10.10 Cool Rooms

underground chambers
dairies
underground dairies
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underground chambers

The idea of an underground room incorporated into a house as a refuge from hot weather has been discussed already, but individual underground or semi-underground structures are a different matter, and we cannot understand them without reference to the broader context. Partially underground structures - *Grubenhäuser* - usually with a steep roof rising direct from the ground surface, have been found over much of Europe. They date from the earliest times up to about the fourteenth century, and in England they comprise the majority of known Anglo-Saxon buildings.

At most European sites these underground rooms occur with a frequency which indicates that they must be dwellings rather than cool rooms or other specialised structures, but in Brittany, according to Meirion-Jones, they were exclusively stores, and no examples of dwellings in this form are known.[1] Slavic examples, round about the sixth century AD, include both stores and dwellings. Examples reconstructed at the Skanzen Brezno, near Louny, include a corn storage pit in a deep bottle shape, with a conical roof of reeds on top, and an apparently shallower cylindrical pit for the same purpose, sheltered by a ridged thatched roof. The interior was baked, presumably by setting a fire in it, then lined with straw. When it was full it was sealed with a lid made of layers of wood, straw, clay and sods. A dwelling hut of the period was oblong with curved corners, only partly excavated, and the sides reinforced with 'wand/ spray wickerwork'. It had a thatched gable roof with a ridge pole carried on two posts.[2]

Dutch settlers introduced similar excavated structures to North America in 1650 as a dwelling suited to the cold New England regions, where they would:[3]

> dig a square pit in the ground, cellar fashion, six or seven feet deep, and as long and as broad as they think proper, case the earth the earth inside all round the wall with timber, which they line with bark of trees or something else to prevent the caving in of the earth; floor this cellar with plank and wainscot it overhead for a ceiling, raise a roof of spars clear up and cover the spars with bark or green sods, so that they can live dry and warm in these houses with their entire families for two, three and four years.

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1 G I Meirion-Jones, *The Vernacular Architecture of Brittany* (Edinburgh 1982), pp 174-7.
2 *Skanzen Brezno* (Louny [Czech Republic] 1996), unpaginated.
3 K E Roe, *Corncribs* (Ames [Iowa] 1988), p 14: unsourced quotation.

In Australia such structures are generally built as dairies, cool rooms or meat houses, for specific storage or functional purposes rather than as living space, but there are some complete underground dwellings as well. The cool room or dairy is a ubiquitous feature of rural Australia, for the climate, and indeed the less regular supply of fresh food, made it far more essential than in Britain. The need to keep the room cool also gave rise to insulated roofing, as well as to the experiments with hollow walling and forms of ventilation which have been discussed above.

dairies

Loudon expressed a number of ideas about dairy design, all of which are more or less relevant to Australian practice. He refers to a private dairy was built with Silverlock walling (as discussed above in the case of the dairy at 'Ellerslie', Bacchus Marsh), and a larger dairy which again had both double sashes and hollow walls. Loudon also quotes the opinion of a Dr Anderson that a dairy should have complete double walls, the inner one of brick or stone, 230-300 mm thick, and the outer, about 600 mm away, of stone or turf.[4]

In Australia many purpose-built dairies are wholly or partially excavated, as is discussed below, but even those above ground tend to use special forms of insulation, hollow walls, double roofs, and other devices to keep them cool. At 'Ramornie' in New South Wales, Étienne Bordier and his Swiss colleagues in 1850 planned a dairy[5]

> which we hope to run on quite a large scale. We found a superbly placed spot on a lawn between two small streams; we drew up a plan, and Jean and two other men immediately set to work, levelling the ground, preparing the timber by felling trees, squaring the beams, etc. We want to erect earthen walls inside so as to keep the house cooler. It will be 30 feet by 20 in size, and will contain a cheese-making area for the Gruyère, a cellar to store it in, and a room for Jean, for that is where he will live.

This raises issues which have already emerged *seriatim* in earlier chapters, notably the use of double walls (if this is what is implied by 'inside'), and of earth or other mass construction. Some of the earliest British cavity walls, as we have seen, were designed to insulate structures such as ice houses. In Australia the cavity wall had been advocated by Major Mitchell for dairy construction, apart from the Silverlock walling at 'Ellerslie', there is the hollow walling of the dairy at the model Farm near Melbourne, the true brick cavity wall in the cheese factory at Cranbourne, and the Tugwell-type walling of the dairy at 'Anambah', New South Wales.

The fact remains that hollow walling is not generally to be found in domestic or farm dairies, but in larger and more specialised buildings. It is perhaps relevant here to refer to an interesting feature, not in a dairy but in a farm butchery, at 'Gulf Station, Victoria. The building is of split timber, with substantial eaves and a verandah, but at

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4 J C Loudon, *An Encyclopædia of Agriculture* (London 1826), §§6298-6302, pp 979-80.

5 Étienne Bordier [transl & ed Kenneth Dutton & Denis Rowe], *A Swiss Settler in Australia* [Auchmuty Library Publication no 6] (Newcastle [New South Wales] 1987), p 11.

the west gable end, and still within the projecting eave, is a freestanding wall clad in split paling weatherboard, undoubtedly designed to intercept the afternoon sun.

The use of earth for the walls of such buildings has been mentioned in the cases of the sapling and pug coolstore of the Porcupine Hotel, Maldon, Victoria; the cob dairy at Ravenswood built by Joseph Jenkins, the Welsh swagman. Earth is used in the roofing of a coolroom at the Norm Briese farm, Lindley, dating from about the 1870s, which has a solid layer of timber face slabs or flitches, overlaid with pug or cob.[6] In underground and semi-underground dairies and cellars an earth roof of one type or another is perhaps more common than not.

Where the roof was not made of a mass of earth or insulating material, it was almost always double, with a ventilated airspace. One of the earliest such roofs was apparently in an underground storehouse at Moreton Bay [Brisbane] in 1827, as will appear below. In 1869 Abraham Lincolne advocated a double roof for dairies, the outer one being little more than a shading device which, for economy, could be restricted to the north and west sides.[7] In Western Australia, according to A C Staples, the coolroom of a dairy farm was often partly excavated for coolness and would have overhanging eaves with spaces between to allow for air circulation.[8] Often the lower surface was treated something in the manner of a finished roof. As late as 1911 a dairy design was published which was to have a lower roof of bark or shingles, a space of 450 mm, and an upper roof of bark, the effect being described as similar to a tent with a fly.[9] For example the semi-underground dairy at Churchill Island, Victoria (attributed to the 1890s), has a paling roof, a space of perhaps 150 mm, then a corrugated iron roof with projecting eaves. The dairy at 'Oatlands' at Cranbourne, Victoria, probably dates from the earlier twentieth century, and has the lower surface clad in boards laid in the manner of weatherboard, and a corrugated iron roof over.

Some more elaborate dairy features, such as evaporative cooling systems and specially ventilated wall cavities, have already been discussed above.

underground dairies

According to Loudon a dairy for the private use of a farmer and his family could be quite small, and might be in a thick-walled dry cellar with windows on two sides for ventilation, and double sashes.[10] In Australia Major Thomas Mitchell wrote in about 1828 that:[11]

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6 John Dallwitz & Susan Marsden, *Heritage of the Lower North* [South Australian Department of Environment and Planning] (no place, 1983), pp 220, 221, 223.

7 Abraham Lincolne, *Farm and Selection: the Australian Farmer's Guide* (Melbourne 1869), p 146, per Deborah Kemp, 1998.

8 A C Staples, *They Made Their Destiny* (Harvey [Western Australia] 1979), p 229.

9 *Town and Country Journal,* 15 March 1911, p 20.

10 J C Loudon, *An Encyclopædia of Agriculture* (London 1826), §§6298-6302, pp 979-80.

11 Thomas Mitchell, 'Sir Thomas L Mitchell, Memoranda Book, 1827-1829', ms C38, Mitchell Library; reel CY 1992.

> ... an underground dairy is best and may be erected at small expense by digging into the south side of a hill, building the walls of rough stone and loam, and covering it with bark or shingles.
>
> Dairies should be kept, as nearly as possible, [at] the same temperature in all seasons of the year: this is of vast importance where but[ter] is the chief object. For this purpose variou[s] means have been devised. A milk-roo[m] sunk three feet within the ground, and a sloping bank raised against its walls externally, to the height of three feet, with the earth dug out of [it] will be found nearly as cool in summer, and warm in winter, as a cellar, but more convenient to occupy, as four or five steps to descend into it will be sufficient.

The description sounds as though it was transcribed by Mitchell from some other source, presumably British, but if so he has at least had the wit to move the dairy from the north to the south side of the hill in response to Australian conditions. Other Britons, such as those who settled in the Eastern Cape area of South Africa in the 1820s, built partly underground rooms similar to those in Australia.[12] In North America there was a considerable range of underground and semi-underground cellar types.[13]

Local descriptions like that of Alexander Harris, in New South Wales, are very much the same as Mitchell's:[14]

> To ward off the excessive heat it is customary to dig out a large hole in the ground, one of the sides being aslant instead of perpendicular for the entrance. This hole is covered over with planks, and this again still further by sheets of bark, to keep any dust or dirt from falling though on the cream; and the whole roof is then covered over with the earth that has been dug out, and is rendered thoroughly solid by beating. At the entrance is placed a door which is padlocked, and all around inside the milk is ranged in the keelers on benches of wood or embankments of earth left for that purpose in the original construction.

Roxburgh and Baglin illustrate a dairy at Hillasmount, Taralga, in New South Wales, which is undatable, but not necessarily from long after the establishment of the property in 1826. It is dug less than a metre into the ground and the walls rise out of the excavation in double slabbing with earth packed in between. At the entrance end only there is a stone wall, together with steps leading down into the room. The nature of the roof, which has long since collapsed, is unclear.[15] At Government House, Sydney, is a semi-underground dairy dating from about 1845 and thought to have been designed, like the house itself, by the prominent English architect Edward Blore.[16]

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12 Ronald Lewcock cites one at 'Gletwyn': R B Lewcock, *Early Nineteenth Century Architecture in South Africa* (Cape Town 1963), p 163.

13 Eric Sloane, *An Age of Barns* (extract edition, 1978 [1967]), no place, unpaginated).

14 [Alexander Harris], *Settlers and Convicts* (Melbourne 1953 [London 1847]), p 146.

15 Rachel Roxburgh, *Colonial Farm Buildings of New South Wales* (Adelaide 1978), pp 54, 59.

16 Information from Richard Aitken, 1999.

The first reference to an underground dairy in Victoria is in 1840,[17] and gives no detail, but it is possibly true that a layer of solid earth over the roof is a more common feature in Victoria than in the other colonies. It is often found in surviving examples up to 0.6 metres thick, while sometimes there are layers of other insulating materials such as thatch. The dairy at 'Dalry' in the Yarra Valley in the 1850s had thatch first, then a layer of bark on top.[18] The Melbourne architect Albert Purchas won a competition in 1862 for a model farm complex, and proposed that the dairy be placed either underground or half underground, with a 'dry lining' around the outside of the sunken portions.[19] In the following year it was reported that the dairy at Arundel Farm, near Keilor, was excavated into the side of a bank, with the front and one end built of stone, and the floor paved with Chinese tiles.[20]

In South Australia William Finlayson 'dug a place partly underground for a Milk house or dairy' shortly after building his cottage at Brownhill Creek in 1839.[21] The cellar of a farm complex south of Clarendon, which may date from the 1850s, is built into the side of a hill and approached from below, but it has a loft above with a thatched roof, now covered over in corrugated iron.[22] The provision of ventilation by means of underground pipes or tunnels has been discussed above, but is found in more elaborate buildings such as cheese factories, not domestic or farm dairies.

other underground rooms

Underground rooms might be required also as meat rooms, wine cellars or root cellars. The first useful Australian reference to an excavated storage chamber is in the instructions given in 1827 by Macleay, the Colonial Secretary, to Captain Patrick Logan, commandant at Moreton Bay [Brisbane]. These were directed towards the storage of provisions pending the construction of permanent stores. It is not apparent that they were actually put into effect, but Logan was told to sink 'about four or five feet into the ground, banking up with the sods and earth therefrom and covering the whole with bark, adding a double roof, if necessary for greater coolness.'[23] This would be atypical in that the structure was seen as temporary and was therefore not slabbed or otherwise shored up at the perimeter. It was, however, for a hot climate, and in envisaging the possibility of a double roof it contrasts with Major Mitchell's contemporary description of a dairy.

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17 At Five Mile Creek, Kyneton, as described by G A Robinson, Chief Protector of Aborigines: J G Randell, *Pastoral Settlement in Northern Victoria,* II, *The Campaspe District* (Burwood [Victoria] 1982), p 19.

18 Hubert de Castella [ed C B Thornton-Smith], *Australian Squatters* [*Les Squatters Australiens*] (Melbourne 1987 (1861]), p 114.

19 *Farmers' Journal and Gardeners' Chronicle,* 26 July 1862, p 393, as advised by Deborah Kemp, 1998.

20 *Farmers' Journal and Gardeners' Chronicle,* 4 July 1863, p 424, as advised by Deborah Kemp, 1998.

21 Stefan Pikusa, *The Adelaide House 1836 to 1901* (Netley [SA] 1986), p 8.

22 Paul Stark, *Meadows Heritage* (Meadows [SA] 1983), p 62.

23 Macleay to Logan, 29 November 1827, Moreton Bay Letter Book 1824-32, NSW Archives, pp 91-4, quoted in Charles Bateson, *Patrick Logan, Tyrant of Brisbane Town* (Sydney 1966), p 88.

W S Chauncy, writing in Victoria as 'Rusticus', gave instructions for the construction of a 'cellar' similar to those for Harris's dairy, but for the major difference that he advocated stacking earth on the roof:[24]

> The side of a hill, having a southern aspect, is best as a site, but this is not of much consequence. Sink a pit about five feet deep, and say in size six by eight or ten feet. Lay all round the outside large pieces of timber, or the trunks of small trees, properly secured at the angles; across the whole lay a few strong poles or spars, and cover with bark; over the bark a layer of saw-dust may be laid; but if none of this is at hand, a few leaves will do as well. Top the whole up with earth taken out of the pit, and plant a few geraniums or other plants upon the surface of the mound. An entrance must be provided at one end, a descent being obtained by means of steps cut out of the earth itself, and which may afterwards be preserved from injury by means of a few pieces of wood laid down upon them. Means must be taken to obtain a thorough ventilation; without this nothing would be gained. The best plan is to leave a small opening at each end secured with open lattice work, to prevent the entrance of small animals.

A meat house at Innamincka station has a carpentered roof stepping up in the form of a central monitor or clerestory.[25] Janet Hogan illustrates a seemingly semi-underground meat house at 'Glengyle', northern Queensland, which is square in plan, with a pyramidal thatched roof (and no monitor).[26]

An interesting variant type is the fish house. At Point Cook homestead, Victoria, is an outbuilding containing three compartments, one of which is a meat house, and another believed to be a fish house. The latter steps down about 0.8 m below ground level and is cement lined, apparently to hold water within which the fish were placed. Another possible example of the type is at Glen Innes House, Port Macquarie, New South Wales, where there are the ruins of a large courtyard surrounded by service quarters of various sorts, including a corner room with a stepped-down floor. The site is close enough to water for fish storage to be a feasible use.[27]

There are or were underground structures other than dairies and food stores of various sorts, especially in South Australia, but they are in the main fortuitous. Some are dwellings, such as a hole dug in the ground on Kangaroo Island, South Australia, in which German immigrants, the Kleeman family, lived for five years from 1837.[28] Miners at Burra, South Australia, excavated sideways into the creek bank for their dwellings, and as William Cawthorne described it in 1850:[29]

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24 'Rusticus' [W S Chauncy], *How to Settle in Victoria* (Melbourne 1855), pp 24-5.
25 Howard Pearce, *Homesteads of the Stony Desert* (Adelaide 1978), p 114.
26 Janet Hogan, *Building Queensland's Heritage* (Richmond [Victoria] 1978), p 103.
27 Information from Elizabeth Dixon, Melbourne 1994.
28 Lothar Brasse, 'The German Contribution', *Historic Environment,* VI, 2 & 3 (1988), p 39.
29 William Cawthorne, 'Journal of a Tour in the North', *South Australian Register,* 13 January 1851, p 3, quoted in Peter Bell, 'Continuity in Australian Domestic Timber Building', *Australian Journal of Historical Archaeology,* VIII (1990), p 4.

> As far as the eye can reach down the creek, these human wombat holes are to be seen - one long hole for a door, and a small square or round one for a window; a perfect street, with above 1,500 residents. .... [We] entered one of the holes: it was very clean and neat, in one part even an attempt at finery; very cool, but very close, as I was informed, at night, there being no ventilation. They are whitewashed inside, and sometimes outside, the most of them having paling verandahs, lean tos, &c. The chimneys are merely holes opening from the footpath above, with a tub or a few clods put round ...

After severe storms in 1851 which flooded the dwellings they were prohibited by the mining company, though it was a decade before they were entirely vacated. More recently it has been the practice at the opal mining settlement of Coober Pedy for the workings themselves are converted to dwellings. The reason is less clear for the early underground dwelling near Kingsford, on the South Para River, South Australia, which seems to date from before 1854.[30] In the twentieth century, before the Price brothers acquired Muloorina run near Lake Eyre, the previous occupants had lived in a dug-out shelter in a sandhill by the Frome River.[31]

Powder magazines are also often excavated into the ground for safety, and this may well have been the function of a mysterious Western Australian structure of the 1890s which resembles the underground dairy of a farm, but that is heavily timbered and with a substantial layer of stone on the roof.[32] Wineries begin in very much in the same mode as dairies, but evolve their own specialised type. Joseph Seppelt, who established his vineyard at Seppeltsfield in the Barossa Valley in 1852, began by using an existing dairy, which had some form of earth walls in a timber frame, and was all above ground but for a small cellar which he used as a cordial and liqueur blending room. In 1867 a very substantial building was put up by Seppelt and his son, designed to accommodate wine making on the gravity system, and it was part excavated into the ground along one long side. It was twice extended, until the dimensions were 19 by 72 metres, but was then partly superseded in 1888 by a new and even larger winery building. This was of a modern factory-like appearance, but stepped down the slope of the land in five stages, to suit the gravity process, and was partly excavated to create what was in effect a cellar, stepping down correspondingly.[33] This was an exceptional series of structures, but many other wineries have very large areas of conventional underground cellarage.

Arltunga in Central Australia is one of the most remote and hostile settled localities in Australia, opened up from 1887 by miners in search of rubies and garnets, and then of gold. In her archaeological investigations of the former store site Kate Holmes discovered a well built stone-walled room, partly excavated into the ground, with an unusual ventilation system, to which reference has been made above.[34] This is the best-built part of the store complex, and Holmes surmises that it was the last - perhaps

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30 Dallwitz & Marsden, *Heritage of the Lower North,* pp 116, 119.

31 Howard Pearce, *Homesteads of the Stony Desert* (Adelaide 1978), p 48.

32 Unidentified photograph, no 5020P, Battye Library.

33 Katrina McDougall, *Winery Buildings in South Australia 1836 to 1936 - The Barossa Region* (extract only sighted, publication details unavailable), pp 19-31.

34 Kate Holmes, 'The White Range Settlement Area, Arltunga Goldfield, Northern Territory; a look at the life style of an isolated mining area using the written and archaeological records' (MA, University of Sydney, 1980), especially pp 59 ff.

built after 1903 when population peaked. However, there is every reason to suppose that the structure was a cool room for storing perishable foods, possibly including meat, which would be sufficient reason for its being well-built. There would have been an urgent need for such a structure from the beginning of settlement, and I do not think it can be assumed to be later than the rest of the complex.