (n:13) and pig (n:4), representing portioning at joints and mid-shaft of long bones as well as filleting of meat. A small number of vertebrae from unidentified large and medium mammals as well as one cattle pelvis had been split sagitally. A large mammal scapula, probably from cattle, had been sawn off across the blade.

Two sheep/goat humeri had exostoses laterally on the trochlea, possibly representing so called 'penning elbow', a condition that may be caused by repeated trauma to the joint (Baker and Brothwell 1980, 127). A pig ulna had porous exostoses medially at the proximal joint, possibly an indication of infection.

Phase 3

The bones from Phase 3 were recovered from features related to the construction of the Eye Hospital in the 1880s, as well from pits (3240, 4375) and layers. Without doubt many of the bones are contemporary with the bones from Phase 1, disturbed during the digging of foundations and of pits. Ageing suggest that most livestock were sub-adult or adult when they died (Table 33). Only one calf bone was found.

One cattle femoral head had been chopped off, indicating portioning of the rear limb. A sheep/goat humerus had been chopped off mid-shaft and a cattle tibia had been sawn off mid-shaft. Three large mammal vertebrae had been split sagitally.

Table 27: Bone preservation grading methodology

Grade 0	Excellent preservation. Entire bone surface complete.
Grade 1	Good preservation. Almost all bone surface complete.
Grade 2	Fair preservation.
Grade 3	Poor preservation. Most bone surface destroyed.
Grade 4	Very poor preservation. No original bone surface remaining.
Grade 5	Extremely poor preservation. Unlikely to be able to identify element.

Table 28: Fay Worley's definitions for mammalian mandibular zones used during bone recording

Zone	Mandible
1	Coronoid process
2	Condyle
3	Ascending ramus
4	Goneal angle
5	Molar region of the body
6	Premolar region of the body
7	Diastema with mental foramen
8	Incisor region and mandibular symphysis

Table 29: Number of identified bones/taxon by chronological phase

	Middle Iron Age	Phase 1	Phase 2	Phase 3
Cattle	1	14	63	18
Sheep/goat		16	117	23
Sheep		1	3	1
Goat			1	
Pig	2	4	27	7
Dog		1	49*	
Horse			4	2
Rabbit			7	2
Hare			1	
Domestic fowl		12	4	2
Duck		5		
Indet. bird		10	7	1
Small mammal		1		
Medium mammal	1	24	50	13
Large mammal	1	21	55	22
Indeterminate		33	270	60
Total	5	144	657	151
Weight (g)	107	1410	10951	2418

* incl. 34 fragments from semi-articulated skeleton and 4 fragments from articulated paw.

Table 30: Bone condition

Phase	N	0	1	2	3	4	5	Gnawed bones	Burnt bones
Middle Iron Age	5		80.0%	20.0%				1	1
Phase 1	144	4.5%	68.2%	24.2%	2.3%	0.8%		1	
Phase 2	657	2.1%	70.1%	25.1%	2.7%	0.01%			
Phase 3	151	1.7%	40.7%	55.9%	1.7%				2

Table 31: Number of identified bones/taxon by feature in the Phase 1 assemblage

	Pit 3245	Pit 3542	Total
Cattle	2	12	14
Sheep/goat	1	15	16
Sheep		1	1
Pig		4	4
Dog		1	9
Domestic fowl	3	9	12
Duck		5	5
Indet. bird		10	10
Small mammal		1	1
Medium mammal		24	24
Large mammal	1	21	22
Indeterminate	1	32	33
Total	8	136	144
Weight (g)	177	1233	1410

Table 32: Ageable mandibles from cattle, sheep/goat and pig

Phase	Species	Dp4	M1	M2	M3	MWS	Estimated age
Middle Iron Age	Pig		PM	e	a	29–32	Sub-adult
Phase 1	Cattle	c	V				months
Phase 2	Cattle	f				4–12	
	Sheep/goat		g	e	b	29	2–3 years
	Sheep/goat		g	e	b	29	2–3 years
	Sheep/goat		l	f-g		38–40	

Age estimate follows Halstead (1986) for cattle, Payne (1973) for sheep and O'Connor (1988) for pig. Mandible wear stages (MWS) according to Grant (1982)

Table 33: Epiphyseal closure of cattle, sheep/goat and pig

	Phase 1		Phase 2		Phase 3	
Cattle	**N**	**% unfused**	**N**	**% unfused**	**N**	**% unfused**
Early fusion			3	33.3%	2	0.0%
Mid fusion	3	33.3%	4	0.0%	3	0.0%
Late fusion			6	16.6%	1	100.0%
Sheep/goat	**N**	**% unfused**	**N**	**% unfused**	**N**	**% unfused**
Early fusion			11	0.0%	5	0.0%
Mid fusion	4	100.0%	7	28.6%	5	0.0%
Late fusion	4	50.0%	13	46.2%	8	0.0%
Pig	**N**	**% unfused**	**N**	**% unfused**	**N**	**% unfused**
Early fusion			1	100.0%	1	0.0%
Mid fusion			2	50.0%	2	50.0%
Late fusion	1	100.0%	3	66.7%		

Table 34: Epiphyseal fusion data

Phase	Species	Element	Proximal	Distal
Phase 1	Domestic fowl (pit 3245)	Coracoid	F	UF
		Humerus	UF	UF
		Tarsometatarsus		F
	Domestic fowl (pit 3542)	Humerus		F
		Humerus		F
		Humerus	F	F
		Ulna		F
		Carpometacarpus	F	F
		Tarsometatarsus		F
		Tarsometatarsus		F
	Duck (pit 3542)	Radius	F	F
		Ulna		F
		Carpometacarpus	F	F
		Carpometacarpus	F	F
		Carpometacarpus	F	

UF = Unfused, F = fused

Table 35: Measurements

Phase	Species	Element	GL	Bp	SD	Bd	10	14
Phase 1	Cattle	Metatarsal				55.4		
	Sheep	Metacarpal	130.2	24.6	15.2	29.6		
	Domestic fowl	Humerus	63.0					
	Domestic fowl	Carpometacarpus	34.6					
	Duck	Radius	71.6					
	Duck	Carpometacarpus	58.7					
	Duck	Carpometacarpus	57.0					
Phase 2	Cattle	Tibia				65.1		
	Sheep	Metacarpal	125.6	24.3	13.3	26.5		
	Sheep/goat	Tibia				30.8		
	Sheep/goat	Tibia				31.0		
	Sheep/goat	Tibia				33.3		
	Dog	Humerus*	116.1		9.6	28.2		
	Dog	Radius*	115.5	15.4	10.8	19.5		
	Dog	Metatarsal III	66.0		6.3			
	Domestic fowl	Femur	99.9	20.0	9.1	20.1		
Phase 3	Sheep	Metacarpal	133.4	27.2	14.8	28.3		
	Pig	Tibia				43.4		

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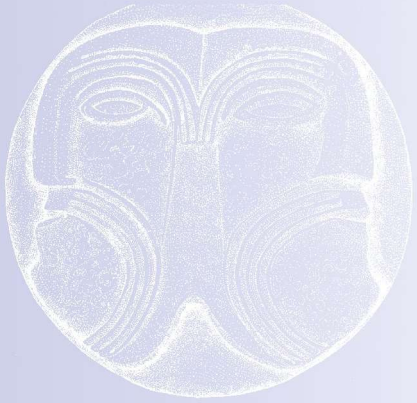
3.5 Other finds

Table 13: Other finds

Material	No.	Weight (g)
Marine shell	280	5002
Slag	14	430



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