

3.05 *Pisé in Australia*

Van Diemens Land
New South Wales
Western Australia
South Australia
Victoria
central Australia
the Riverina
later New South Wales
Queensland
the twentieth century
the pisé revival

Van Diemens Land

Australian immigrants must have been influenced in the use of pisé by books like those of Wilds and Allen, and by *Mann's Emigrant's Guide*, which recommended it as material useful to settlers in New South Wales,¹ but it made its first appearance at an earlier date than any of these works. The earliest claimed pisé structure in Australia is a former house of 1821 at 'Winton', Campbell Town, Tasmania.² In 1823 the *Hobart Town Gazette* reported that a mode of building had been introduced from Europe, in which earth was sprinkled with water and then rammed into a mould about 2.2 metres long, the thickness being not more than 360 or 460 mm for even a two storey building. A house of this type had been built by J Evans on a farm at Coal River which he rented from Henry Rice.³ Rice was the explorer of the east coast of Tasmania,⁴ but nothing seems to be known of this farm, and G W Evans, the Deputy Surveyor-General, held Coal River Farm until he sold it to Simeon Lord. One J Evans had a farm in 1826 at Tea Tree, some way from Coal River,⁵ but there is no remaining indication of any pisé building upon it.

A week after its first report the *Hobart Town Gazette* was able to publish a notice inserted by the Van Diemen's Land Agricultural Society;⁶

-
- 1 *** *Mann's Emigrant's Guide to Australia*, p 22.
 - 2 Vera C Taylor, *Winton Merino Stud, 1835-1985* (Geelong, Neptune Press, 1985), as advised by Geoffrey Stilwell of the Allport Library, not yet sighted by me.
 - 3 *Hobart Town Gazette*, 3 May 1823, quoted in the *Sydney Gazette*, XI, 1019 (28 May 1823), no page.
 - 4 Vivienne Rae-Ellis, *Louisa Ann Meredith: a Tigress in Exile* (Hobart 1990 [1969]), p 51.
 - 5 Anne McKay [ed], *Journals of the Land Commissioners of Van Diemen's Land 1826-28* (Hobart 1962), pp 3, 33.
 - 6 *Hobart Town Gazette*, 10 May 1823, quoted in John Archer, *Building a Nation* (Sydney 1987), p 41. See also *Royal Australian Historical Society Journal and Proceedings*, XL, part 5 (1955), p 244, quoted by A L Green, 'Unfired Earth Walls. The Promotion and Use of Sod, Sun-Dried Brick, Cob and Pisé Walling in New South Wales from 1788 to 1960' (MBltEnv, University of New South Wales, 1989), p 38.

Resolved - That the mode of building in Pisé. or rammed earth, appearing to this Society to be both economical and expeditious, and from the experience of James Gordon, Esq., Vice-President of the Society, to be easily practised in the Colony; the Society earnestly recommend its Adoption in Van Diemen's Land. Information of the Means to be pursued will be readily afforded to any person who will address himself to the Society.

H. J. Emmett, Secretary.

The method certainly appears to have been taken up by a number of settlers. Another pisé building may have been built at Macquarie Plains in 1823, by John Powell. According to his son's biographer the family lived in a building of mud which was known as a 'Pisa House' because of its abnormal height and the fact that it slanted,⁷ but mud buildings rarely slant without falling down, and 'pisa' is a common corruption of pisé. Even if pisé was the intended word, it is not necessarily an accurate description, for the Land Commissioners in 1826 described it as being of sods.⁸ Similar doubts surround the 'pisey-house' which T W Mond first saw at Carrick in 1841 and later demolished to build his surviving Gothic house, for he described it as being of mud and straw, which is inconsistent with true pisé construction.⁹ Meanwhile pisé was well enough known for William Thornley, when considering the building of a house in about 1835, to say to his servant, Crab, 'You have seen a good deal of these new sort of houses at Pitt-water'.¹⁰

There is no element of doubt about Richard Willis's property, 'Wanstead Park', north of Campbell Town, for the Land Commissioners dwelt at length on the single storey 'Pisa House' that he was erecting when they inspected it in June 1827. They thought it 'by no means a cheap method'.¹¹

It is not the outside Walls no matter of what materials composed, that draw the Money from a Man's Purse, it is the finishing inside that renders it so serious a concern, The Carpenters Work - the Nailor's, the Plaisterers', the Painters, the Ironmongers, and the Upholsterer's. For instance, about Seventy thousand Bricks would suffice to erect such a Building as Mr Willis's Pisa, the making and burning of them, cost fifteen shillings a thousand, the laying of them, Ten shillings per thousand, the whole expense therefore stands thus

	£	S	D
70 Thousand Bricks at 15/-	54	.. 16	.. 0
Bricklayer, pr Thousand 10/-	35	.. 0	.. 0
	£89	.. 0	.. 0

7 Benjamin Gregory, *The Thorough Businessman* (London 1871), p 6.

8 McKay, *Journals of the Land Commissioners*, p 23. Gregory, p 6, gives the date of Powell's arrival in Van Diemen's Land as 1822, but McKay, p 145, gives 15 July 1823.

9 E G Robertson & Edith Craig, *Early Houses of Northern Tasmania* (2 vols, Melbourne 1964), II, p 235.

10 William Thornley [ed J S Mills], *The Adventures of an Emigrant in Van Diemen's Land* (Adelaide 1973 [1840s]), p 133.

11 McKay, *Journals of the Land Commissioners*, p 61.

For that Sum the Shell of the House in finished in Brick work. Take into consideration the digging and drawing of the Clay for the Pisa, the putting it into the Frame (which costs at least five Guineas), the ramming, all done by a lazy Set of Fellows at day's labour. It goes up slowly, whereas a Brick House, built by Task, goes up by Magic. If a person would therefore take the trouble of calculating, he would find that Brick Dwelling will not in the end be so expensive as either a Pisa, or a Weather Boarded, brick nogged House.

When Captain Jacob saw the finished building in 1832 he thought it 'the finest house & every thing in it the best style ... in the Island'.¹²

The present house at Wanstead Park is of two storeys rather than one, but it seems to be the same building, doubtless completed after the departure of the Land Commissioners. Its owner, Mr Donald Gibson, stated that it was of earth, though the surface has been roughcast (in Mr Gibson's lifetime) and this cannot readily be confirmed; nevertheless the thickness of the walls, the lines of cracking, and especially the slightly protruding timber beam ends in the rear wall are consistent with pisé construction. Furthermore, Mr Gibson recalled noticing that one of the chimney bricks was dated 1827, which would suggest, though not prove, that the present building is of that date. The building is a most substantial one, on a stone foundation, and generally in good condition.

Wanstead Park is not the only pisé building surviving in Tasmania. Near Jericho survive the lower metre or so only of parts of the walls of the probation station, built in 1841 to house convicts under the probation system. Though the construction appears to have been fairly crude it is still possible to discern the narrow layers in which the earth was rammed, the divisions between the large masses or *banchées* produced by one set of formwork, and the holes where the putlocks supporting the formwork passed through the wall. Of much more regular construction, though it shows no signs of putlocks, is a house at the settlement of Dulcott, on Pitt Water. Even though Pitt Water is the very area referred to by Thornley in 1835, this building looks as if it might belong to a later period. It is in good condition except for the front wall, which a few years ago fell totally away, helping to reveal the construction, but is now restored. 'Broadland House' at 10 Lyttleton Street, East Launceston (now part of Launceston Grammar), a two storey building probably dating from the 1840s, is said to be of rammed earth.¹³ In 1855 an architect, Augustus Frederick Smith, called tenders for a six roomed pisé cottage in Hobart¹⁴ - an interesting demonstration that pisé was more than merely a vernacular technique.

New South Wales

12 P L Brown [ed], *Clyde Company Papers. I. Prologue 1821-35* (Melbourne 1941), p 178.

13 So I am advised by Anne Neale, though it is described as stuccoed brick in Malcolm Fraser et al, *The Heritage of Australia* (South Melbourne 1981), p 7/118.

14 *Hobart Town Advertiser*, 20 November 1855, p 3. The reference was very kindly sent to me by Geoffrey Stilwell, then Librarian, Special Collections, State Library of Tasmania. Smith was a former lieutenant of the 99th Regiment who began practice as a surveyor, architect and civil engineer in Hobart in 1854.

Stimulated by the appearance of pisé in Van Diemen's Land, the *Sydney Gazette*, on the very same date as the Van Diemen's Land Agricultural Society advertisement, published at length Holland's translation from Cointeraux, in the hope that it would prove useful 'on the settlement of Bathurst, and other parts of the country which may be thinly wooded'.¹⁵ Pisé did achieve some vogue in the Bathurst area, and in 1827 Captain W J Dumaresq commented on 'the original huts, composed of rammed earth, or pisé, as the French call it'.¹⁶ 'Brisbane Grove', a two storeyed pisé house built in the 1830s at O'Connell, near Bathurst, survived into the 1960s,¹⁷ while an eight-roomed two storeyed pisé house in Bathurst itself, of 1854, also survived well enough to be admired years later.¹⁸ A number of existing buildings in the area have been referred to as pisé, but as two of these (the O'Connell Hotel and the barn at 'Lindlegreen') have proved to be of cob, as discussed above, the remainder must be regarded as unsubstantiated. The shire's conservation consultants clearly have no idea what the word means, and cite at least three structures as being of wattle and daub or pisé, as if the two were similar.¹⁹ As things stand there is no authenticated pisé structure surviving in the area despite the numerous references in the shire's heritage study,²⁰ two former hotels, one of about 1851 at Kelso,²¹ and one of 1856 at Sodwalls,²² and half a dozen other buildings cited by Annette Green.²³

Dennis Jeans asserts that pisé was used by the Australian Agricultural Company at Port Stephens in the 1820s,²⁴ and though this does not seem to be confirmed by documentary sources, a pisé ruin at Werris Creek is thought to have been one of the company's outstations.²⁵ At Charles Hooke's 'Denbigh', Narellan, before 1826:²⁶

Some of the cottages had been built ... of rammed earth. A cedar frame about eighteen inches [150 mm] high by eight feet [2.4 m] long, with a few iron bars across, was placed on the line of wall, and damp loam rammed between them as hard as possible. The bars were then removed and the frame placed higher, or at the side, until the walls were completed. The doors and windows were afterwards cut out, and wooden frames placed in them ...

-
- 15 *Sydney Gazette*, XI, 1021 (12 June 1823), supplement; 1622 (19 June 1823), supplement.
- 16 W J Dumaresq, 'A Ride to Bathurst, 1827', *Australian*, 13 March 1827, et seq, quoted in George Mackaness [ed], *Fourteen Journeys over the Blue Mountains of New South Wales 1813-1841* (Sydney 1965), p 186.
- 17 Rachel Roxburgh & Douglass Baglin, *Colonial Farm Buildings of New South Wales* (Adelaide 1978), p 26.
- 18 Peter Freeman, *The Homestead: a Riverina Anthology* (Melbourne 1982), p 82, citing the *Town and Country Journal*, 12 March 1870 [p 16].
- 19 Hughes Trueman Ludlow, *Evans Shire Heritage Study* (2 vols, no place, 1987), II, items 14, 23, 91.
- 20 Hughes Trueman Ludlow, *Evans Shire Heritage Study*, items 7, 8, 95 &c.
- 21 Green, 'Unfired Earth Walls', p 234.
- 22 Green, 'Unfired Earth Walls', p 119, citing Y Jenkins et al, *100 Years of Education* (Sodwalls, NSW, 1969), p 20.
- 23 Green, 'Unfired Earth Buildings', pp 246-7.
- 24 Dennis Jeans, 'The Building Industry: Materials and Styles', in Judy Birmingham, Dennis Jeans & Ian Jack, *Industrial Archaeology in Australia: Rural Industry* (Richmond, Victoria, 1983), p 101.
- 25 Green, 'Unfired Earth Walls', p 248.
- 26 Roxburgh & Baglin, *Colonial Farm Buildings*, p 26. No pisé buildings are known to survive at Denbigh.

For such a building, there must be no clay in the soil, only loam, sufficiently damp to allow of its being rammed hard with post-hole rammers.

No pisé buildings are believed to survive at Denbigh. In about 1841 the Ogilvie brothers are said to have built two thatch-roofed pisé huts at their run 'Swanlea' (later 'Yulgilbar') on the Clarence, though the accuracy of the description cannot be guaranteed.²⁷ In the Illawarra Valley, Waughope House, which was a three-storeyed pisé building said to date from 1846, was demolished in 1960.²⁸ There are a few early examples which survive elsewhere in New South Wales, such as 'Rose Cottage' at Parkes, of 1848,²⁹ and a house at Gundy in the Hunter Valley, which is claimed to date from 1856,³⁰ but henceforward the principal focus of pisé building in New South Wales was to be the Riverina, as will be discussed below.

Western Australia

In pre-convict Western Australia pisé construction is said to have been common outside Perth and Fremantle, and known locally as 'ram jam'³¹ (rendered mistakenly by Dennis Jeans as 'jim-jam'³²). One of the earliest known pisé buildings was that built by E P B Lennard in about 1842 to replace his original 'St Leonard's' after it was destroyed by fire.³³ One house at the Australind settlement, not yet completed in 1843, was reported to be of 'rammed clay'.³⁴

South Australia

In South Australia pisé was common in the first years of settlement, and even Governor Hindmarsh lived at first in a pisé hut.³⁵ There is a difficulty, however, in that the word pisé was used at times to describe a construction which used wetted clay with straw rather than dry loam with gravel.³⁶ Though this material was still rammed in place within formwork, it is probably better described as cob, and resembles the cob in formwork which has been discussed above. In other cases passing references

27 George Farwell, *Squatters' Castle* (Melbourne 1977), p 145.

28 Mark Hitchcock, 'Illawarra Homesteads' (BArch, University of New South Wales, 1980), p 141.

29 Green, 'Unfired Earth Walls', p 248.

30 Green, 'Unfired Earth Walls', p 119, citing a letter from the Scone Shire Council of 20 August 1985.

31 J M R Cameron, 'The Colonization of Pre Convict Western Australia' (PhD University of Western Australia, 1975), p 214, ref J M R Cameron, 'Some Comments on the Early Rural Dwelling', *Australind*, II (1968), pp 20-25. Cameron's thesis, pl XXXVI, illustrates ramjam ruins in the Avon Valley.

32 Dennis Jeans, 'The Building Industry: Materials and Styles', in Judy Birmingham, Dennis Jeans & Ian Jack, *Industrial Archaeology in Australia: Rural Industry* (Richmond, Victoria, 1983), p 101. Jim Jam is in fact the name of a place in Western Australia, and relates to the name of jamwood, an aromatic wattle which smells like jam, is grown throughout the wheat belt, and is used for fence posts. Information from Charles Staples, Perth, 1991.

33 Barbara Chapman, *The Colonial Eye* (Perth 1979), p 86.

34 Ian Molyneux and Associates, 'Leschenault Homestead' Conservation Plan (2 vols, Fremantle [Western Australia] 1996), p 141.

35 Elfrida & Rolf Jensen, *Colonial Architecture in South Australia* (Adelaide 1980), p 69.

36 William and Helen Finlayson's shared dwelling in Currie Street, Adelaide, built in 1837: ref Stefan Pikusa, *The Adelaide House 1836 to 1901* (Netley, S A, 1986), p 7.

tend to suggest that the word was used loosely of any form of earth construction, as with John Ridley, who reported that his father had been fortunate to find on his purchased section in Adelaide 'a small cottage of mud (pésé)'.³⁷ On the other hand James Hawker, speaking of the period 1838 to 1841, recalled what was clearly a true pisé, notwithstanding that the loam was slightly damped and that chopped grass was mixed in. The frame was bolted together, and could easily be taken to pieces and adjusted, and it was possible either to leave spaces for the doors and windows, or to cut them out later.³⁸

Robert Gouger described what was quite unequivocally pisé. He used it for his own house, which he described as cool, substantial and of finished appearance, and he claimed that it was the cheapest and most durable method of building on any land where limestone could not be found. Many settlers understood the system, and the cost would be about four shillings and sixpence per square yard of one foot [0.3 m] thick, plus one shilling and sixpence for the necessary plastering. The process, according to Gouger, was simple, but 'the constant eye of the master' was required to have justice done by the workmen. A fine friable loam was the best earth, and it was rammed hard in a frame about 1.8 metres long by 0.9 metres high, and supported by movable props on the walls. These might be of any thickness, according to the height of the rooms and the weight of the roof, and it was possible either to leave spaces for the doors and windows or to cut them out afterwards, in which case this should be done immediately, for once the work hardened it could not readily be cut without damaging it.³⁹

A slightly later work repeated the same description, but added that most of the houses in the colony were of stone or brick;⁴⁰ in fact within a decade there seems to have been a reaction against the use of pisé in Adelaide, and it was being said that:⁴¹

Most of the old erections were built in that most dirty and contemptible of all colonial inventions; 'pise (sic) or rammed earth. There never was in the city more than one good house of such material, and that must have cost as much to make it what it is, and to preserve it, as would have paid for more desirable materials. However 'de mortuis nil nisi bonum.' The practice is now extinct here, never (it is to be hoped) to be revived.

Cornish miners continued to use a crude system of pisé building in which, according to Oswald Pryor, a mixture of loam, clay, and broken stone was rammed between formwork. However, it had to be left to set before the next course was placed, and this suggests that it may have had a moisture content closer to that of cob.⁴²

37 Annie Ridley, *A Backward Glance. The Story of John Ridley, a Pioneer* (London 1904), p 58, quoted in John Archer, *Building a Nation* (Sydney 1987), p 51.

38 J C Hawker, *Early Experiences in South Australia* (Adelaide 1899), p 12, quoted by Pikusa, *The Adelaide House*, p 119.

39 Robert Gouger, *South Australia in 1837; in a Series of Letters: with a Postscript as to 1838* (London 1838), pp 70-1.

40 Henry Capper, *Capper's South Australia* (3rd ed, London 1839), p 147. Dates from 1839 as compared with Gouger's account of 1838.

41 *Builder*, IV, 161 (7 March 1846), p 110; notes taken from the *South Australian Register* and *Adelaide Observer*.

42 Oswald Pryor, *Australia's Little Cornwall* (Adelaide 1969 [1962]), pp 65-6.

Victoria

In the Port Phillip District, meanwhile, Samuel and William Jackson replaced the first sod buildings on their station at Sunbury with a pisé structure (the term seems here to be used accurately) to which was attached a wattle and daub skillion as a sleeping apartment.⁴³ A claim that the Crossley family built a pisé house at Cavendish, in the Western District, before 1839, seems inconsistent with historical sources. The building itself stood perfectly sound ninety years later.⁴⁴ H B Foot, the surveyor, appears to have built his five-roomed 'Merriang Cottage' of pisé on Dendy's Brighton Estate in the early forties,⁴⁵ while Bate refers to other pisé buildings extant in new Road, Brighton, in 1846.⁴⁶ Exford Homestead, on the Werribee River, dates from 1843 and has been described as made of pisé,⁴⁷ but in fact it is some sort of lightweight infill between large posts. Marian Ryan (née Cotton) described the cottage on the Ryan property at Mount Macedon, built in 1849, as 'pisa', but her description of the method suggests otherwise.⁴⁸

No pisé structure of the 1840s is known to survive in Victoria, but the living pisé tradition dates from that period. The squatter C H Macknight built a pisé dairy at Strathloddon in 1842, and after being forced to abandon this run he built another in the following year at his 'Dunmore' station near Port Fairy,⁴⁹ the existence of which is confirmed by Rolf Boldrewood.⁵⁰ It is recorded that the pisé box or form was brought from Port Fairy, though whether it was fabricated there or imported is not clear. These structures by Macknight stand at the head of the pisé tradition which has been passed on by his family in the way which will be described below. A year after the dairy was built at Strathloddon a ten roomed pisé house was constructed at nearby Mount Franklin for Augustus Parker, Protector of Aborigines.⁵¹

There is no indication that pisé ever became a part of common building practice in Victoria, and it certainly seems to have been regarded as a great novelty when William Kelly introduced it to the city of Melbourne in 1853. Kelly had seen pisé work in southern California, thought it had 'formerly' been used in the southern counties of England for granaries and outbuildings, and was convinced that because

-
- 43 N M O'Donnell, 'Some Pioneers of the Sunbury District', *Victorian Historical Magazine*, III, 2 (April 1919), p 52, quotes an ms on the same subject by Isaac Batey, who describes the clay being laid in moulds like a brick mould on a larger scale; when the clay was set the mould was removed and a fresh batch placed.
- 44 H James, 'How to Build a Pise House', *Australian Home Beautiful*, 1 January 1929, p 29 (illustrated).
- 45 Weston Bate, *A History of Brighton* (Melbourne 1962), p 42.
- 46 Bate, *History of Brighton* p 91, n 77.
- 47 E A Beever, 'Exford, Victoria' in J H McClemens et al, *Historic Homesteads of Australia* (North Melbourne 1969), pp 146-8.
- 48 Maie Casey, *An Australian Story 1837-1907* (London 1962), p 89.
- 49 Graeme Harpley, 'Pisé Building in the Riverina' (2 vols, BArch research report, University of Melbourne, 1980),
- 50 'Rolf Boldrewood' [T A Browne] *Old Melbourne memories* (1896 [1884]), pp 32-3. Boldrewood claimed to have seen the building in 1840, but it did not exist at that time.
- 51 Edgar Morrison, *Early Days in the Loddon Valley* (Yandoit [Victoria] 1966), p 69.

the materials were free and the process was quick, it was well suited for use in Melbourne. Not that he ignored its disadvantages:

... if the materials are not properly admixed and tempered and thoroughly rammed, so as to prevent the possibility of interstices, houses built in this matter become, after a short time, intolerable, from the quantities of bugs and other vermin which insinuate themselves into them, and then honeycomb the walls from side to side, rendering extirpation impossible, except by resorting to entire demolition.

Kelly entered a treaty to lease 0.2 hectares of trust property in Lonsdale Street West and proposed to build on it 'a great horse repository, with all its appurtenances'. He drew the plans, set out the lines, and within a few days had several lines of frames on the site with men busily ramming earth into them. People gathered to laugh at the process until, when the frames were unscrewed, they were confounded by the appearance of the solid polished walls 'like connected blocks of drab coloured marble', in the first rise of about 1.8 metres. Now, however, fears began to spread that brick and masonry would be superseded in Melbourne; Kelly got wind of, and was able to foil a plot by brick-burners, quarrymen and masons to invade his land and break down the work.

Now too Kelly was summoned by La Trobe, who took a great interest in the process but suggested that Kelly should have used a stone foundation; though construction was now too far advanced to remedy the fault, La Trobe was in the end proved correct. But the building seemed to be progressing well and Kelly put on the roof timbers and finished one end of the pisé work, 'in imitation of cut stone and cornice, to show the degree of perfection to which it could be carried'. He was asked to contract for building a new military barracks at Melbourne and a government camp on one of the goldfields in pisé, and was offered several private contracts as well. However, the walls of the Lonsdale Street building became badly eroded in a rainstorm, and as Kelly had heard a rumour that his lease was invalid, he left the damage unrepaired and the roof incomplete, until finally it began to crumble.⁵²

Though Kelly abandoned his career as a pisé builder the material did not disappear entirely from the Victorian scene. 'Rusticus', writing in Melbourne in 1855, gave a brief account of what he called a 'pisa house' for the use of settlers, and included some tips that suggested that he was really familiar with the material.⁵³

The PISA HOUSE is constructed by means of a shifting frame, which is removed from place to place, all round the building, in order to receive the earth of which the wall is composed. The surface soil is frequently well adapted for the purpose. One man digs it out, works it up finely, and then throws it into the frame, which is about six feet [1.8 m] long, three feet [0.9 m] high, and eighteen inches [450 mm] wide; another labourer is engaged in ramming in the earth as it is thrown into the frame, so as to make it perfectly solid. No water is used

52 William Kelly, *Life in Victoria in 1853, and Victoria in 1858* (2 vols, London 1860), I, pp 296-9, 318-9.

53 'Rusticus' [W S Chauncy], *How to Settle in Victoria* (Melbourne 1855), pp 20-21.

with it, and as soon as the frame is full it is taken asunder and removed to the adjoining space. Stiff clays are not suitable for this work, and the best soil is that which contains a small admixture of sand. These walls are rendered very durable by a coating of plaster, to preserve them from moisture, and form an excellent substitute for a stone-house. A little broken glass should be thrown in at the bottom, to keep out rats or mice, and a good drainage secured all round the building.

Charles Mayes made an ingenious, though not very important contribution, when in 1854 he obtained a Victorian patent (only the second granted in the colony) for his 'improved pisé'. The moulds were to be of plain or galvanised sheet iron, 1 mm or greater in thickness, and were to contain a core such that a flattened tube or slit was left running vertically through the wall, the narrow transverse dimension being about one third of the wall thickness. The sides of the mould were held apart, and the core supported in position relative to them, by means of bolts running across the wall thickness. In Mayes's illustration the wall surface is shown elaborately finished in imitation of ashlar work with flat arches above and spandrel panels below the window. Through the whole ran the series of vertical tubes which, according to the inventor, made the pisé less likely to crack, easier to dry out, more weatherproof and so on, as well as being useful for ventilation purposes. Mayes's patent embraced various materials which might be used in his system: a loam and gravel pisé of the traditional type; a mixture of burnt clay or waste bricks with sand and clay which, it was said, required thorough ramming to attain its proper strength; a 'cob pisé' consisting of clay, rich black mould or mud, mixed with chopped straw or shavings and thoroughly tempered together within the formwork; a 'concrete pisé' consisting of a concrete bound with common lime and only moderately rammed; and a 'beton pisé' made with hydraulic lime and not rammed at all - in fact a true concrete.⁵⁴

From year to year the Victorian Industrial Society offered prizes for the best method of manufacturing pisé, with very little result, and by 1860 the society itself had become defunct for want of patronage. In his Prize Essay of that year Mayes speaks of the Roman use of pisé in Pliny's time and of its use in Mexico, and by the Mormons at Salt Lake City, but his omission of any reference to its use in Victoria speaks for itself. Margaret Kiddle, nevertheless, refers to thatched pisé buildings in the German settlements which grew up near Hamilton, Penshurst and elsewhere. They resulted from sustained German immigration from South Australia in the 1850s, and are supposed to have been replaced by bluestone as their owners became more prosperous.⁵⁵ Whether these were really pisé buildings may be doubted: pisé was not traditionally a German method, and surviving German-built mud houses in the district are of a totally different construction, which will be discussed below.

In Victoria it is only amongst the selectors that pisé seems to have become properly acclimatised as part of the vernacular, and then in a debased form. In the Maldon-

54 Patent application no 2 [old series], granted to Charles Mayes, 1854. See also Charles Mayes, 'Manufactures for the Economical Development of the Resources of the Colony', in *Victorian Government Prize Essays 1860* (Melbourne 1861), pp 349-50, refs Cresy's *Cyclopaedia of Civil Engineering, &c*, and Allen, *Cottage Building*.

55 Margaret Kiddle, *Men of Yesterday* (Melbourne 1961), p 417.

Muckleford area are to be found various probable pisé structures, and one indisputable one of an indeterminate date where the mud is built up in panels between partly squared 25 to 35 centimetre posts spaced about 2.5 and 3 metres apart. The formwork must have been nailed horizontally across the faces of the post, so that the earth surface finished flush with the timber, and as the posts support most of the load from the roof, the earth is really a non-structural infill. The method provides the buildings with durable timber arrises and is for crude work a much simpler and more logical device than the stone quoins and dressings previously recommended by Wilds. We find pisé mentioned once in Victoria in the 1880s as being 'well adapted to station requirements in districts where brick and stone are not procurable',⁵⁶ but the tradition was effectively dead.

central Australia

There seems to be little evidence of pisé building after the 1840s in South Australia itself, except in remote inland areas. In the north-east, for example, 'Curnamona' homestead near Yunta, of about 1860-70, is of pisé.⁵⁷ George Farwell described the Afghan mosque at Marree as pisé,⁵⁸ and the homestead at Pandie Pandie, dating from the 1880s, appears to be of this construction, though Howard Pearce refers to it as mud brick.⁵⁹ Pearce regards pisé construction as very uncommon in the Stony Desert, and the only example he cites is the men's quarters at 'Arrabury' homestead, across the border in Queensland, which apparently dates from the 1880s.⁶⁰ Ray Sumner refers to a group of pisé buildings extending across the border into Queensland, in the Channel Country south and west of Winton, but she does not identify them.⁶¹ At Love's Creek near Alice Springs there are (or were) also the remains of a pisé house⁶².

the Riverina

Meanwhile there had been an extraordinary of pisé construction in the Riverina of New South Wales, where the tradition was soon to be continued by the descendants of C H Macknight, who had used the material at Dunmore in Victoria. 'Hartwood'

56 Terry & Oakden, *What to Build and How to Build It* (Melbourne 1885), p 16.

57 Malcolm Fraser et al, *The Heritage of Australia* (South Melbourne 1981), p 5/95. The walls are here described as 'mud and gravel', but they are referred to as pisé in Bruce Harry, 'Historic Building Method and its Relevance to Conservation Today', in Peter Freeman et al [eds], *Building Conservation in Australia* (Red Hill [ACT] 1985), p 52.

58 George Farwell, *Traveller's Tales* (Melbourne 1949), quoted Howard Pearce, *Homesteads of the Stony Desert* (Adelaide 1978), p 41. The reference to pisé may be erroneous, for Pearce describes most of Ghan town as adobe: alternatively, Pearce himself may be in error as suggested in relation to Pandie Pandie.

59 Pearce, *Homesteads of the Stony Desert*, p 75, cf illustration p 76.

60 Pearce, *Homesteads of the Stony Desert*, pp 110-112

61 Ray Sumner, 'The Queensland Style', in Robert Irving (ed), *The History and Design of the Australian House* (Melbourne 1985), p 312, citing her own 'Local Materials in North Queensland Housing', *LINQ*, IV (3 & 4), 1975, pp 1-12.

62 E & D Baglin, *Australian Chimneys and Cookhouses* (Sydney 1979), p 30.

station' has been said to be of pisé, and to date from the late 1840s,⁶³ which would make it the earliest example in the Riverina, but this in no way accords with Peter Freeman's account⁶⁴ (unless the reference is to another homestead on one of the three runs which went to make up the property). Another putatively early example, though not dated, is the homestead at 'Wonga'.⁶⁵ At 791 David Street, Albury, is a single story pisé house built over a substantial cellar with stone foundation walls, which dates from 1857 and originally stood in a vineyard. Little can be seen of the construction itself because of later overlays of other material.⁶⁶ There are moderately convincing references to the use of pisé at the German settlements of Klemzig and Hahndorf in South Australia,⁶⁷ and by the late 1860s German settlers at Walla Walla, who had emigrated from the Barossa Valley, are said to have been building in pisé.⁶⁸ This seems suspect given that at least one of the buildings, discussed above, was of palisade and pug construction.

It was not long after 1867 that the pisé homestead was built at 'Cunningham Plains', now 'Curraweena', near Harden. The claim or implication in a near-contemporary report was that the owner, Campbell, was the originator of pisé in that part of the country, and he was said to have got the idea from a Chinese employee.⁶⁹ However, as Campbell clearly was not the originator, the Chinese connection is of little interest. At this site there survive today the remains not only of the pisé and concrete house, but of pisé stables, barn, coach-house, and even a pisé-walled draughting yard.⁷⁰ At 'Red Bank' station near Jugiong, to the south of Cunningham Plains, the house and eleven or twelve other buildings were built in pisé by 1870, but only four survive.⁷¹

In 1870 the *Sydney Morning Herald* published an account of pisé construction, referring to the fact that it had been used in the early days of South Australia. It was a conventional account, calling for a masonry foundation, and for the earth to be used dry, though it might be moistened slightly if it was already very desiccated. It was suggested that the doors and windows might be arched with brick as an improvement.⁷² In the next few years the *New South Welsh Town and Country*

63 Mrs Elizabeth Smythe, personal communication, 10 February 1983. She cites an article on Hartwood Station, with a photograph, in *The Land* of 9 September 1980.

64 Peter Freeman *The Homestead: a Riverina Anthology* (Melbourne 1982), pp 250 ff.

65 Elizabeth Smythe, 10 February 1983.

66 The first owner was one Gable, according to mimeographed notes issued by the Albury and District Historical Society, 1969. The date is scratched on the cellar wall.

67 *South Australian*, 1 May 1839, and E M Yelland [ed], *Colonists, Copper and Corn* (Melbourne 1970), pp 183-4, quoted in Archer, *Building a Nation*, p 53.

68 Peter Freeman, *The Homestead: a Riverina Anthology* (Melbourne 1982), p 80, incorrectly attributes this information to Rachel Roxburgh & Douglass Baglin, *Colonial Farm Buildings of New South Wales* (Adelaide 1978), p 26.

69 *Town and Country Journal*, 10 August 1872, p 178, quoted in Peter Freeman *The Homestead: a Riverina Anthology* (Melbourne 1982), p 100.

70 Harpley, 'Pisé Building in the Riverina', partly based upon information obtained from Peter Freeman both directly and from Freeman's *The Woolshed: a Riverina Anthology* (Melbourne 1980), in which see especially p, 92 for Cunningham Plains. The pisé structures by 1872 were the homestead (external walls), stables, stores, coach-house, garden walls and fencing: Green, 'Unfired Earth Walls', quoting R A Littlejohn of the Harden Historical Society. Some of the pisé work is illustrated in Peter Freeman, *The Homestead: a Riverina Anthology* (Melbourne 1982), p 101.

71 Green, 'Unfired Earth Walls', p 198, quoting A L Green, 'Redbank Stables Conservation Plan' (MBltEnv, University of NSW), 1985, p 15.

72 *Sydney Morning Herald*, 8 April 1870, quoted by Green, 'Unfired Earth Walls', pp 191-2.

Journal published much material on pisé. In 1870 it mentioned Campbell's recently built 'Cunningham Plains',⁷³ and discussed the advantages of the method. Soon afterwards it commented on the pisé house in Bathurst, referred to above, which had been built fourteen years earlier. It was plastered and 'squared' in imitation of stonework, and had remained absolutely sound in an area where most brick buildings cracked within a few months of construction. The editorial discussion refers to the material as 'clay' and says that time is required for it to harden, suggesting a lack of familiarity with true pisé construction.⁷⁴ In November 1871, however, the journal published a detailed account of true pisé construction, including an illustration of the system and the tools used, but again referred to the material as clay.⁷⁵ In August 1872 it published another description, this time of the method as actually used for the pisé buildings at 'Red Bank'. It now stated that practical experience showed the clay did not work.⁷⁶ Finally in 1873 it gave another brief description of pisé within the context of a more general article.⁷⁷

Between Redbank and Cunningham Plains stations was the gold mining settlement of McMahan's reef, with a hotel and some dwellings of pisé,⁷⁸ and to the north of this another settlement of pisé dwellings sprang up in the later 1870s on the foothills of the Bethungra Range, west of Cootamundra. Three selectors built pisé dwellings, according to Freeman, of which one built by Hallinan was surviving at the time he wrote (1982).⁷⁹ In 1870 it was reported that a selector at Mylong had dug a dam by machine and used the material to build a pisé house, which was thought to indicate a promising future for pisé.⁸⁰ It was apparently in about 1882 that the Presbyterians built the pisé church which still stands at Tubbul, and there are the remains of another pisé church at Cullinga, east of Cootamundra, which was built in 1883 and substantially demolished fifty years later.⁸¹ In 1877 the Melbourne architects Lloyd Tayler & Wyatt called tenders for the pisé foundations and walls of a villa near Wentworth, New South Wales.⁸²

73 *Town and Country Journal*, 26 February 1870, p 23, quoted by Peter Freeman *The Homestead: a Riverina Anthology* (Melbourne 1982), p 101; also by Green, 'Unfired Earth Walls', p 50, and identified in n 27, p 65.

74 *Town and Country Journal*, 12 March 1870, p 16, quoted by Green, 'Unfired Earth Walls', pp 193-4.

75 *Town and Country Journal*, 11 November 1871, p 621, quoted in Green, 'Unfired Earth Walls', pp 194-6, and illustration, p 15.

76 *Town and Country Journal*, 10 August 1872, p 178, quoted in Green, 'Unfired Earth Walls', pp 197-8.

77 *Town and Country Journal*, 3, 10 May 1873, quoted by Peter Freeman *The Homestead: a Riverina Anthology* (Melbourne 1982), p 83.

78 *Town and Country Journal*, 10 August 1872 [?p 178], quoted in Peter Freeman *The Homestead: a Riverina Anthology* (Melbourne 1982), p 80.

79 Peter Freeman, *The Homestead*, p 82.

80 Peter Freeman, *The Homestead*, p 82, quoting *Town and Country Journal*, 9 April 1870.

81 Peter Freeman, *The Homestead*, p 81-2. The church at Cullinga appears to be the same one (labelled as being at Cootamundra) of which an illustration is held by the La Trobe Library, and from which I obtain the dates. The illustration is reproduced in my *Victorian Primitive* (Carlton, Victoria, 1977), p 57.

82 *Argus*, 15 June 1877, p 2. It has been surmised that this was their scheme for 'Tapio' homestead, unexecuted, but the first tender for a house in the area was in May 1876, and others follow - almost certainly indicating more than one building.

A number of other pisé buildings were subsequently put up in the Riverina. In about 1907-9 the architect Archibald Charles Macknight (1868-1948), son of C H Macknight, built his own house in pisé, and then went on to construct many other Riverina buildings in the same way, including those which still stand at 'Butherwah', 'Jillamatong', 'Mulwala' (a wing added in 1927) stations,⁸³ and 'Mulwala Station Homestead'.⁸⁴ In this he was followed to some extent by his son, and the Macknights were not alone in this, for a major pisé house in the area was built in about 1913 to the design of the prominent Melbourne architects Klingender and Alsop.⁸⁵ In 1923 A C Macknight wrote:⁸⁶

Earth is a much better non-conductor than brick, stone or concrete, and owing to its cheapness, external walls are usually made much thicker than is possible with other materials; so the reason for its coolness is easily understood. ...
... I always advise the use of concrete foundations and concrete lintels, and also plenty of reinforcement in the walls ...

later New South Wales

Meanwhile pisé building had not been confined solely to the Riverina. At Bentley on the Richmond River, in 1871 R B Dawson built the back wall of a shed in pisé and set out to build a cottage, but abandoned the project because of the expense, especially the cost of the labour involved.⁸⁷ In 1872 John Quin built a four-roomed pisé house at 'Tarella', 35 km from Wilcannia.⁸⁸ 'Jemalong' homestead near Forbes survives, and is said to date from the 1870s.⁸⁹ Dennis Jeans illustrates the remains of a pisé house at West Wyalong.⁹⁰

In the 1890s the *Agricultural Gazette of New South Wales* began publishing material on pisé. In 1897 there appeared an account by W J Pleffer of 'Wyndella', Armidale, seemingly based upon actual experience,⁹¹ and 1901 two articles based upon textbook accounts.⁹² By 1905 the *Gazette* was republishing this material, together with

83 Peter Freeman, *The Homestead*, pp 83, 279.

84 'Mulwala Station Homestead', as distinct from 'Mulwala', is entirely of pisé. at the time of writing the date of construction has not been established nor the traditional attribution to MacKnight confirmed, but it is under investigation by Alexander Newell, an architectural student at Deakin University, whose parents recently bought the property.

85 *Real Property Annual*, 1913, p 61.

86 A C Macknight, 'The Australian Country House', *Australian Home Builder*, May 1923, p 54, cited in Peter Cuffley, *Australian Houses of the '20s & '30s* (Fitzroy [Victoria] 1989), pp 51-2.

87 *Agricultural Gazette of New South Wales*, XVI, 8 (2 August 1905), p 784.

88 Eve Pownall, *Mary of Maranoa* (2nd ed, Sydney 1959 [1959]), pp 214-5.

89 Robert Irving, 'Mostly about Walls', in Irving, *The Australian House*, p 200; Green, 'Unfired Earth Walls', p 235.

90 Dennis Jeans, 'The Building Industry: Materials and Styles', in Judy Birmingham, Dennis Jeans & Ian Jack, *Industrial Archaeology in Australia: Rural Industry* (Richmond, Victoria, 1983), p 101.

91 *Agricultural Gazette of New South Wales*, September 1897, p 672, quoted in Green, 'Unfired Earth Walls', pp 60-61.

92 Green, 'Unfired Earth Walls', p 61, citing the *Agricultural Gazette of New South Wales*, October 1901, pp 1244-8; December 1901, pp 1602-5. The former was based upon R S Burn's *Handbook of Mechanical Arts*, modified to meet local conditions, and the latter on R MacLagan,

comments by J Pridham of the Public Works Department, Sydney, who proposed the use of Californian red pine as the timber best suited for shuttering, the replacement of wooden 'connecting bars' with iron ones, and other improvements.⁹³ Soon G L Sutton was investigating earth construction at the Cowra Experimental Farm, where a ploughman's cottage and a combined barn, store and office building were put up.⁹⁴ Sutton wrote about this in the *Gazette*, and concluded that pisé was 'infinitely superior and more durable than slabs, galvanised iron, or weatherboards [and] quite as durable, and much cooler than solid brick.'⁹⁵ In 1911 Sutton's article was reprinted in *The Farmer's Handbook*.⁹⁶ The handbook also described a variation of pisé in which a 'framework' of saplings or poles was built and 1¹/₄ inch [32 mm] wire netting fixed securely to both sides, then earth rammed inside to make a wall 100-170 mm thick.⁹⁷ The posts were 0.9 to 1.0 metres apart, and it is difficult to see how netting spaced over such a distance could withstand the pressure of ramming.

Queensland

At Jundah in Western Queensland, in 1884, the local police officer wrote of the prohibitive cost of carting timber at least 480 km for the proposed new police station and lock-up:⁹⁸

Mud or pise walls make very good buildings. Walls according to the plan of the proposed government buildings at Jundah could be erected for a little over 200 pounds. The private apartments of the hotel here are constructed of this material and present a good and solid appearance.

At Windorah the police quarters, designed in 1884 and built in 1995, were indeed of earth, presumably pisé, and were earth floored as well.⁹⁹ At 'Arrabury', near Windorah, there are men's quarters of pisé apparently dating from 1896.¹⁰⁰ To the east and some way south, the homestead at 'Boorara' station, Hungerford, was built of pisé before 1916.¹⁰¹ However census data investigated by Ray Sumner shows that both pisé and adobe were very rare in Queensland in 1911 and 1921, and almost entirely confined to the south-western districts.¹⁰² The first census data of 1911 records less than two thousand pisé buildings in the whole of Australia.¹⁰³ Even

Manual on Earthwork [in *Indian Engineering*, II]. This is apparently the material that was republished in 1905 with new illustrations as 'Pisé and Adobe Buildings for Dwellings, Dairies, and Store-Rooms', *Agricultural Gazette of New South Wales*, XIV, 4 (3 April 1905), pp 327-334.

93 Green, 'Unfired Earth Walls', p 333.

94 Green, 'Unfired Earth Walls', appendix H, item Cowra 01.

95 *Agricultural Gazette of New South Wales*, 2 May, 2 August & 2 September 1907, pp 414-418, 679-697, & 732-740, quoted in Green, 'Unfired Earth Walls', pp 27, 61, 232.

96 Green, op cit, p 61, ref W A Clarke [ed], *The Farmers Handbook* (1911), pp 204-5.

97 Quoted in Williams-Ellis, *Cottage Building*, pp 87-8.

98 Quoted in Donald Watson, *The Queensland House* (typescript report, Brisbane 1981), p 8.8.

99 J S Kerr, *Out of Sight, Out of Mind* (Sydney 1988), p 97.

100 Howard Pearce, *Homesteads of the Stony Desert* (Adelaide 1978), pp 112-3.

101 Mitchell Library videodisc no 03584.

102 Ray Sumner, *Settlers and Habitat in Northern Queensland* (Townsville, Queensland, 1974), p 15.

103 Quoted Green, 'Unfired Earth Walls', p 28.

allowing that a large proportion would not have been recognised or properly described in the census returns, this is a very small number, and it would not seem that many more were being built.

the twentieth century

There was a certain amount of pisé used in Victoria in the early twentieth century. 'The Robins' on the Kangaroo Ground Road, Warrandyte, was built in 1914 by the artist Penleigh Boyd, with walls of pisé,¹⁰⁴ up to 330 mm thick of pisé, and 'reinforced concrete', probably meaning mass concrete.¹⁰⁵ From the early 1920s Justus Jorgensen and his followers built pise structures at their artists' colony, 'Monsalvat', at Eltham. John Harcourt, who also settled at Eltham, became a great advocate for the material.¹⁰⁶ 'Lang Koop' homestead in Western Victoria was built of pisé in 1927 by Major H James, at a total cost of £465, including fitments from Adelaide and their freight.¹⁰⁷ At Zumstein in the Grampians, the eponymous Zumstein, an Australian of Swiss parentage, built three pisé cottages in 1930-35 as tourist accommodation.¹⁰⁸ They are unusual in that the walls are only about 275 mm [9 inches] thick, the lifts appear to be about 300 mm, and no putlocks seem to have been used. In 1937 the Adelaide architect Eric Dancker designed Sir Magnus Cormack's house 'Kojjak' at Apsley, in pisé. The owner's brother, Bill Cormack, is said to have located a good soil with buckshot gravel in it on the property, and the finished walls were coated externally in a mixture of lime and animal fat.¹⁰⁹

The majority of pisé buildings were in New South Wales. There is a particularly good photographic record of the building of 'Gilead' at Bectric, by the Perry Brothers, in 1917.¹¹⁰ In about the 1920s, a German builder constructed a number of pisé houses including the cottage 'Wilton', forty kilometres south of Wagga, essentially a basic four-roomed house with a central passage and a surrounding concrete-floored verandah.¹¹¹ A much more substantial house, probably of the 1930s, is 'Upper Wantagong' on the Jingellic Road near Holbrook, of about fourteen rooms, and with walls said to be a metre thick.¹¹² Annette Green has recorded scores of other examples, as well as reminiscences about builders like the Fallon brothers, and the Greig family, which go into considerable detail about their methods. Ned, Dick and Doug Fallon are said to have built most of the pisé buildings in the Harden district, and to have worked exclusively in the material from about 1900 to the late 1920s.

104 Geoffrey Serle, *Robin Boyd* (Melbourne 1985), 13.

105 Marguerite Marshall, *Eltham Shire* (no place or date), p 38,

106 Peter Cuffley, *Australian Houses of the Forties and Fifties* (Knoxfield [Victoria] 1993), pp 128, 130.

107 H James, 'How to Build a Pisé House', *Australian Home Beautiful*, 1 January 1929, pp 25-9; and information from Ian Ballinger of Horsham, 1993.

108 Daniel Catrice, 'Zumstein's Cottages Grampians National Park Draft Conservation Analysis' (typescript 1993), passim.

109 Captioned photograph held by the Horsham Historical Society, and further information from Ian Ballinger.

110 Mitchell Library videodisc nos 03035, 6, 7.

111 The house is 5 kilometres from Mangoplah on the Yerong Creek Road: Mrs Elizabeth Smythe, personal communication, 10 February 1983.

112 Elizabeth Smythe, 10 February 1983.

The Greig family built eight or nine houses in the Murrumbateman district between 1910 and 1920.¹¹³

In 1921, as has been discussed already in relation to adobe, Arthur Morry wrote in Queensland promoting both materials, and in 1929 the Town Planning Association discussed their suitability for use in the west of the state, for 'those who are desirous of improving the abnormal housing conditions of the West'. Morry's discussion assumed the use of bolts rather than timber putlocks (as with Pridham's proposal in 1905), and recommended the inclusion of concrete sills and lintels in areas where cement was obtainable. Another report from Townsville, quoted in 1929, suggests that pisé was well regarded as a cyclone-proof form of construction.¹¹⁴

the pisé revival

The shortage of conventional building materials after World War II gave rise to a renewal of interest. 'What is Pise-de-Terre?' was a cover story in the *Australian Home Beautiful* of June 1942,¹¹⁵ and in April 1943 the magazine published extracts from American and British articles dealing with pisé construction and soil stabilisation.¹¹⁶ A bulletin on the subject was published by the Commonwealth Experimental Building Station in Sydney, and drew heavily on certain specific practices which had been developed in the Corowa District in New South Wales, possibly by A C Macknight. One was to keep all door and window heads at the same height, and to cast a continuous reinforced concrete lintel all around the building at this level. Another was to cement render the exterior, and to bond this render by scoring the whole surface of the pisé in a six inch [150 mm] grid, boring conical recesses 25-35 mm deep at each intersection, driving in springhead roofing nails until the head was flush with the surface, and ensuring that the cement was well forced in behind the nail heads.¹¹⁷ Subsequently *You Can Build Your Own Home*, of 1946 and 1948, included an account partly derived from this CEBS bulletin, as well as from a bulletin of the United States Department of Agriculture, and a book by P B Aird of Natal, South Africa.¹¹⁸

In 1944 John D Moore published a design for a pisé house suitable for building in a hot dry area, and stated 'Numerous examples exist in Australia and there are craftsmen skilled in its technique',¹¹⁹ but Kenneth McConnel wrote in 1947 of pisé as a material now largely forgotten. Indeed McConnel's reference to it as 'nothing more nor less than packed mud, sometimes mixed with fibre' does not suggest any personal experience of building in it. But he spoke favourably of it as giving coolness in summer and warmth in winter, and looking charming under a coat of whitewash. He

113 Green, 'Unfired Earth Walls', pp 318-324.

114 *Architectural and Building Journal of Queensland*, VIII, 37 (10 September 1929), pp 27-32.

115 'What is Pise-de-Terre?', *Australian Home Beautiful*, June 1942, p 16, and cover 'How this House was Built: Pise Building Explained', Peter Cuffley, *Australian Houses of the Forties and Fifties* (Knoxfield [Victoria] 1993), pp 54, 137.

116 *Australian Home Beautiful*, April 1943, cited by Cuffley, *Australian Houses of the Forties and Fifties*, p 128.

117 Quoted in *You Can Build Your Own Home* [2nd ed, Sydney 1948 [1946]], pp 92-3.

118 *You Can Build Your Own Home*, pp 90-93.

119 J D Moore, *Home Again!* (Sydney 1944), p 57.

further referred to ant-bed (pulverised ant hills) as a refinement of pisé which had not been sufficiently tried out. With a little netting or wire reinforcement, McConnel thought it would be almost as permanent as reinforced concrete, and that a 200 mm wall would be quite satisfactory for single storey construction.¹²⁰

Other architects were already taking up the system. S Van Breda designed 'Werai', near Forbes in 1940.¹²¹ In about 1949-52 Sydney Ancher designed a pisé house at 12 Baker Crescent, Baulkham Hills, and thus conferred upon the method for the first time the imprimatur of modernism.¹²² In Melbourne pisé remained more associated with picturesque arts-and-craftsy design. The landscaper Edna Walling promoted pisé as well as adobe,¹²³ though she was not specific about the technical details and her comments on surface finishes (already referred to above) would be equally applicable to either material. J D Harcourt of Eltham, whose use of adobe has been mentioned, wrote in the *Australian Home Beautiful* of January 1946, on 'Natural Earth as Building Material. Pisé-de-Terre, Cob and Mud Brick Methods Explained'.¹²⁴ During the 1950s, Harcourt built about eight two-storey pisé houses of an English cottage character, near the Eltham Railway station, a little way from Melbourne.¹²⁵

The living tradition of pisé construction was that of the Riverina, and especially the work of the Macknights, *père et fils*. It was probably this which most influenced G F Middleton of the Commonwealth Experimental Building Station, who prepared an official report on pisé construction in the Corowa district in 1946-7,¹²⁶ and published a bulletin on earth wall construction in 1952.¹²⁷ In the following year appeared his book *Build Your House of Earth*,¹²⁸ which was to become the Old Testament of the alternative lifestylers in the following decades. In the same year as Middleton's book, Lloyd's *Building Construction for Craftsmen and Builders* illustrated pisé construction (and, in a small way, adobe).¹²⁹ However, it was perhaps when the Queensland Housing Commission published a standard design for a pisé or adobe house in 1950,¹³⁰ that both materials can be said to have emerged from their tenuous existence in rural areas and artistic circles, and re-entered the real world of building.

120 Kenneth McConnel, *Planning the Australian Homestead* (Sydney 1947), p 114.

121 Green, 'Unfired Earth Walls', p 235.

122 Green, 'Unfired Earth Walls', p 221.

123 Edna Walling, *Cottage Gardens in Australia* (Melbourne 1947), p 85.

124 J D Harcourt, 'Natural Earth as Building Material. Pisé-de-Terre, Cob and Mud Brick Methods Explained', *Australian Home Beautiful*, June 1942, p 16, cited by Cuffley, *Australian Houses of the Forties and Fifties*, p 130.

125 Ted Howard, 'Earth Building in Australia - a Vista', *Owner Building and Earth Architecture* (Melbourne 1984), p 59.

126 G F Middleton, 'Pisé de terre Construction. Report on Investigation and Inspection of Pisé [*sic*] built houses in Corowa, N.S.W., and surrounding district, December, 1946 - January, 1947' [report no 350/1, file no BS 47/10, CEBS] (Sydney, February 1947)), cited in Bridget Jolly, 'Solomit in Australia and its European Context' (PhD submission, University of Adelaide, 1998), p 222.

127 G F Middleton, *Earth-Wall Construction* (Bulletin no 5, Commonwealth Experimental Building Station, Sydney 1952).

128 G F Middleton, *Build Your House of Earth* (Sydney 1953).

129 C Lloyd, *Building Construction for Craftsmen and Builders* (Melbourne 1953), pp 118-9,

130 Queensland Housing Commission, drawing no S3574, 6 September 1950, 'Adobe Block and/or Pisé de Terre'.