

## CUT-BACK IN RESOURCES DELAYS OPENING OF TAYSIDE HOSPITAL – A ROMAN PROBLEM

W.J. MacLennan, Geriatric Medicine Unit, Edinburgh

Limited resources as a problem interfering with the delivery of health care is not confined to the twentieth century. It beset the Romans during their occupation of Tayside around 85 AD. After defeating the Caledonii at Mons Graupius, they started to consolidate their position by building a series of forts accommodating either one (500 men) or two (1,000 men) cohorts across Strathearn and Strathblane from Ardoch to Stracathro.<sup>1</sup> They constructed a similar line of fortifications across the mouths of the glens to the North. The system was to be further stabilised by building a legionary fortress containing 5,500 men.

Amongst many other resources including stores, granaries, workshops and baths, this fortress was also to have a 250-bed hospital.<sup>2</sup> Work on the hospital was well on when a message arrived to announce that there was trouble on the Dacian frontier.<sup>1</sup> A legion was rushed from Britannia (Great Britain) to Dacia, and the gap plugged by evacuating Scotland. During this emergency, all evacuated army buildings were demolished to their foundations; such early demolition later benefited archaeologists by leaving the foundations in pristine condition. Excavation of Roman sites elsewhere was more difficult where a whole series of forts and buildings had been built on top of each other.

### FORTRESS HOSPITAL

Excavation of Inchtuthil uncovered an impression of the foundations of a wooden building which could have been a hospital. This was 90 m by 60 m and had an open court at its centre (Figure 1).<sup>2</sup> Around this were an inner range of rooms, a corridor and an outer range. At one end of the inner range was a hall, 13 m by 5 m. Comparison with similar excavated sites suggests that this hall was used to assess patients on arrival and to perform operations. Hearths had been installed in halls elsewhere and these may have been used to sterilise instruments or prepare them for cautery.<sup>3</sup> Most of the apartments were arranged in pairs with a passage about 2 m wide between them and each was 4.0 m by 4.3 m. A comparison with the space in barrack rooms indicates that each cubicle could take four patients, which would give the hospital a capacity of about 250, i.e. 5.5% of the legionary strength. Some of the rooms were not paired, and it is likely that these may have been stores or offices. There were no latrines, suggesting that they had not yet been installed or that patients were so incapacitated that they had to use chamber pots.

Excavators initially were surprised to find that walls were erected on either side of the interfaces of the corridor and cubicle ranges, and that a drain lay between each pair. A probable explanation is that the corridor and each of the two ranges both had separate gable roofs: drains collected water from the roof of the corridor and the slopes of the cubicle roofs facing the corridor. The plan would also have facilitated the construction of a clerestory to allow light into the corridor and to improve its ventilation.

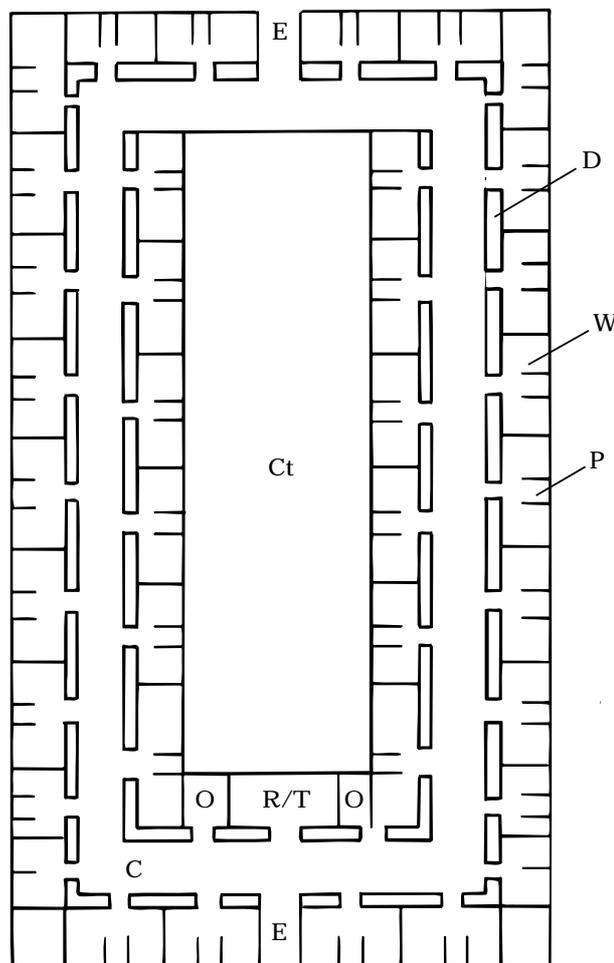


FIGURE 1

Hospital in Roman fortress at Inchtuthil.<sup>2</sup>

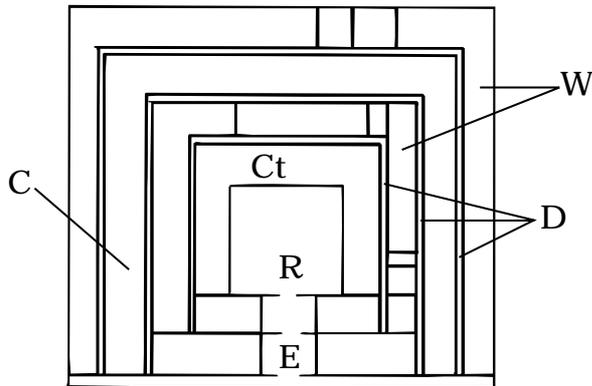
W - ward cubicle; P - passage between cubicles; R/T - reception and treatment room; C - corridor; O - office; D - double walls between corridor and cubicles; Ct - central court.

### Other Hospitals

The only other fortress in Britain with a comparable hospital is at Caerleon (Figure 2).<sup>4</sup> Poor preservation of the site means that many of the divisions between cubicles are missing. Another difference is that the ranges of cubicles only occupied three sides of the rectangle, with the fourth side being later occupied by a large reception apartment projecting into the central court.

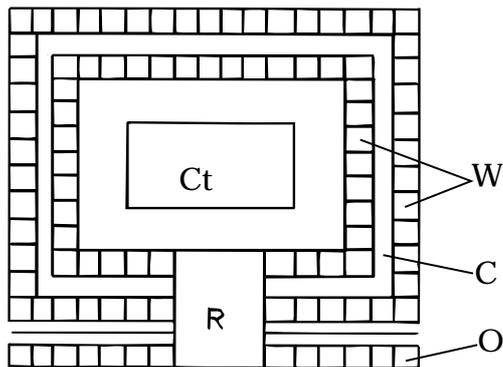
Similar fortress hospitals have been identified on the continent. The one at Vindonissa, Switzerland had a pattern similar to that at Inchtuthil (Figure 2),<sup>5</sup> with the only difference being that at either side of the reception area

FIGURE 2  
Other fortress hospitals.



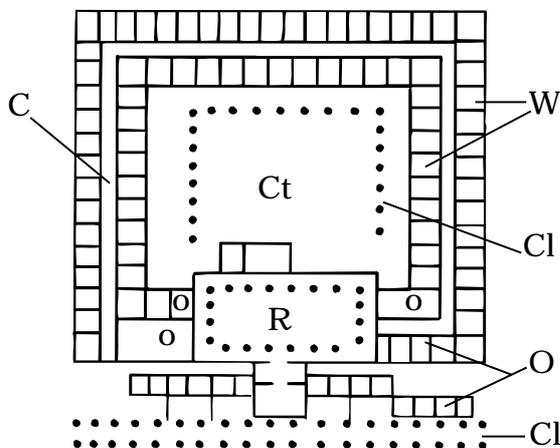
*Caerleon*<sup>4</sup>

D - double walls; R - reception area;  
C - corridor; E - entrance; Ct - court.



*Vindonissa*<sup>5</sup>

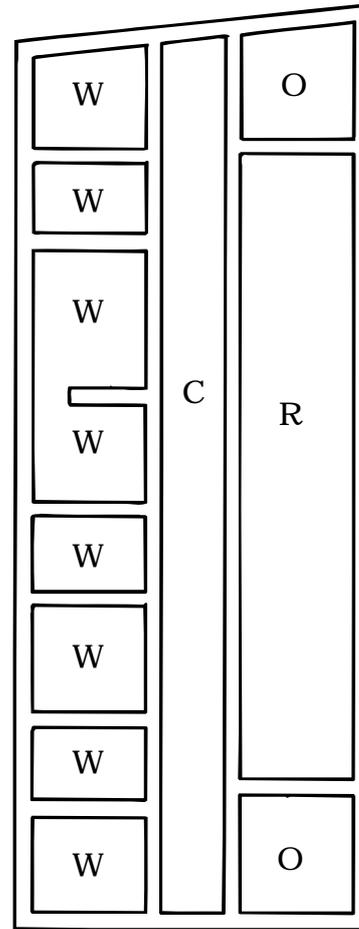
W - ward cubicle; O - office;  
R - reception area; C - corridor.



*Vetera*<sup>3</sup>

W - ward cubicle; Cl - colonnade;  
O - office; R - reception area;  
C - corridor; Ct - central court.

FIGURE 3  
Hospital in Fendoch auxiliary fort.<sup>6</sup>



W - ward cubicle; R - reception area; O - office; C - corridor.

there was an extra row of rooms which might have been utilised for offices or staff accommodation. Yet another hospital with a central courtyard is in the fortress at Vetera in Germany (Figure 2).<sup>3</sup>

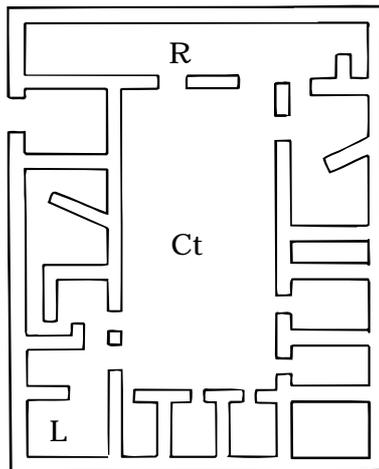
### AUXILIARY FORT HOSPITALS

#### *Fendoch*

Built to accommodate a single cohort, this is sited at the entrance to the Sma' Glen. Amongst the structures inside was a wooden building which may have been a small hospital (Figure 3).<sup>6</sup> It was rectangular, 33 m by 12 m, and in it two longitudinal divisions created two sets of rooms separated by a central corridor. Each of the eight rooms on one side was 4.1 m by 4.6 m with the capacity for four men, so that the total capacity of the hospital would have been for 32 men, or 6.6% of the cohort, a proportion similar to that of the fortress hospital. On the other side the rooms were probably used as an admission area and operating theatre, and two offices or stores.

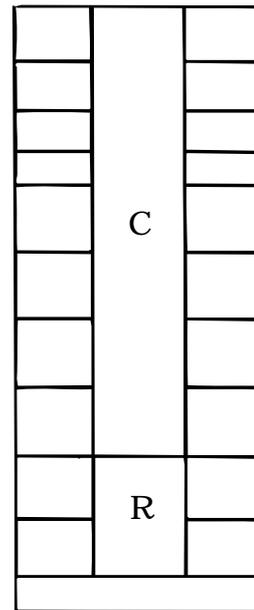
#### *Strageath*

This auxiliary fort, lying to the north of Ardoch near Muthill, also had a wooden building in which two rows of rooms were divided by a corridor which had a single room at its far end.<sup>7</sup>



*Housesteads*<sup>11</sup>

R - reception; L - latrine; Ct - central courtyard.



*Corbridge*<sup>8</sup>

FIGURE 4  
Other auxiliary hospitals.

This building has a corridor (C) between two rooms. It is more likely to be a store than a hospital.

### *Doone*

A similar structure has been uncovered in a fort at Doone, but data on this are still being analysed.<sup>8</sup>

Opinions differ as to the significance of single corridor buildings. They could well have functioned as hospitals, but without firm evidence, such as the presence of surgical instruments, it is impossible to be certain about their role.

### *Other Hospitals*

A wooden building in Corbridge, a depot fort near Hadrian's Wall,<sup>9</sup> consists of two lines of eight rooms with a corridor

between them (Figure 4). The consensus view is that it is more likely to be a store house than an infirmary. A rectangular wooden building at Housesteads, a fort built on to Hadrian's wall, is much more likely to have been a hospital in that it has a central courtyard with a range of rooms on each side (Figure 4).<sup>10</sup>

### STAFF

As in modern hospitals a manager (*praefectus castrorum*) was in charge.<sup>2,11</sup> The doctors (*medici ordinarii*) had served an apprenticeship with an experienced doctor and had usually

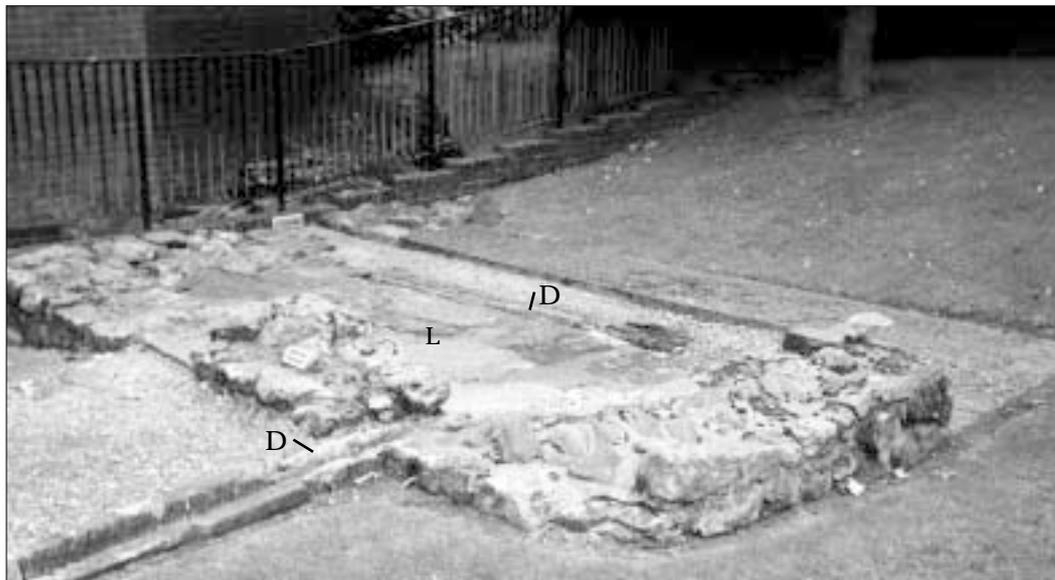


FIGURE 5

Romans enjoyed levels of sanitation not achieved in Britain again until the nineteenth century. Their latrines had an efficient system of drainage, and were designed to be a popular meeting place as well as one for performing natural functions.

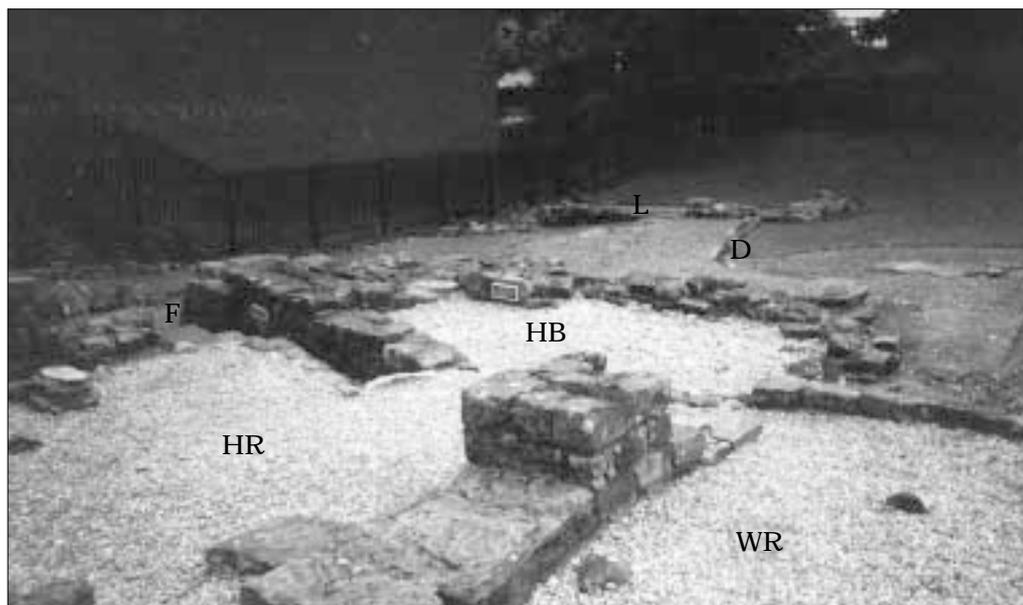


FIGURE 6

Roman soldiers maintained high levels of hygiene even in such savage places as Bearsden. The Bathhouse consisted of many rooms, including: a warm room (WR), a hot room (HR) and a hot bath (HB).

joined the army to develop extra skill in surgery prior to a career in private practice. Their rank was equivalent to that of a centurion. The garrison commander was usually accompanied by his own personal doctor. There also were orderlies, described as *immunes* because they were excused the fatigues of ordinary legionaries. The other group (*capsulares*) applied field dressings prior to returning casualties to the base hospital.

MEDICAL CARE

*Health Promotion*

Commanders considered that the health of their men was essential to having an effective fighting force.<sup>11</sup> Much attention was given to selecting recruits in sound health and ensuring adequate hygiene within forts by providing latrines, efficient drainage, and both hot and cold baths.<sup>12</sup> (See Figures 5 and 6).

Grain was the dietary staple and much effort went into ensuring adequate supplies.<sup>11</sup> During the Severan campaigns in Scotland, in the early third century AD, a fort at Gateshead in Northumberland contained a large number of granaries. From there grain was sent by ship to either Cramond on the Forth, in Edinburgh, or to Carpow on the Tay.<sup>13</sup>

Once settled permanently in a fort, soldiers developed an annexe, where they grew fruit and vegetables.<sup>11</sup> In favourable circumstances they even bred cattle, sheep and pigs. Those near to the coast were able to indulge themselves on oysters. Dependent upon the locality, other foods available were meat, poultry, fish, cheese, and olive oil.

*Medicine*

The development of medicine in the Classical period can be traced back to the work of the Hippocratic physicians in Greece.<sup>14</sup> They emphasised the importance of taking a detailed history and performing a thorough physical examination; the theoretical basis for their practice was, however, less sound in that it was based upon illness being

due to an imbalance of four humours.

An aspect of medicine in which Greeks and their Roman successors excelled was in describing and cataloguing the appearance and therapeutic properties of plants. Three individuals have produced pharmacopoeias

TABLE 1

Details of the effects or conditions treated by several plants and minerals from the pharmacopoeia of Sonbonius Largus.<sup>12</sup>

Substance	Effects	Substance	Effects
Plant		Metal	
aconitine	analgesic	alum	dental care
aloe	laxative	silver salts	antiseptic
belladonna	hallucinogen	sulphur	lice, scabies
juniper	skin oil		
liquorice	dyspepsia		
male fern	antiparasitic		
opium	analgesic	Animal	
rosemary	sweet breath	canthirides	heart failure
squill	heart failure		
turpentine	antiseptic		
valerian	sedative		

in the first century AD, they were: Dioscorides, a Greek surgeon in Nero's navy; Celsus, a wealthy Roman estate owner; and Pliny, a senior Roman administrator.<sup>14</sup> Another person who compiled a pharmacopoeia was Sonbonius Largus;<sup>15</sup> he is of particular interest in that he came over to Britain in 43 AD as Claudius' personal physician. Table 1 lists some of the substances included in his records.<sup>15</sup>

In assessing the efficiency and therapeutic work of such medication caution is required. Important therapeutic effects of some plants may not have been recognised, physicians' diagnostic skills were poorly focused, the effect of a plant was ascribed to its appearance, and standardisation of doses was difficult.

## Surgery

Archaeologists have found surgical instruments from the Roman period either in graves or in buildings unexpectedly destroyed, as in Pompeii.<sup>16</sup> One of the most recent finds has been that of a surgical kit in a Romano-British grave at Stanway near Colchester.<sup>17</sup> It is clear from their shape that the latter instruments were British in origin but that their design followed Roman principles. The kit consisted of spring forceps, scalpels, sharp and blunt hooks, handled needles, a scoop probe and a small surgical saw.

Roman surgeons often had specialised interests and used needles designed for couching cataracts; forceps for cauterising the uvula; hooks for performing a tonsillectomy; hooks for performing a haemorrhoidectomy; and a knife, hooks, elevators, forceps and crown trephine for operating on bones.<sup>16</sup> Dental kits have also been identified. Evidence that eye disease could be a major problem in the Roman army is attested by a report found at Vindolanda on the strength of the First Cohort of Turingians.<sup>18</sup> It recorded that 31 men were unfit, 15 sick, 6 wounded and 10 were suffering from eye disease.

The writings of Galen from the third century AD suggest that, in the hands of experts at least, it was possible to perform extremely complex surgical operations.<sup>19</sup> He describes in detail how to perform a laparotomy and how to get the loops of bowel back into the abdomen afterwards. He also provides information on the drainage of abscesses in chronic osteomyelitis and on surgery for the removal of tumours ranging from lipomas and nasal polyps to breast cancer. Impressive though the techniques were, there is no information on mortality rates.

## DISCUSSION

The role of the hospital at Inchtuthil in the treatment of ill or wounded soldiers has yet to be defined. It is likely that the area under the control of the fortress ranged from Stirling (55 km) in the south-east, to Stracathro (56 km) in the north-west, so that it would have taken around three days to move a seriously ill patient from the periphery to the central hospital. It is likely, therefore, that initial treatment would have been provided by a *capsularis* or *immunis* at the local fort, and that the hospital functioned as a secondary referral centre. In a major battle away from the fortress, surgery would probably have been performed at a field hospital in the nearest temporary camp.

The question arises as to the effectiveness of the design of the hospital. Efficiency demanded that new patients were seen in an assessment area rather than ward cubicles. The hearths in such assessment areas suggest that they were probably used to heat instruments with the purpose of cauterising wounds and ulcers.<sup>3</sup> There is no evidence that the Romans gave consideration to instruments spreading infection.

If, as has been proposed, the central corridor of a legionary hospital had a clerestory with windows, this would have provided the corridor with light and plenty of fresh air.<sup>2</sup> The paired ward cubicles with entrances in separate passages would have reduced the level of noise in the hospital and kept unpleasant odours at bay. The fresh air and isolated cubicles also reduced the risk of cross-infection, but there is no evidence that they were designed specifically with this in mind. The one disadvantage of the rectangular corridor and paired cubicle system is that it must have been impossible to keep patients under close surveillance.

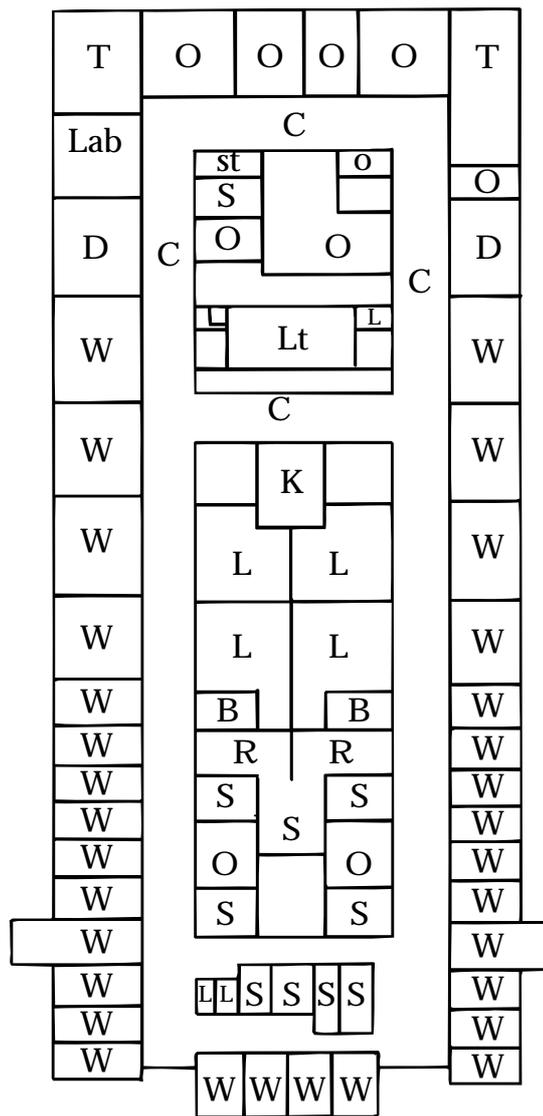


FIGURE 7<sup>19</sup>

Modern 'racetrack' ward with offices (O), teaching rooms (T), laboratories (L), nursing station (St), lift (Lt), kitchen (K), laundries (L), ward cubicles (W), reception areas (R), staff rooms (S).

It is also surprising that an organisation obsessed by latrines rarely installed them in hospitals, and this suggests that most patients were disabled and bed-bound.

A wide range of Roman buildings had central courtyards so it would be logical for hospitals to be built on the same principles. No archaeological evidence exists that the courtyard was used to grow medicinal plants but this could be another possibility.<sup>2</sup> It is more likely that once a fighting unit had settled down, such medicinal herbs and plants would have been grown in one of the fortress annexes.

It is also unclear why hospitals were established in some auxiliary forts but not in others. In some instances storage buildings may have been mistaken for hospitals, and, in others, there was insufficient excavation to exclude or to uncover the relevant building. However, neither explanation fits all situations. Another possibility is hospitals, such as the one in Fendoch, may have supported more than one fort.

A final issue is whether Roman hospitals were comparable to 'race track' wards in modern hospitals (Figure 7).<sup>20</sup> Despite superficial similarities, surveillance and communication are easier in the modern ward, in that most of the staff stations are in the central area with the patient areas located opposite, and any doors opening directly on to the corridor. On the debit side, ease of communication between ward areas is likely to increase cross-infection.<sup>3</sup> The risk is further enhanced by poor ventilation, only resolved by the continuous and expensive use of an air conditioning plant.

#### CONCLUSION

The Roman army had an extremely effective medical system for its troops in which a field dressing service was the start of a service with the patients then being progressed back to high quality hospital care where this was required. It is likely that, by accident rather than design, the layout of the hospital also reduced the risk of cross-infection. Though few army surgeons would have had the skills of Galen, they would have mastered a wide-range of techniques, and are likely to have significantly reduced both the morbidity and mortality of troops after a major battle. It is conceivable, indeed, that, with a low rate of cross-infection, the mortality figures could have been well below those experienced in the British army in the first half of the nineteenth century.

#### REFERENCES

- <sup>1</sup> Maxwell GS. *The Romans in Scotland*. Edinburgh: Thin; 1989.
- <sup>2</sup> Pitts LF, St Joseph JK. *Inchtuthil: the Roman Legionary Fortress*. Britannia Monograph Series 1985, no 6.
- <sup>3</sup> Selwyn S. Hospital Infection: the First 2,500 years. *J Hosp Infect* 1991; A (suppl 18):5-64.
- <sup>4</sup> Boon GD. *Isca, the Roman Legionary Fortress at Caerleon, Mon*. Cardiff: National Museum of Wales; 1972.
- <sup>5</sup> Thomson JD. *The Hospital: a Social and Architectural History*. New Haven: Yale University Press; 1975.
- <sup>6</sup> Richmond IA, McIntyre J. The Agricola fort at Fendoch. *Proc Soc Antiq Scot* 1938-9; 73:110-54.
- <sup>7</sup> Frere SS, Wilkes JJ. *Strageath. Excavations within the Roman Fort 1973-82*. Britannia Monograph Series no 9. London: Society for Promotion of Roman Studies, 1989.
- <sup>8</sup> Maxwell GS. Personal communication.
- <sup>9</sup> Bishop MC, Dore JN. *Corbridge: Excavations of the Roman Fort and Town*. London: Batsford; 1988.
- <sup>10</sup> Crow J. *Housesteads*. London: Batsford / English Heritage; 1995.
- <sup>11</sup> Webster G. *The Roman Imperial Army*. London: Batsford; 1985.
- <sup>12</sup> Due to concerns about conservancy, none of the Roman hospitals in Scotland have been left exposed. Review of several features along the Antonine illustrates some steps taken to maintain good health. See Figures 5, 6 and 8.
- <sup>13</sup> Bidwell P. *Roman Forts in Britain*. London: Batsford / English Heritage; 1997.
- <sup>14</sup> Porter R. *The Greatest Benefit to Mankind: a Medical History of Humanity from Antiquity to the Present*. London: Harper Collins; 1997.
- <sup>15</sup> Comrie JD. *History of Scottish Medicine*. London: Balliere, Tindall and Cox; 1931.
- <sup>16</sup> The composition of Roman medical *instrumentaria* as an indicator of medical practice: a provisional assessment. *Clio Med* 1995; 27:189-203.
- <sup>17</sup> Jackson R. An ancient British medical kit from Stanway, Essex. *Lancet* 1997; 350:1471-3.
- <sup>18</sup> Birley AR. A case of eye disease (Pippitudo) on the Roman frontier in Britain. *Doc Ophthalmol* 1992; 81:111-9.
- <sup>19</sup> Toledo-Pereyra LH. A surgeon of antiquity. *Surg Gyn Obs* 1974; 138:767-70.
- <sup>20</sup> Thompson JD. *The Hospital: a Social and Architectural History*. New Haven: Yale University Press; 1975.

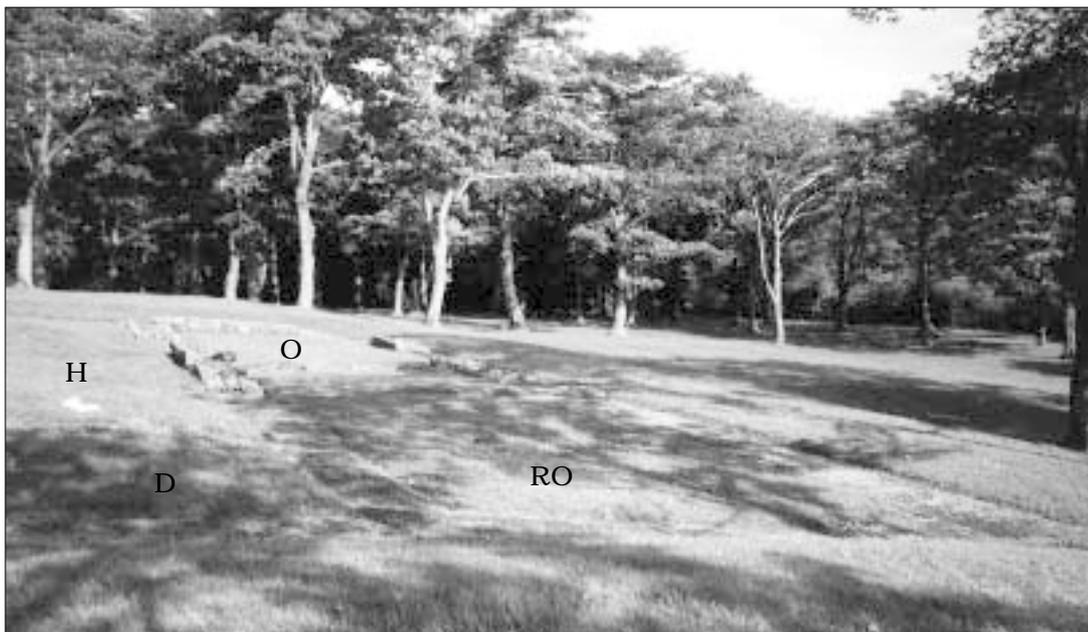


FIGURE 8

Maintenance of health was dependent upon well organised army units. Bar Hill was a small fort sited behind the Antonine wall near Twechar. The picture illustrates a section of the Principia, regimental headquarters. There is an office (O), regimental shrine (S), regimental office (RO), dais (D) (where the commander addressed his men) and hall (H).