

ABPL90085 THE CULTURE OF BUILDING



earth building

COMMONWEALTH OF AUSTRALIA

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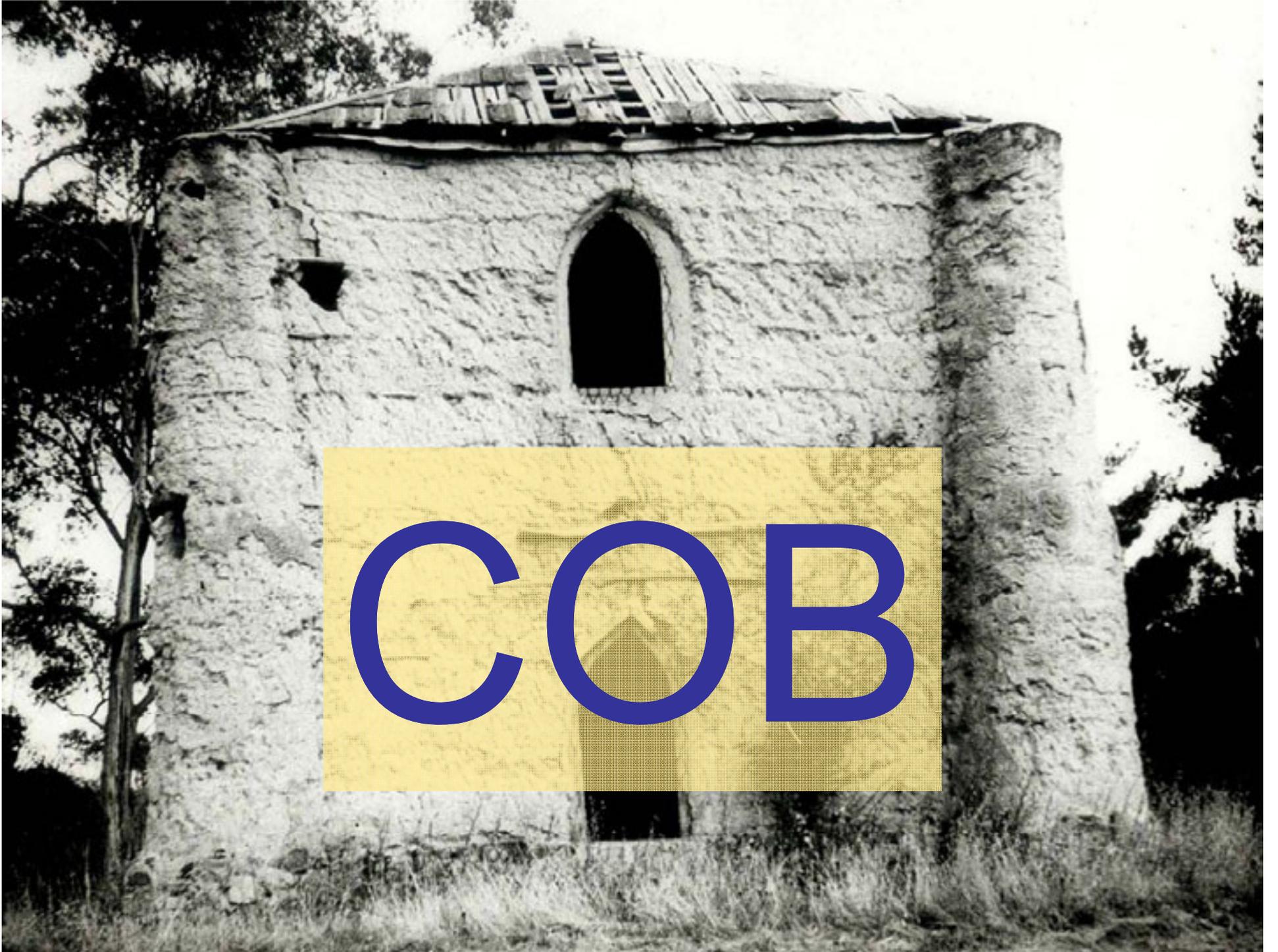
earth building types

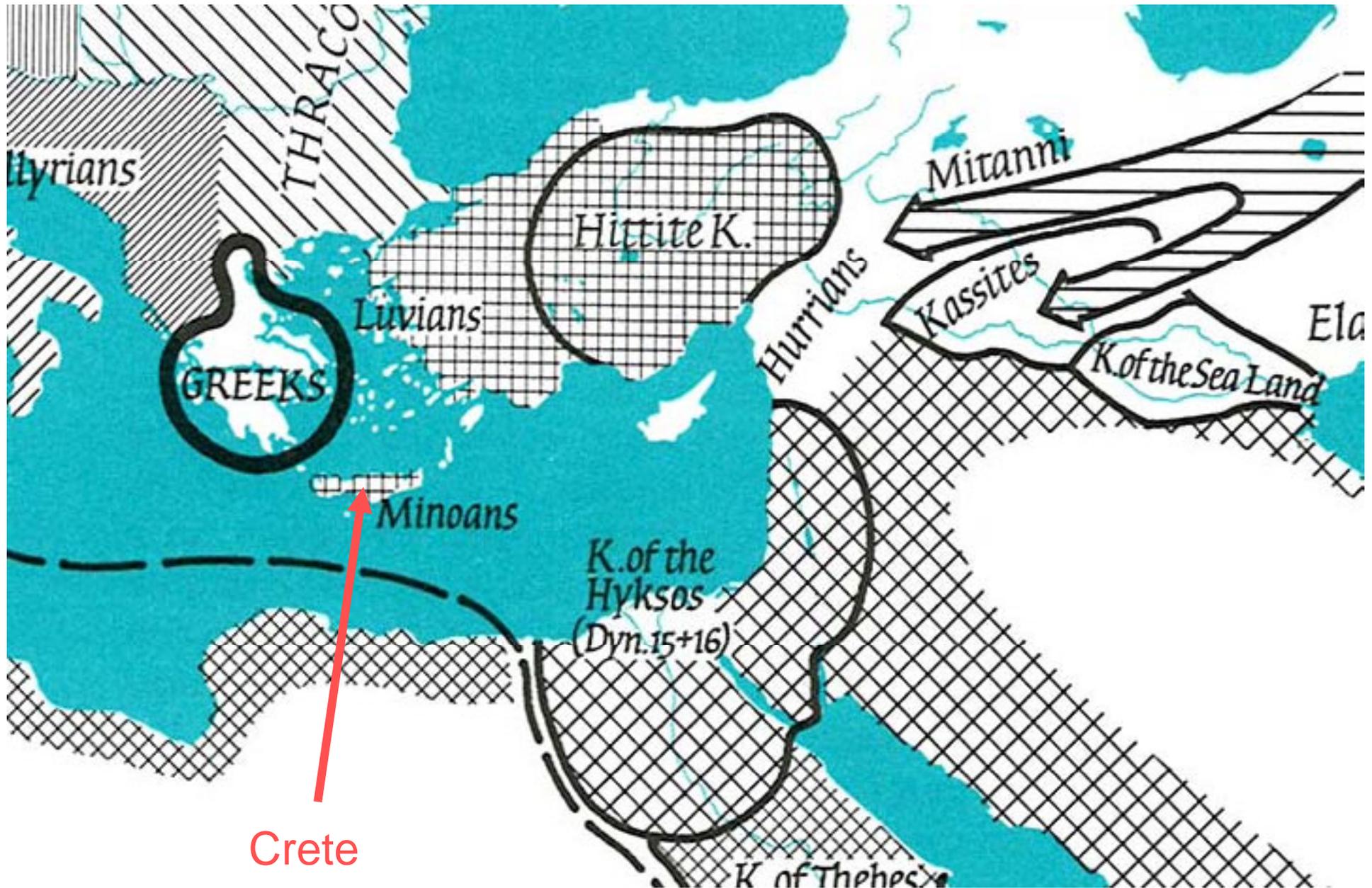
ADOBE or CLAY LUMP

COB or PUG
(& LAYERED CONSTRUCTION)

SODS

PISÉ DE TERRE or RAMMED EARTH





the Aegean world, 1600 BC

McEvedy, *Penguin Atlas of Ancient History*, p 31



second palace of Mallia, Crete, c 1700-1450 BC
Miles Lewis

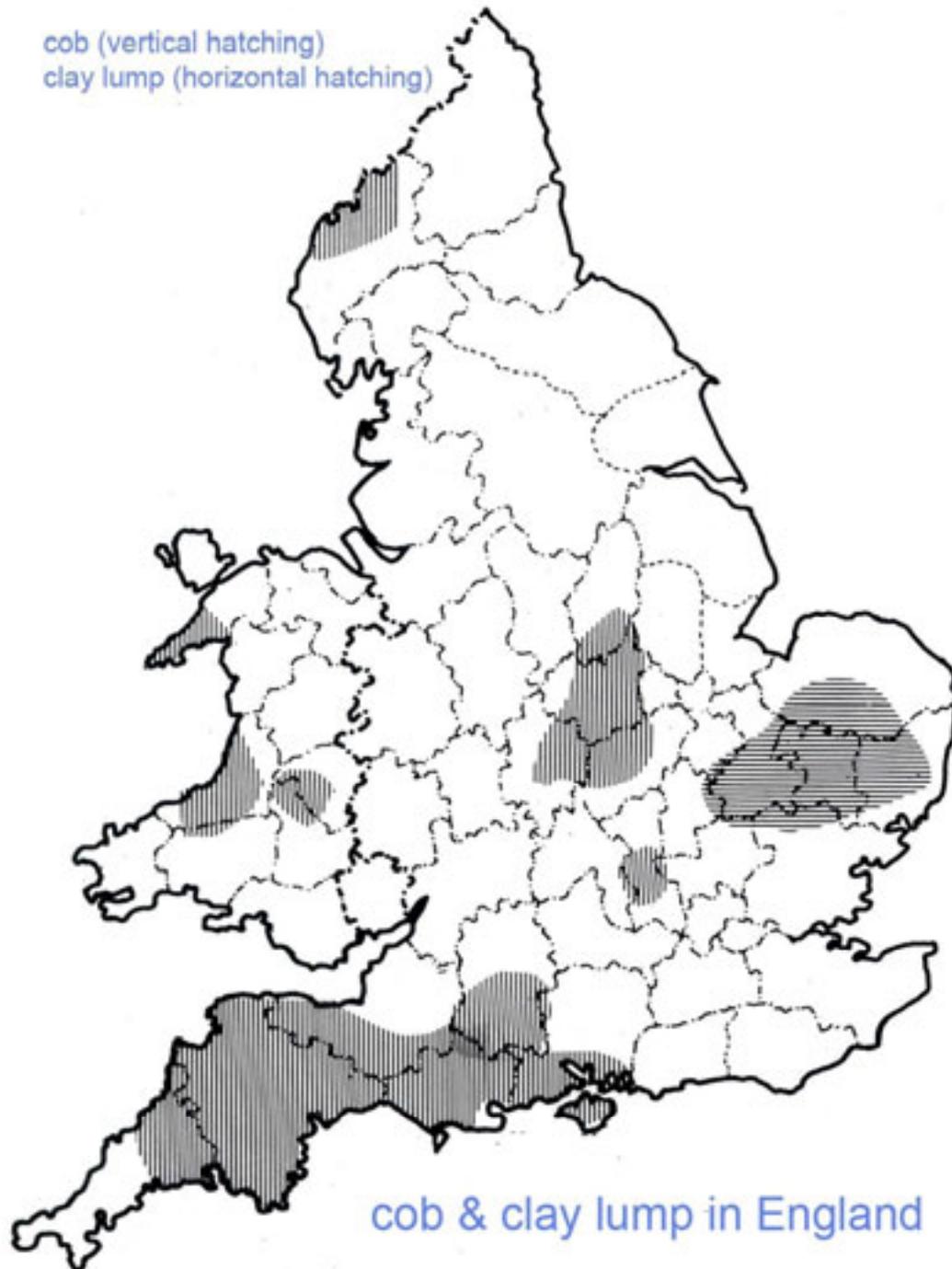


second palace of Mallia, detail of mud [cob] and rubble walling
Miles Lewis



Marib, Yemen, a city built on an ancient tell

George Michell [ed], *Architecture of the Islamic World: its History and Social Meaning* (New York 1978), p 180



England and Wales,
showing distribution
of clay and similar
walling materials

Ronald Brunskill, *Illustrated
Handbook of Vernacular
Architecture* (London 1970), p
176

thatched cob building, Somerset, UK
Lewis, *Architectura*, p 54





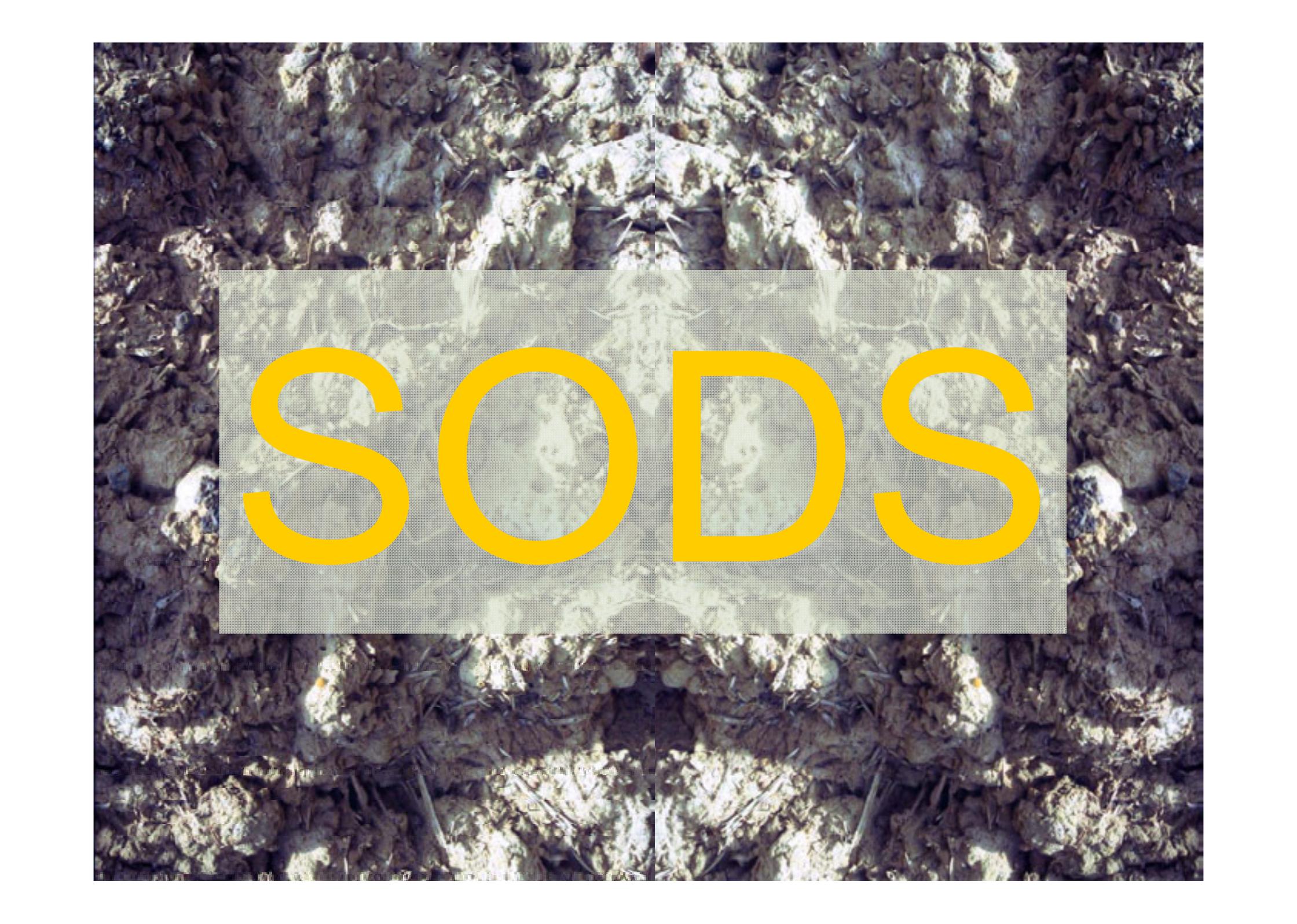
construction
of a cob (or
layered)
building in
Burkina

Jean-Louis
Bourgeois,
*Spectacular
Vernacular: the
Adobe Tradition*
(New York 1996),
p 37

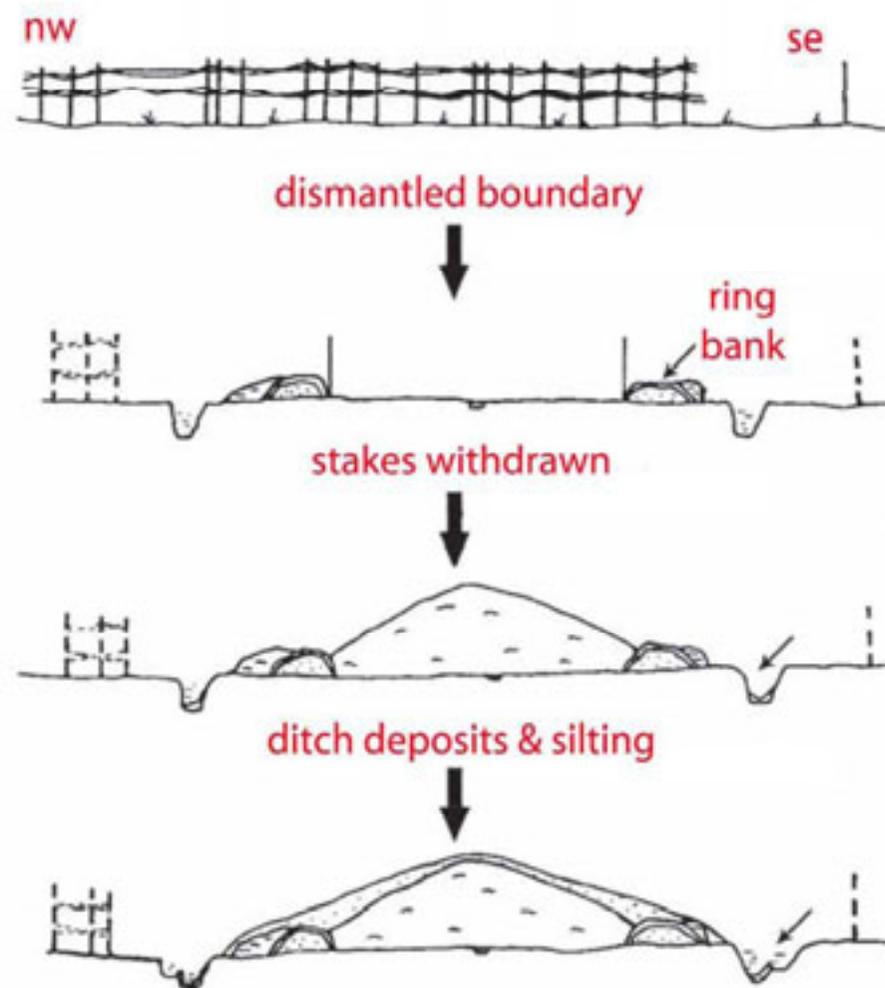
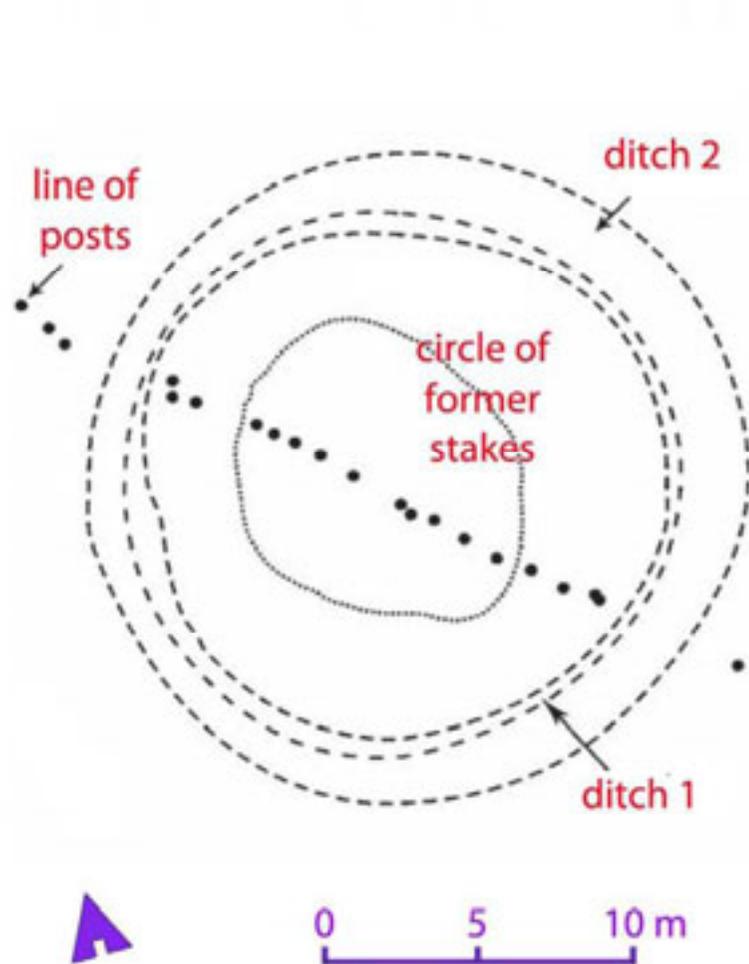


houses and a minaret,
Sada, Yemen, built by
'layering in clay'

Enrico Guidoni, *Primitive
Architecture* (New York 1978
[1975]), p 17

An aerial photograph of a field showing a central grid of soil sods. The sods are arranged in a regular pattern, with a central area highlighted by a semi-transparent grey rectangle. The text 'SODS' is overlaid in large, bold, yellow letters on this central area. The surrounding field consists of numerous smaller, irregular sods, some of which are light-colored and appear to be made of soil and organic matter.

SODS



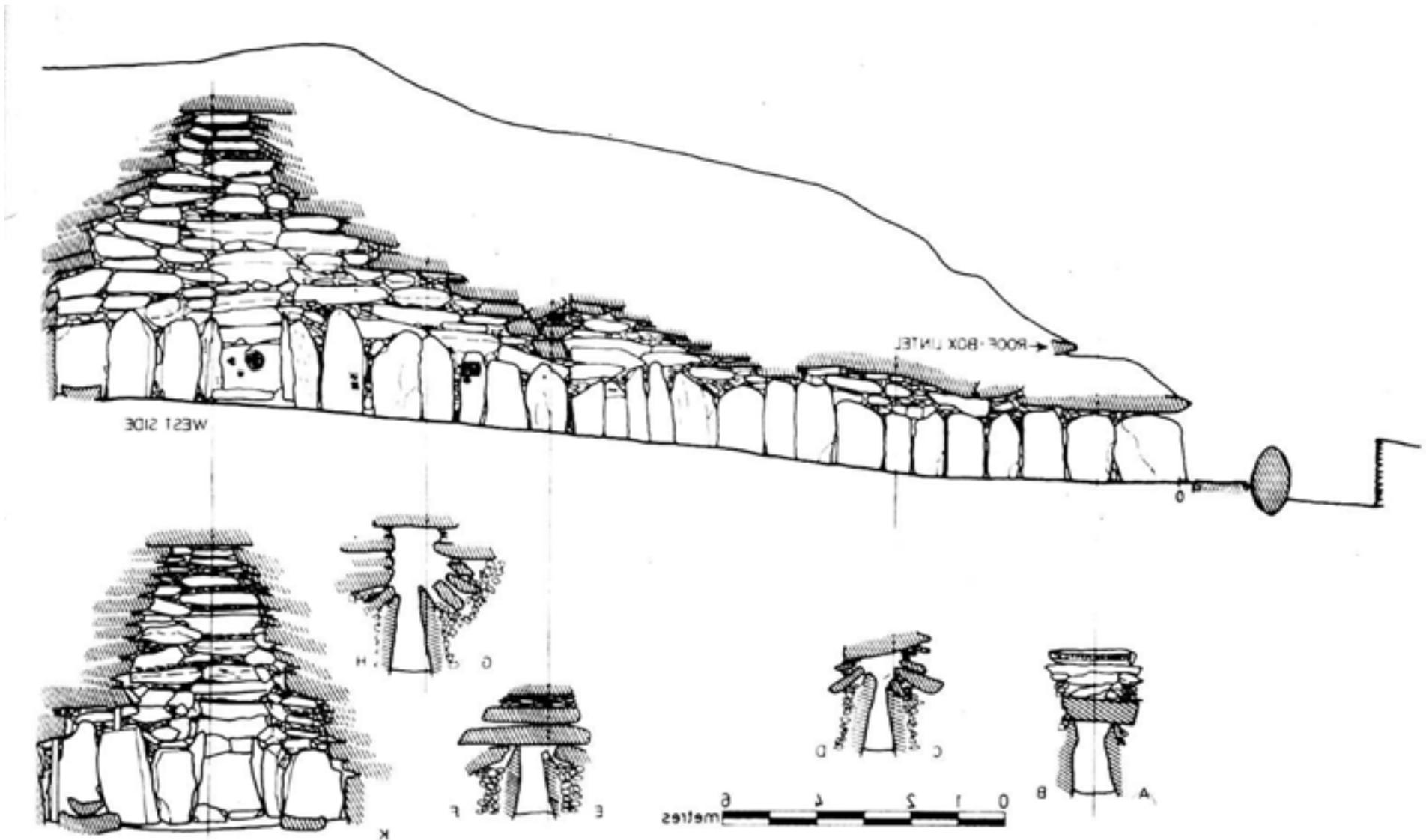
Trelen 2, Cornwall, Neolithic / Early Bronze Age

M A Owoc, 'From the Ground Up: Agency, Practice, and Community in the Southwestern British Bronze Age', *Journal of Archaeological Method and Theory*, XII, 4 (2005), p 269



tomb at New Grange, Ireland, c 3200 BC

M J O'Kelly, *Newgrange* (London 1998 [1992]), p 54



New Grange: sections

O'Kelly, *Newgrange*, p 94



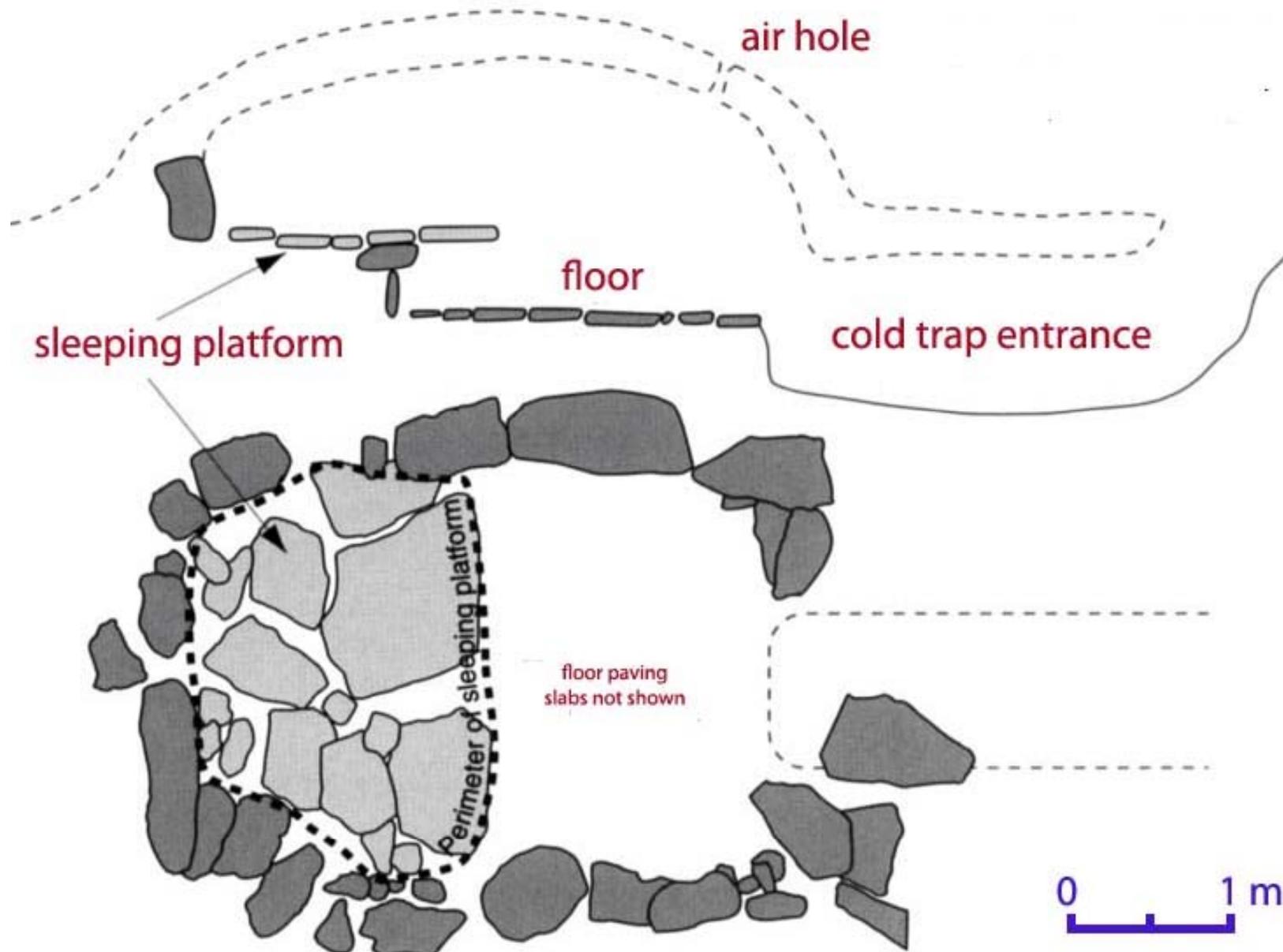
reconstructed Bronze Age house at Hjerl Hede, Denmark,
of log construction roofed with transverse strips of turf

Gorm Benzon, *Gammelt Danske Bindingsværk*(Copenhagen 1984), p 145



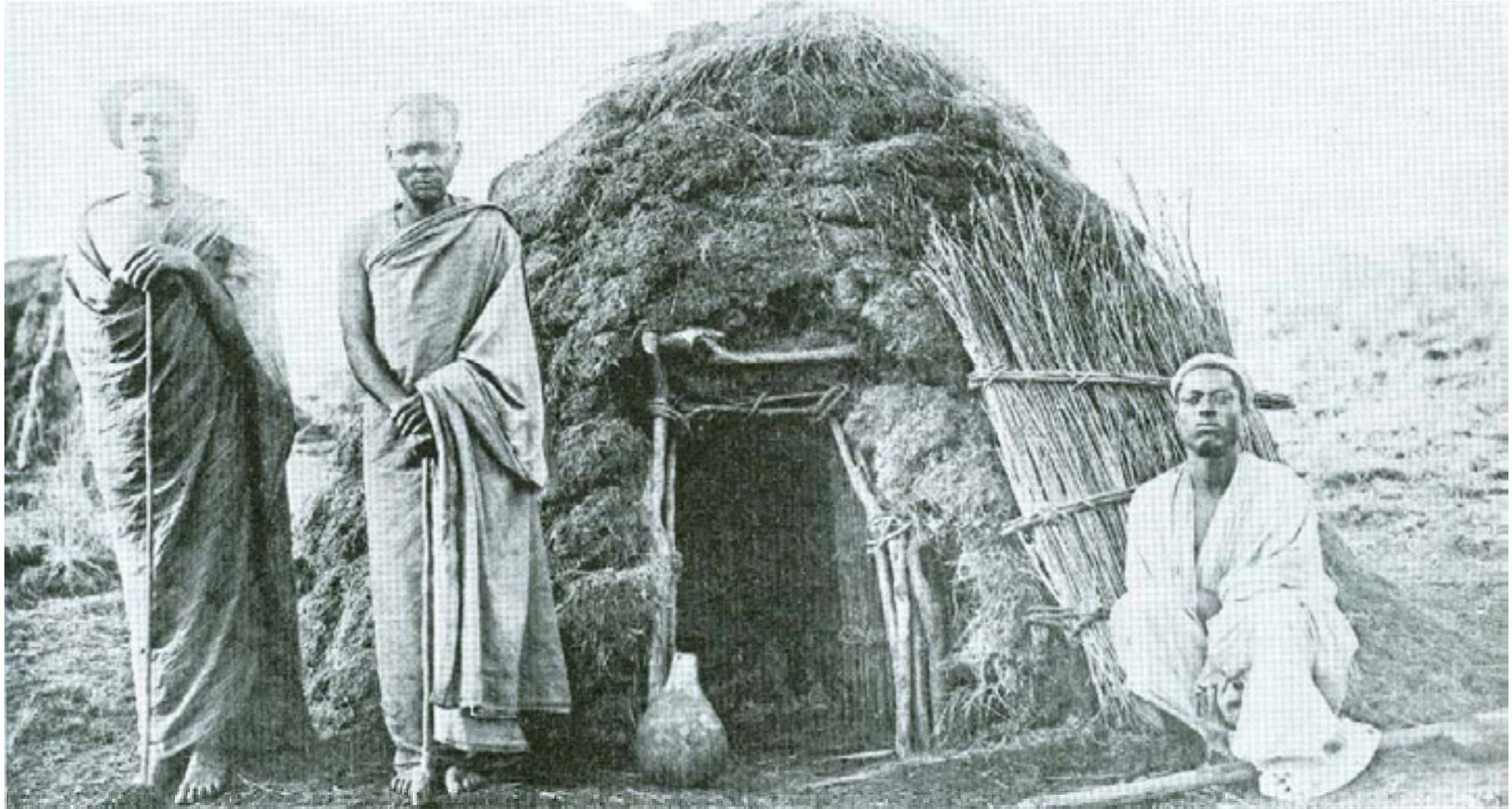
Danish farmhouse with 'winter walls' built of turf on the flat, then on the edge in the upper part, from an old drawing

Gorm Benzon, *Bindingsværk i Mellemjylland* (no place [?Copenhagen] 1985), p 9

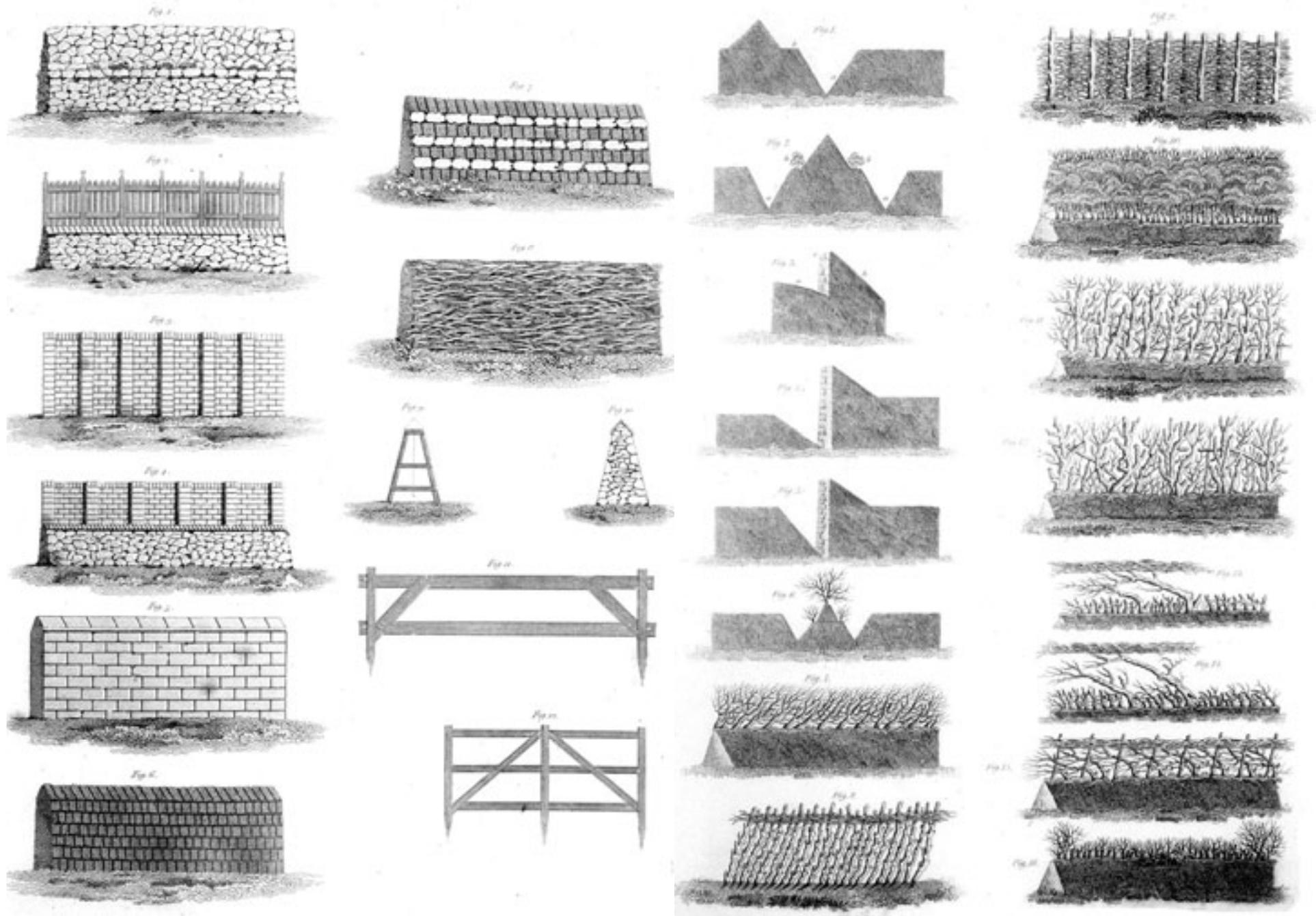


Inuit building [Pordern Point house 13], Alaska

Robert Park, 'Thule Winter Site Demography in the High Arctic', *American Antiquity*, LXII, 2 (1997), p 21



Wanji house, southwestern Tanzania
thatched with turves of the local peat bog

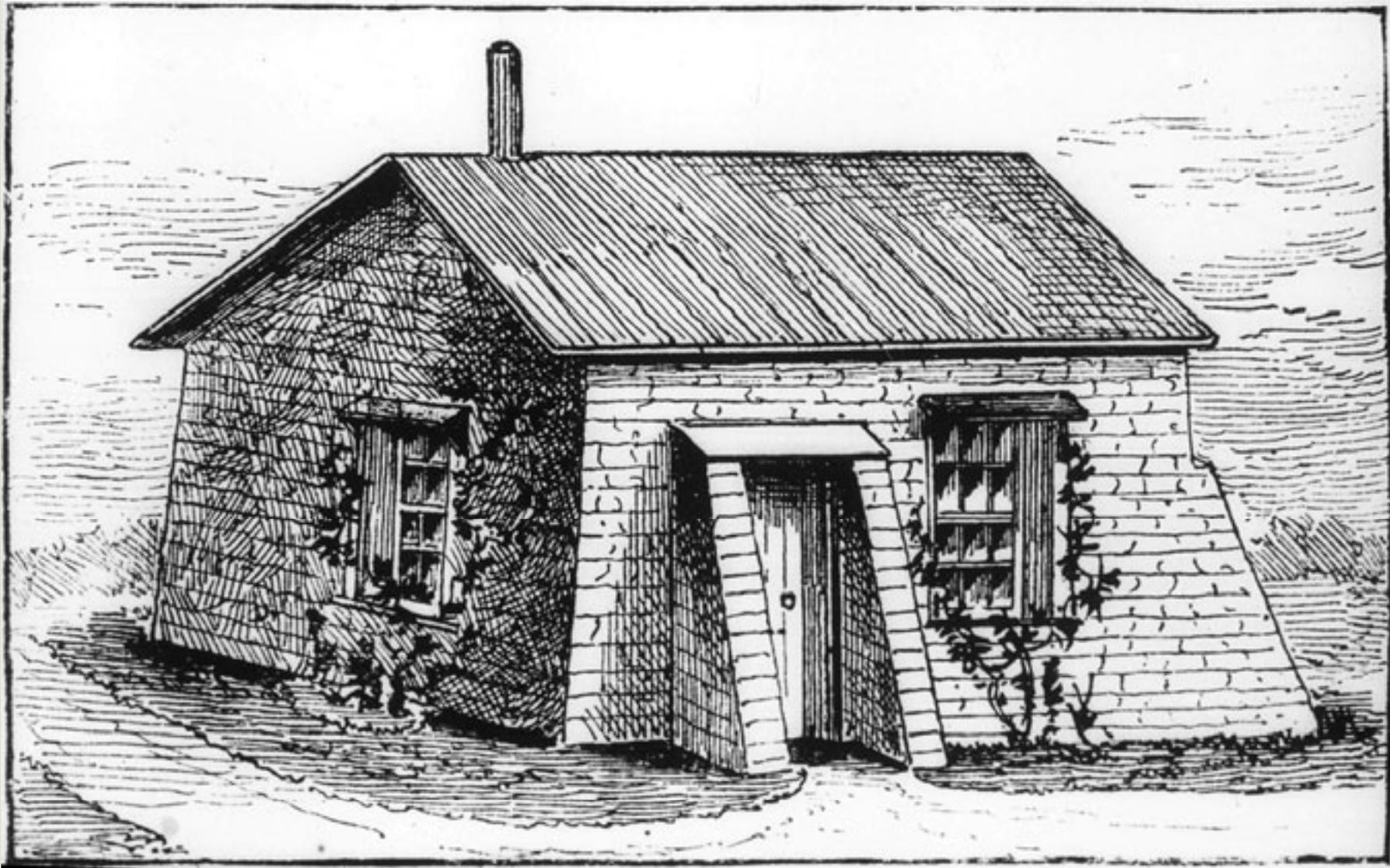


farm fences from Abraham Rees, *Cyclopaedia*, 1814



Melbourne Gaol, 1836, showing the escape of Aboriginal prisoners in 1838, by W F E Liardet

Susan Adams [ed Weston Bate], *Liardet's Water-Colours of Early Melbourne* (Melbourne 1972), no 4



sod house on the American prairies, 1886

King, *Homes for Home-Builders*, p 101



sod house, Oklahoma, 1890s

Edward Dale, 'From Log Cabin to Sod House', *Journal of the Illinois State Historical Society*, 38 (4) (1945), p 402

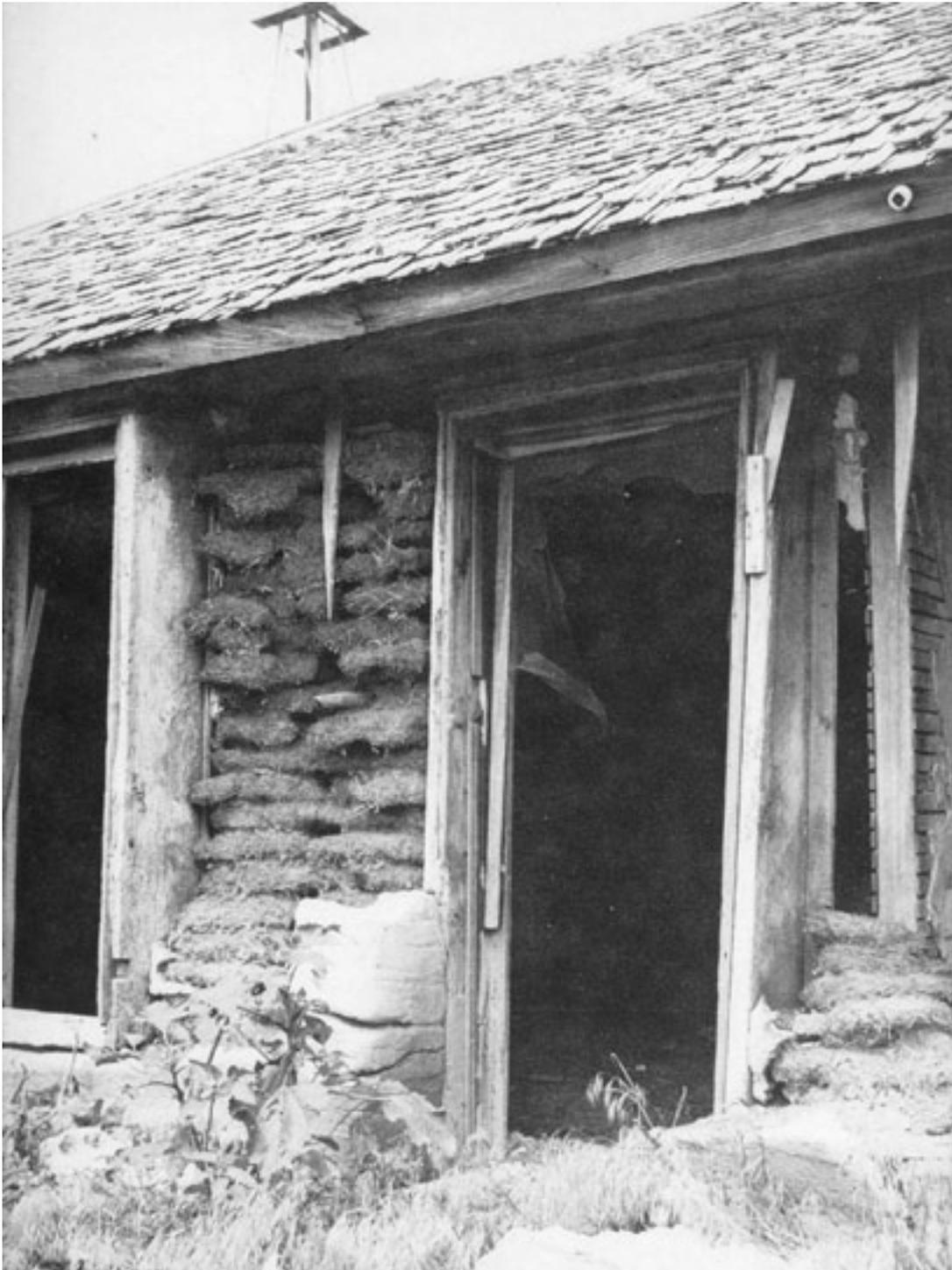


Frank Visek sod house, south-west Custer County, Nebraska

Tim Turner, 'Sod Houses in Nebraska', *APT Bulletin*, VII, 4 (1975), p 26



what is the roofing material?



Sod house in
Buffalo County,
Nebraska: modern
view of decayed
wall

Turner, 'Sod Houses in
Nebraska', p 34

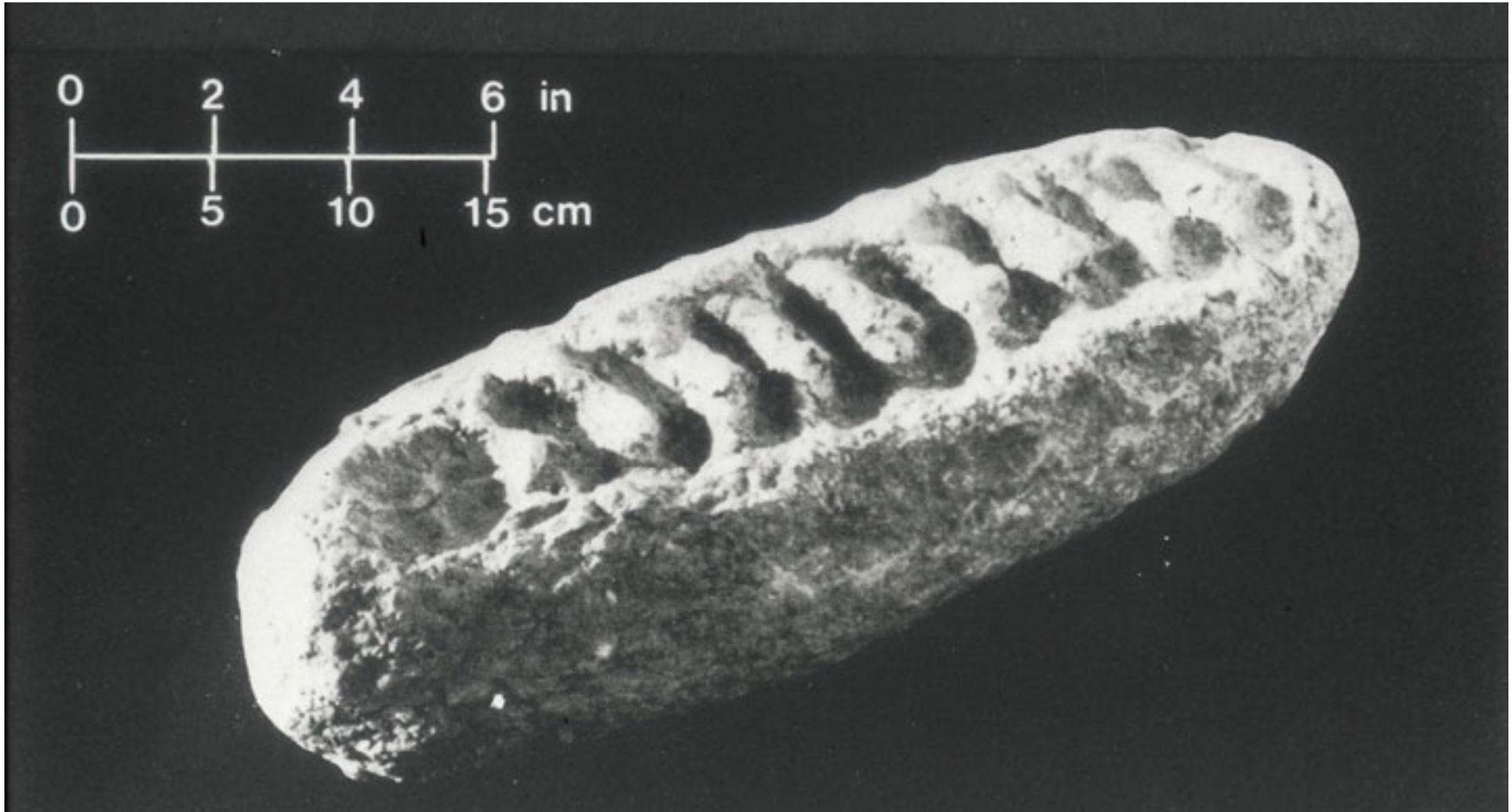


sod house, Waipori, New Zealand

McNeill Collection, reproduced in Jeremy Salmond, *Old New Zealand Houses 1800-1940* (Auckland 1986) p 38

A large pile of reddish-brown adobe bricks is shown under bright sunlight. The bricks are rectangular and stacked in a somewhat haphazard manner. The background is a vast expanse of similar bricks, suggesting a large-scale production or storage area. The lighting is harsh, creating strong shadows and highlights on the surfaces of the bricks.

ADOBÉ

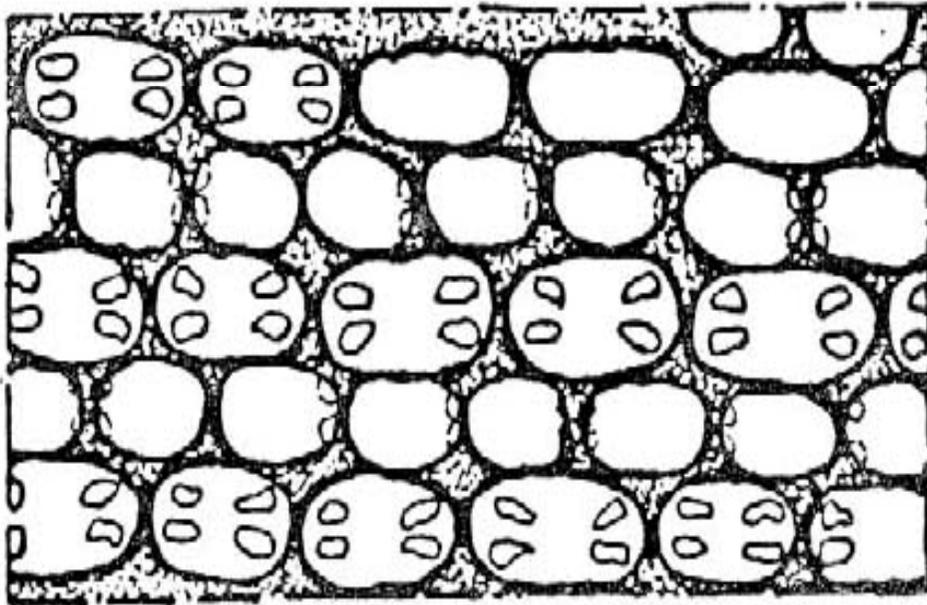


sun-dried brick from Jericho, c 8,000 BC

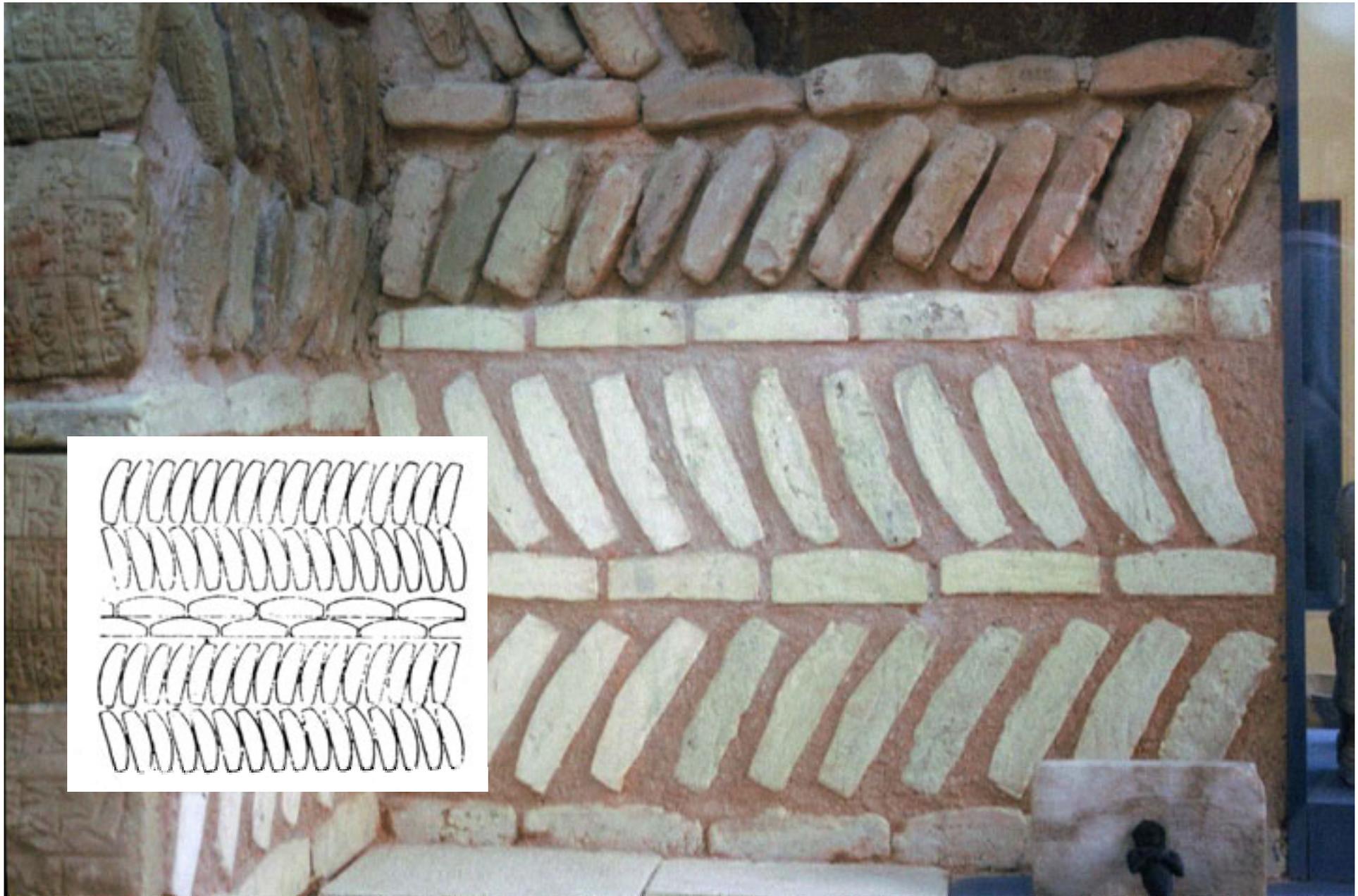
John Woodforde, *Bricks to Build a House* (London 1976), p 19



sun-dried bricks
from Sialk, Iran, 6th
millennium BC

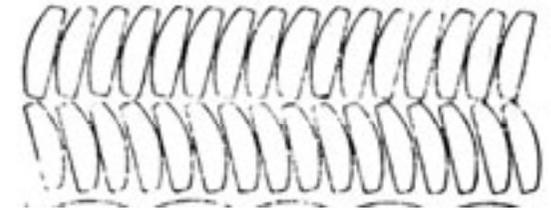


A U Pope, *Introducing Persian
Architecture* (Soroush Press,
Tehran 1976 [1969]), p 7.



plano-convex bricks laid in herringbone patterns 3rd millennium BC

unspecified source, Archaeological Museum, Istanbul: Miles Lewis; drawing from Seton Lloyd, 'Building in Brick and Stone' in Charles Singer et al [eds], *A History of Technology*, volume I, *From Early Times to the Fall of Ancient Empires* (Oxford 1954), p 465



building with clay
roll walls,
herringbone-
fashion, Svabence,
near Vyskov,
Moravia,
Czechoslovakia

Vaclav Menci, *Lidova
Architektura v
Ceskoslovensku* (Prague
1980), p 12



wall of *opus spicatum* in the Czech Republic
Martin Čerňanský by email

barn of *opus spicatum* in the Czech Republic
Martin Čerňanský by email





building with clay
roll walls in a
timber frame,
Stefanov,
Moravia,
Czechoslovakia
1875

Mencl, *Lidova*
Architektura, p 12

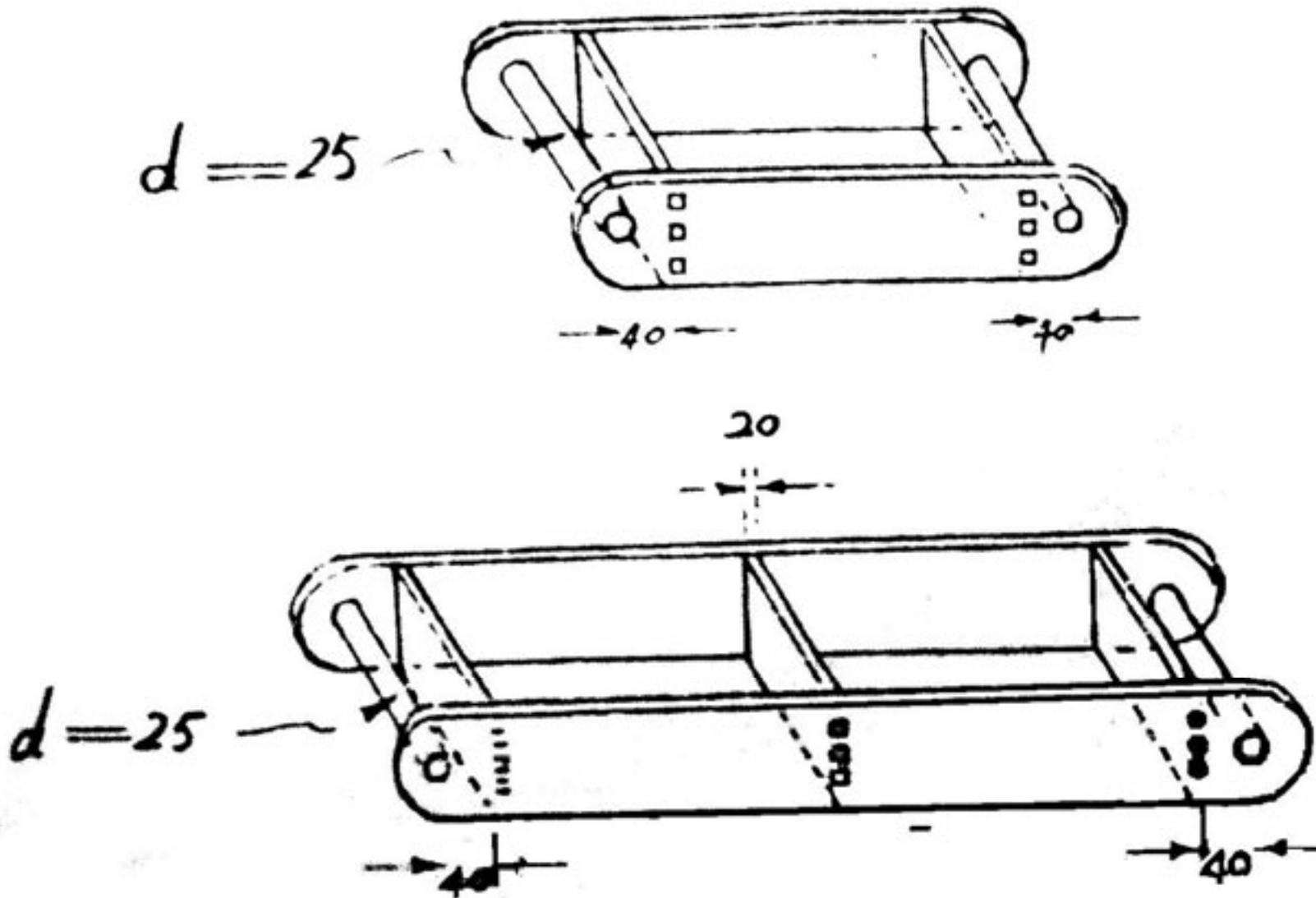


Mohenjo-Daro, Indus Valley, c 2500-2000 BC

Lewis, *Architectura*, p 39



earth [adobe?] and timber building, Yunnan Sheng province, China
No 3 from a commercial slide set provided by Ye Quim, 1995



adobe moulds, China

Ron Edwards & Lin Wei-Hao, *Mud Brick and Earth Building the Chinese Way* (2nd ed, Kuranda [Queensland] 1984), p 14

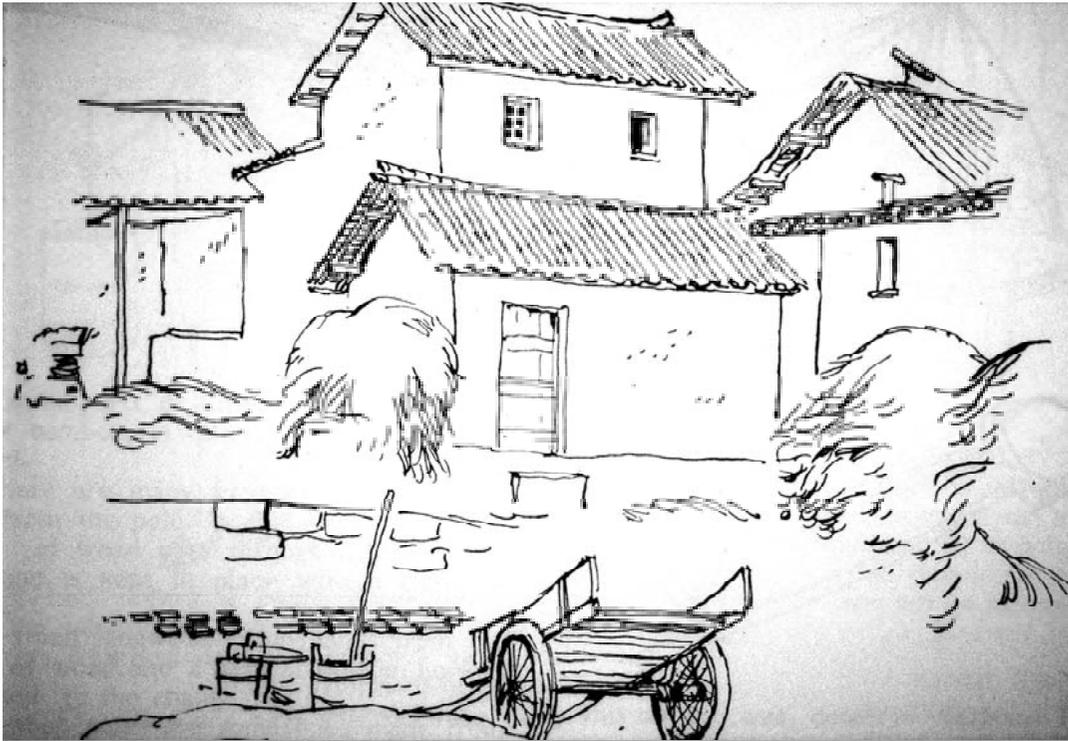


adobe making, Dragon Springs Commune, north of Kunming, China: wetting the mould; discharging the brick

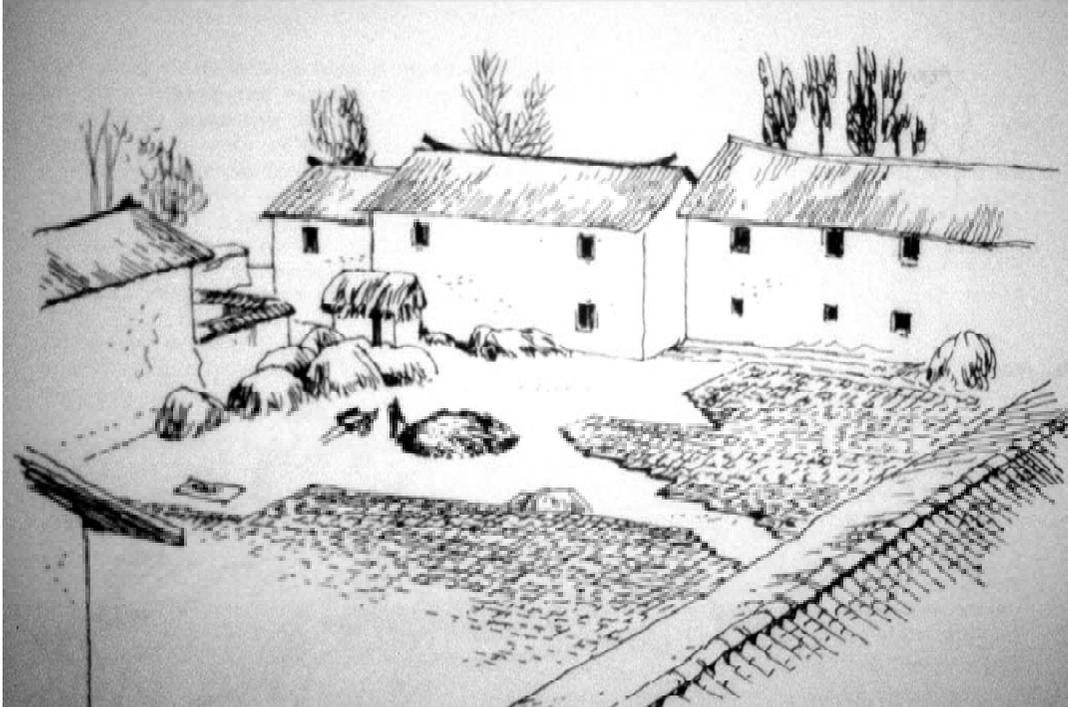


Adobes drying,
China

Lewis, *Architectura*,
p 55



adobe yard, farm of Li
Fu-Wen, Dragon Springs
Commune
manufacture; adobes
drying



Edwards & Lin, *Mud Brick and Earth
Building*, p 14

adobe types

slab

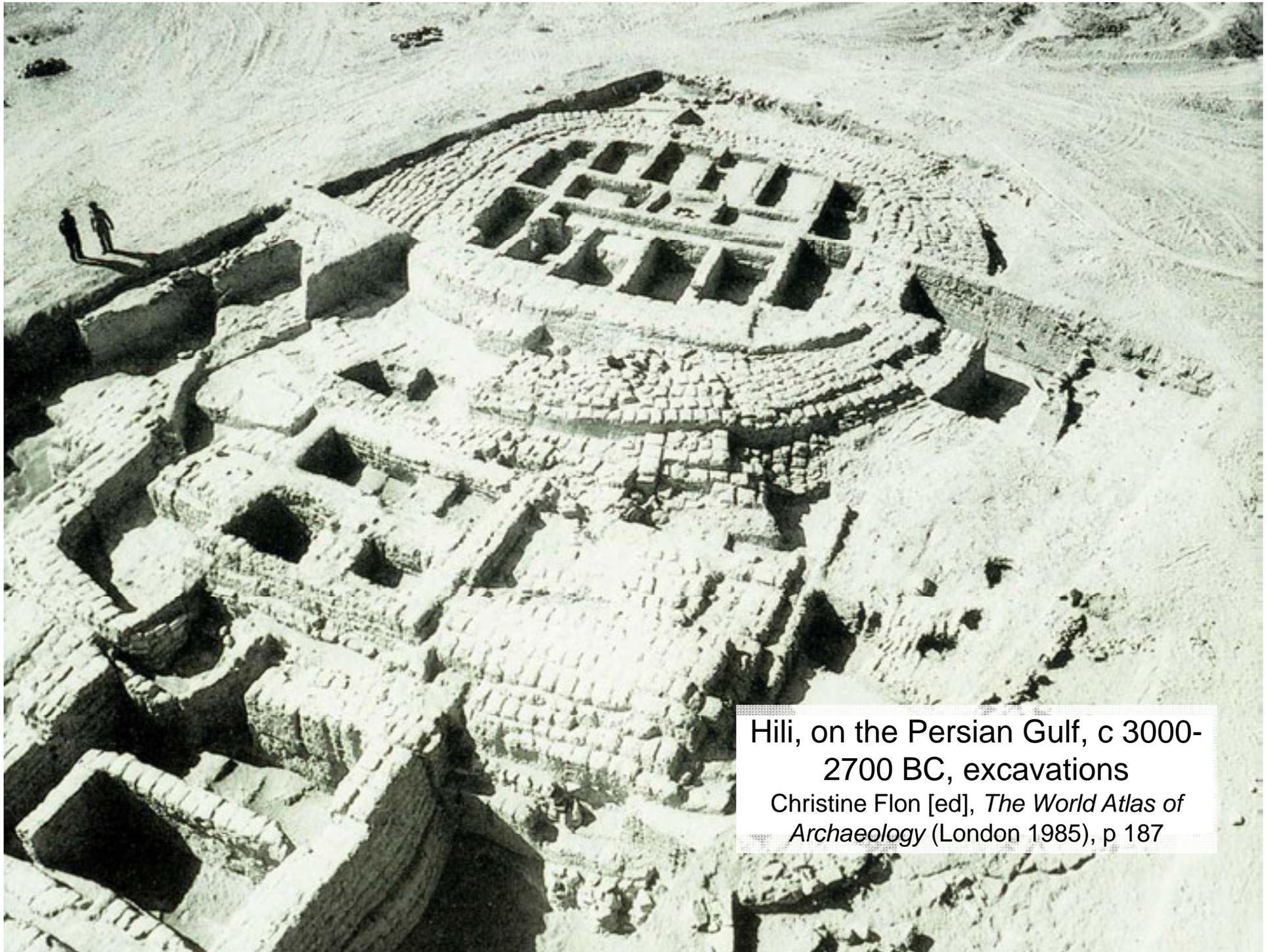
plate

block



adobe at Catal
Hüyük, Turkey, c
5700 BC

Miles Lewis



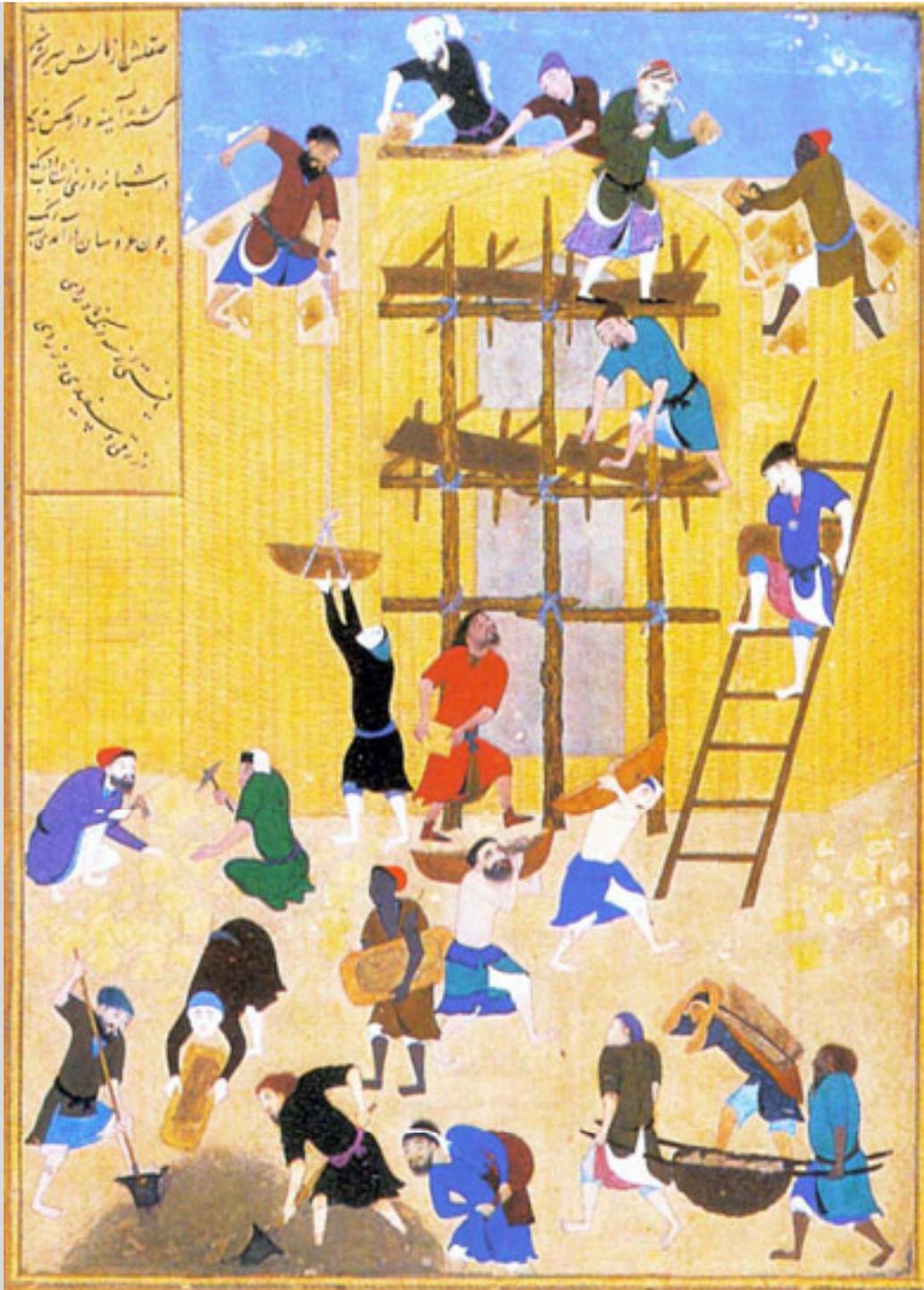
Hili, on the Persian Gulf, c 3000-
2700 BC, excavations

Christine Flon [ed], *The World Atlas of
Archaeology* (London 1985), p 187



Ziggurat at Aqar
Quf, Irak, c 1200
BC, showing a mud
brick structure with
reed reinforcement

Lloyd, 'Building in Brick
and Stone' p 468



the construction of
the Khawanaq
Palace, Iran,
illustrated by
Bizhad, 1495

from a Khamsa manuscript by
Nezāmī, 1495. British Library,
London, Or6810F.154v.



domed building, Abu Ghal Ghal, Northern Syria

Miles Lewis



domed building, Abu Ghal Ghal, showing the construction

Miles Lewis



domed houses at Buinessmir, near Aleppo, Syria
Mansell



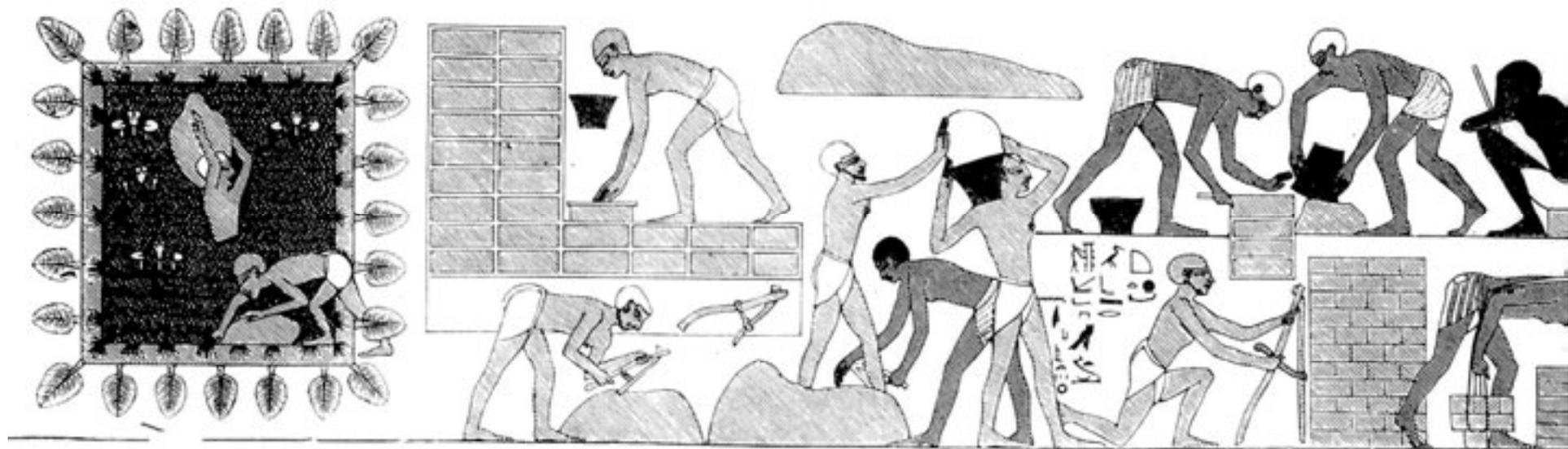
Tulor village, Chile, before AD 300

Australians Studying Abroad



tomb at Abd-el-Qrna, Egypt, Middle Kingdom, wall painting of the building of a temple, showing the manufacture and use of mud bricks

Woodforde, *Bricks to Build a House*, pp 28-9. For another illustration of Egyptian mud brick making, at Rekhmire, Luxor (XVIII Dyn), see Delia Pemberton, *Ancient Egypt* [Architectural Guides for Travellers] (San Francisco 1992), p 13



tomb at Abd-el-Qrna: details



adobe pile, New Gurna, Egypt
Miles Lewis



detail of adobes, New Gourná,
Miles Lewis



New Gourna, Egypt, by Hasan Fathy
Lewis, *Architectura*, p 15



adobe manufacture, West Aswan village, Egypt

Miles Lewis



Gournia, Crete, mainly Late Minoan I, say c 1400BC: view from the east

Miles Lewis



Gournia, Crete,
remains of mud
brick

Miles Lewis



Buyuk Kale, Bogazköy (Hattusas), Building E, c C13th BC: remains from the southwest

Miles Lewis



Buyuk Kale,
Building E:
detail of mud or
mud brick

Miles Lewis



Erebuni Citadel, near Erevan, Armenia, 782 BC, view

MilesLewis



Erebuni Citadel,
view along
collapsed walls of
a passage

Miles Lewis



Erebuni Citadel, detail of mud brick
Miles Lewis



legionnaires
building a
fortification of
unbaked bricks,
from Trajan's
column, Rome

Jean-Pierre Adam
[translated Anthony
Matthews], *Roman
Building Materials and
Techniques* (Indiana
UOP, Bloomington
[Indiana] 1994), p 81



mud brick
architecture of
Timimoun, French
West Africa

MUAS 7,153



West African earth tower; Mosque at Bobo Diolasso, Burkino Faso
Environmental Communications, *Indigenous West African Architecture & Decoration*.



Djenné Mosque, Mali,
rebuilt 1906-7

Lewis, *Architectura*, p 57



Djenné Mosque, Mali, rebuilt 1906-7

Lewis, *Architectura*, p 56



thatched houses and granaries of the village of
Djiri, Burkina Faso, West Africa
Lewis, *Architectura*, p 256

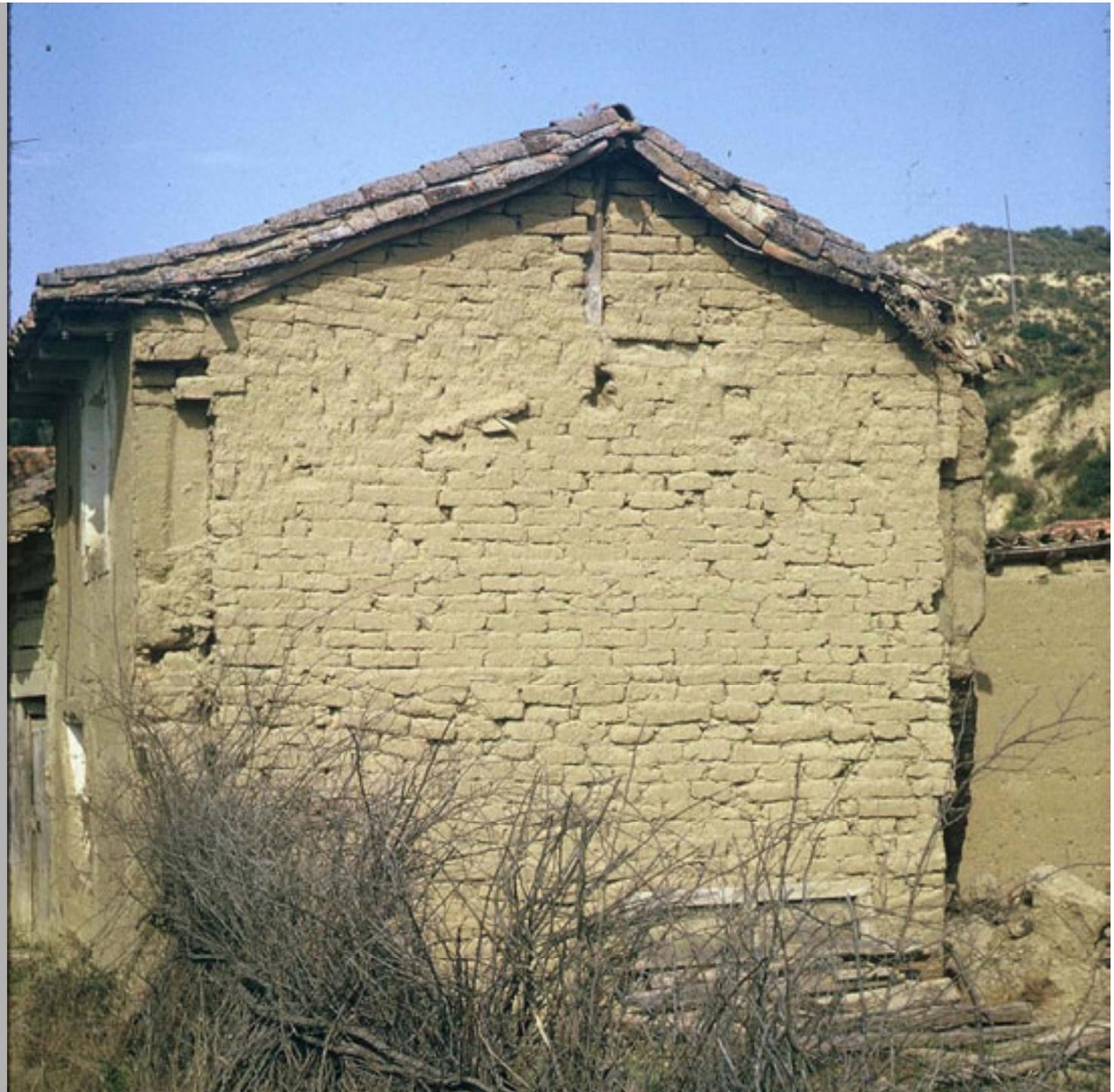


adobe building near San Miguel de la Escalada, León, Spain

Miles Lewis

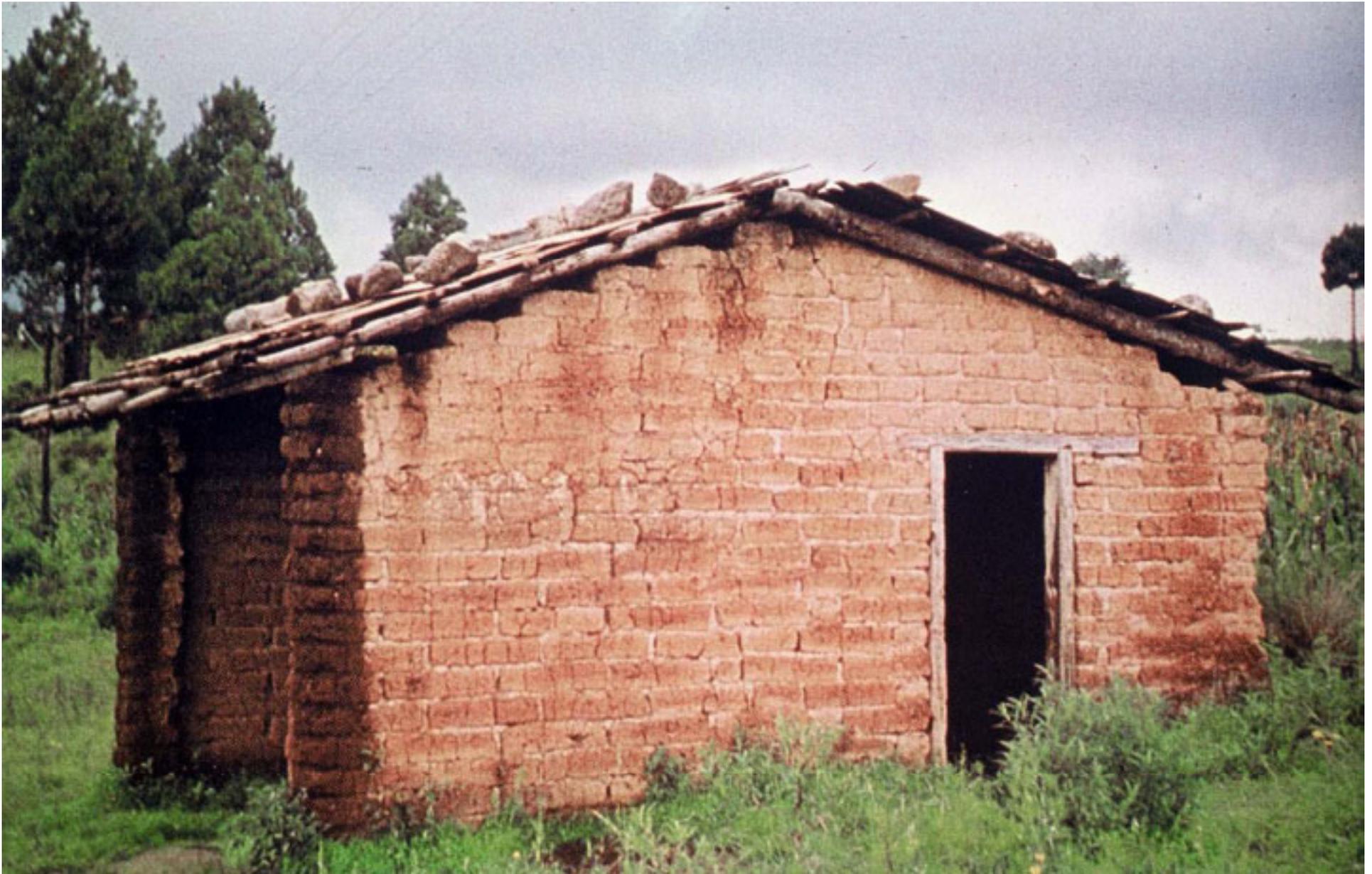
adobe
building near
San Miguel
de la
Escalada
Léon, Spain

Miles Lewis

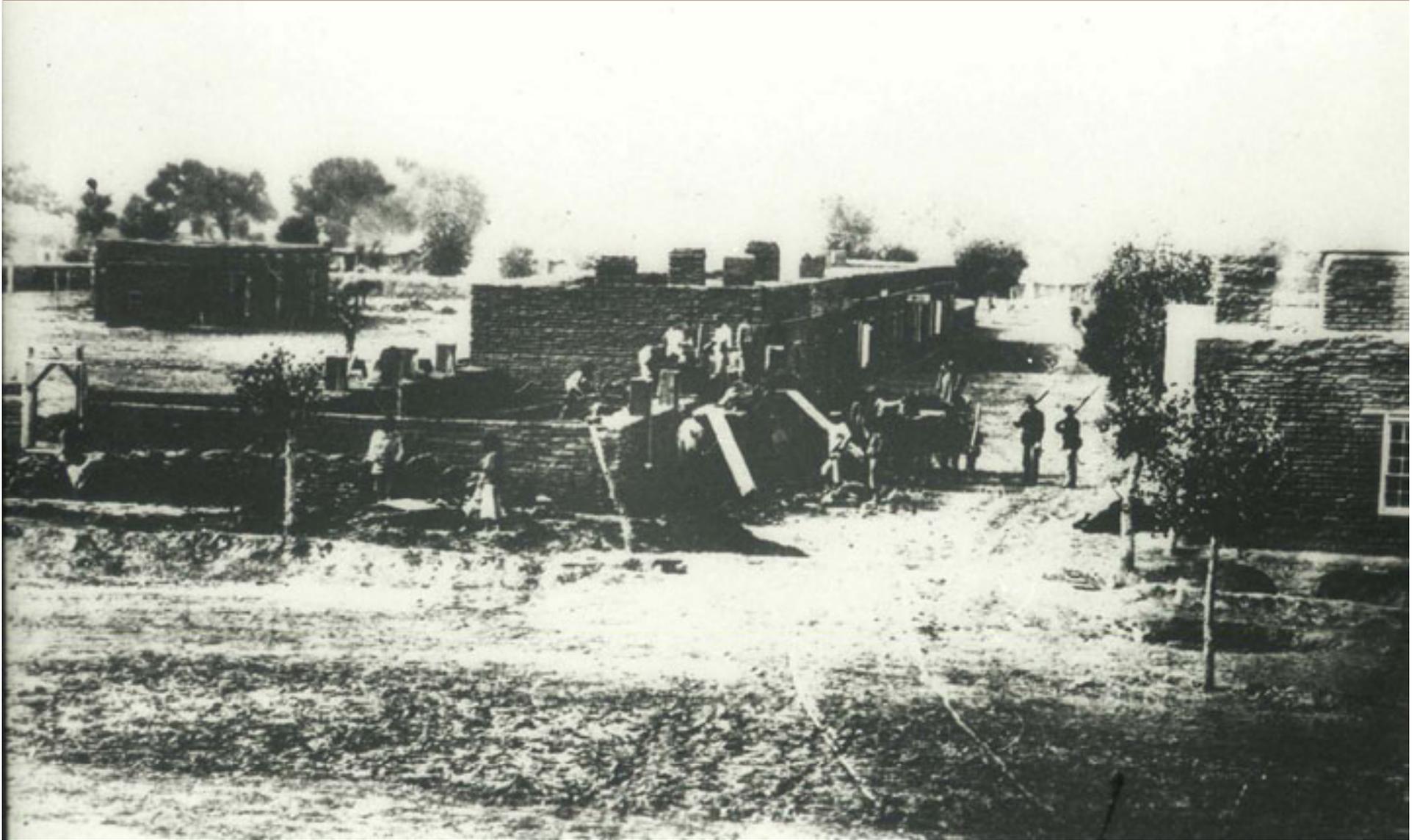




adobe building, San Cristobal, Guatemala
Miles Lewis



adobe hut, Mexico, C20th
Woodforde, *Bricks to Build a House*, p 144



Navajo Indians building adobe barracks at Fort Sumner, c 1865

Adobe Past and Present [reprint from *Palacio*, LXX, 4], [New Mexico] 1972), p 144



clay lump house,
Shipdham, Norfolk



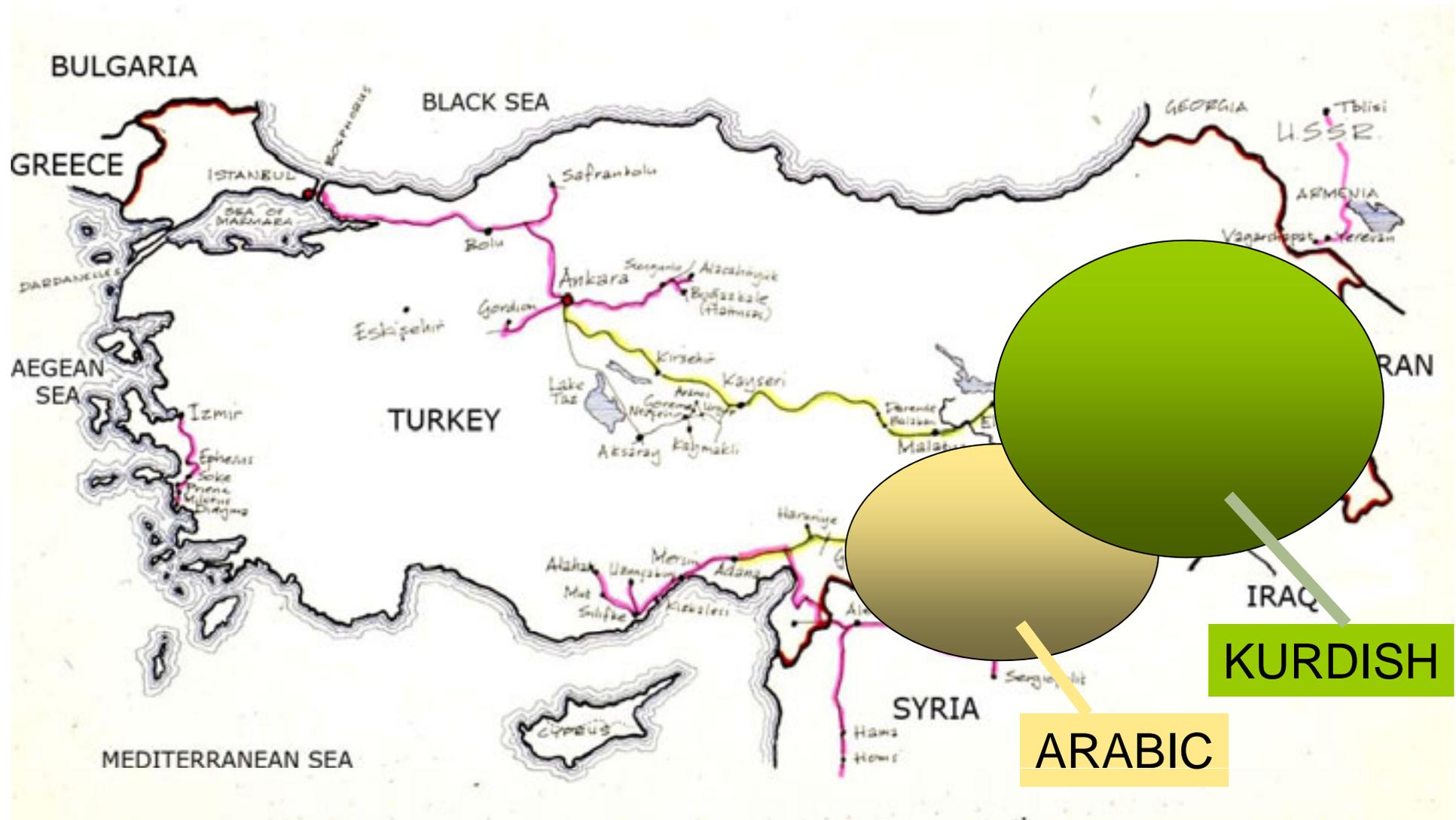
clay batt house, 65 High
St, Orwell, Cambridgeshire

Alec Clifton-Taylor, *The Pattern of
English Building* (London 1972), p 284.
Eric Mercer, *English Vernacular
Houses* (London 1975), pl 97B.



TURKEY

a case study in adobe



Arabic and Kurdish mud brick subcultures , Turkey

Miles Lewis



domed turbe or
shrine (?)
Ugurlu, off Urfa-
Harran Road,
southern Turkey
(Arabic)

Miles Lewis



Yumrutepe, off Van-Muradiye Road, southern Turkey: dung cakes and piles (Turkish)
Miles Lewis



adobes drying at Uragli, on the Urfa-Harran Road, southern Turkey

Miles Lewis



Balaban, an Arab village in southern Turkey
Miles Lewis



Balaban

mixing mud for
adobes

drying piles



Miles Lewis



adobe drying pile , Balaban
Miles Lewis



mud brick making site, Özbag, north of Kirsehir, eastern Turkey (1)

Miles Lewis



Özbag, close view with barrows (2)

Miles Lewis



Özbag, brick
mould (3)

Miles Lewis



Özbag, weting
the mould
filling the mould
(4,5)



Özbag

striking off the
clay (6)



the filled
mould (7)

Miles Lewis



Özbag

emptying the
mould at the
hacking ground
(8, 9)

Miles Lewis

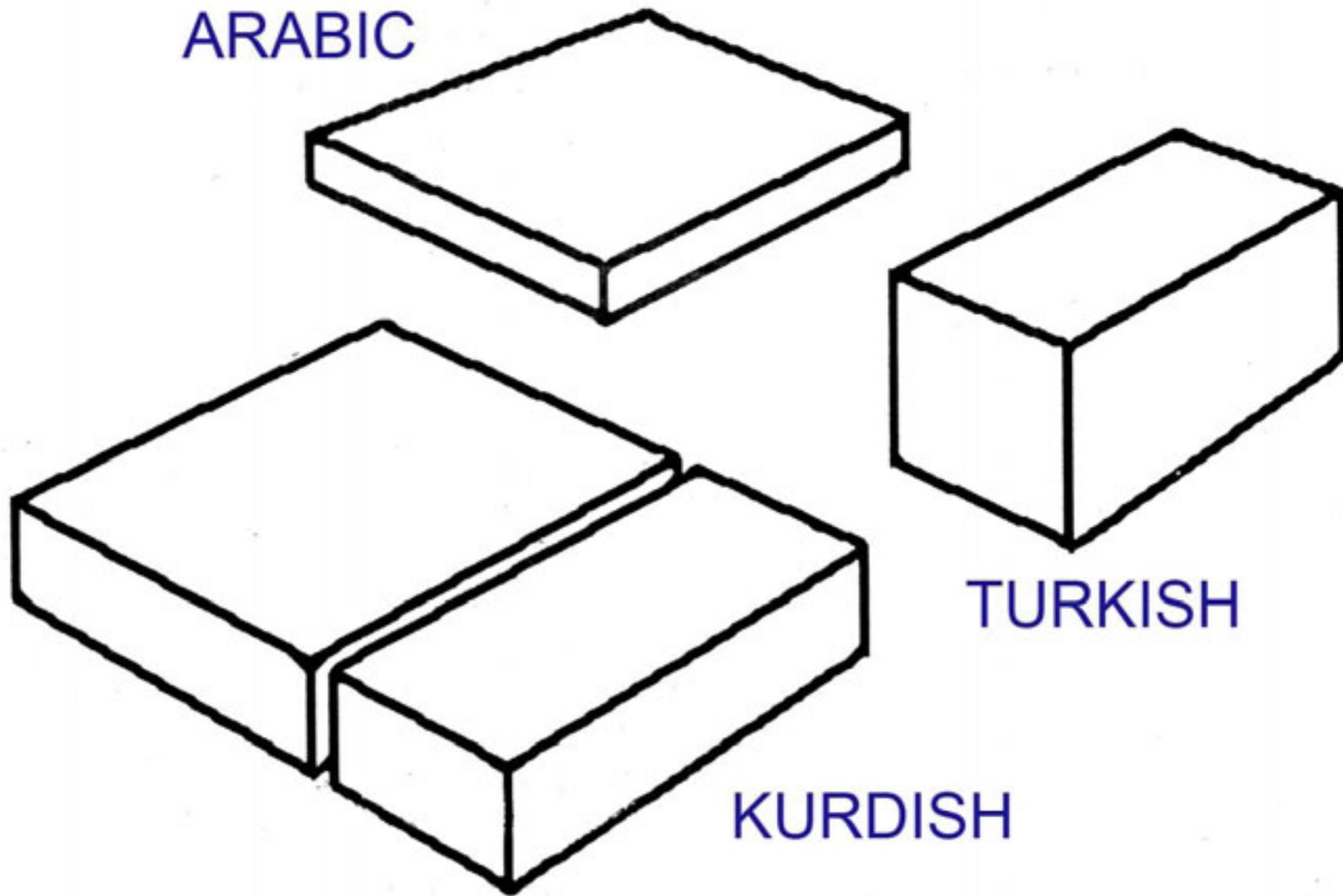


Özbag, the first drying, with Serdar Beycan (10)

Miles Lewis



Özbag, the drying ground (11)
Miles Lewis



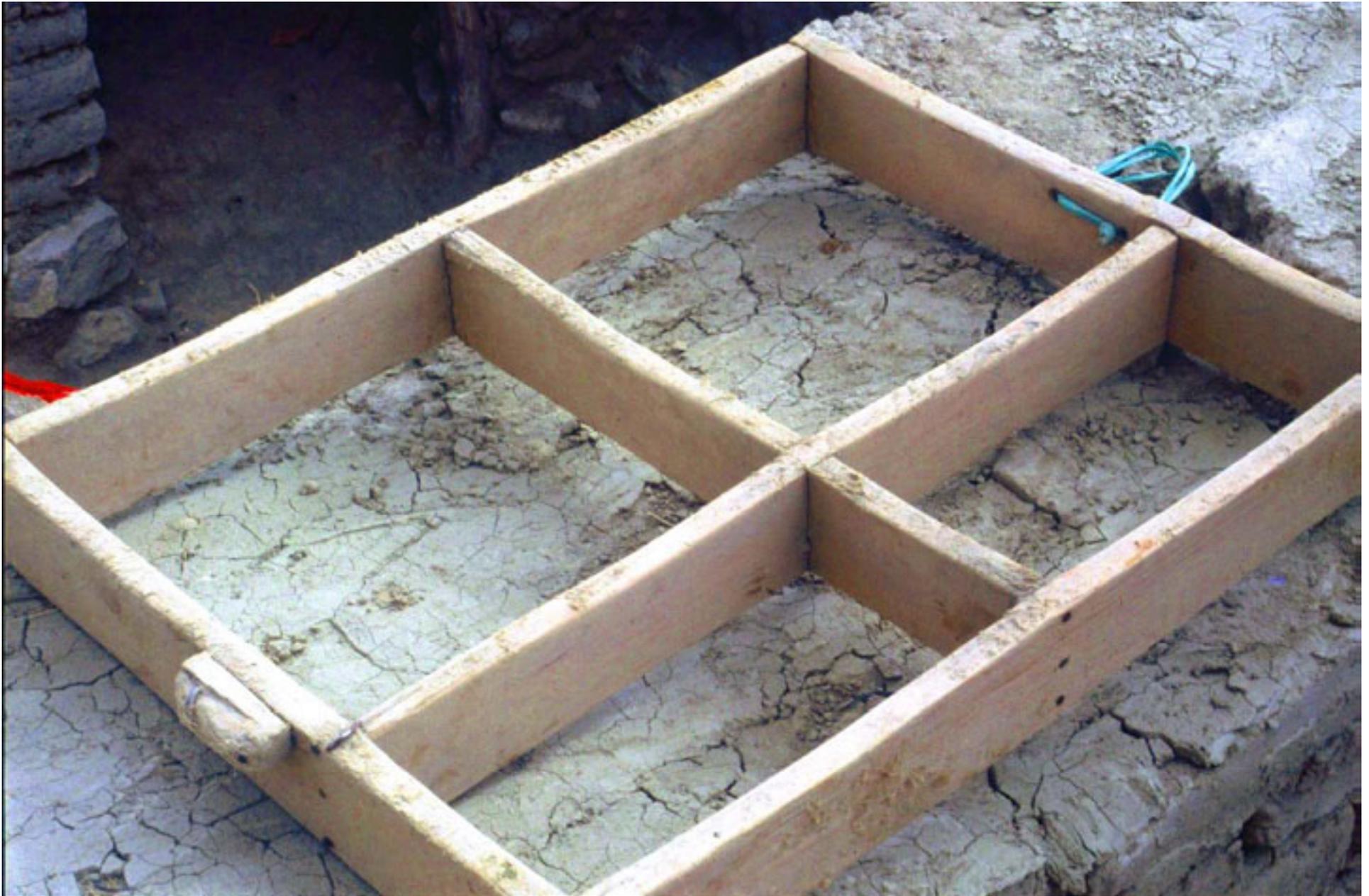
the Kurdish compromise

Miles Lewis



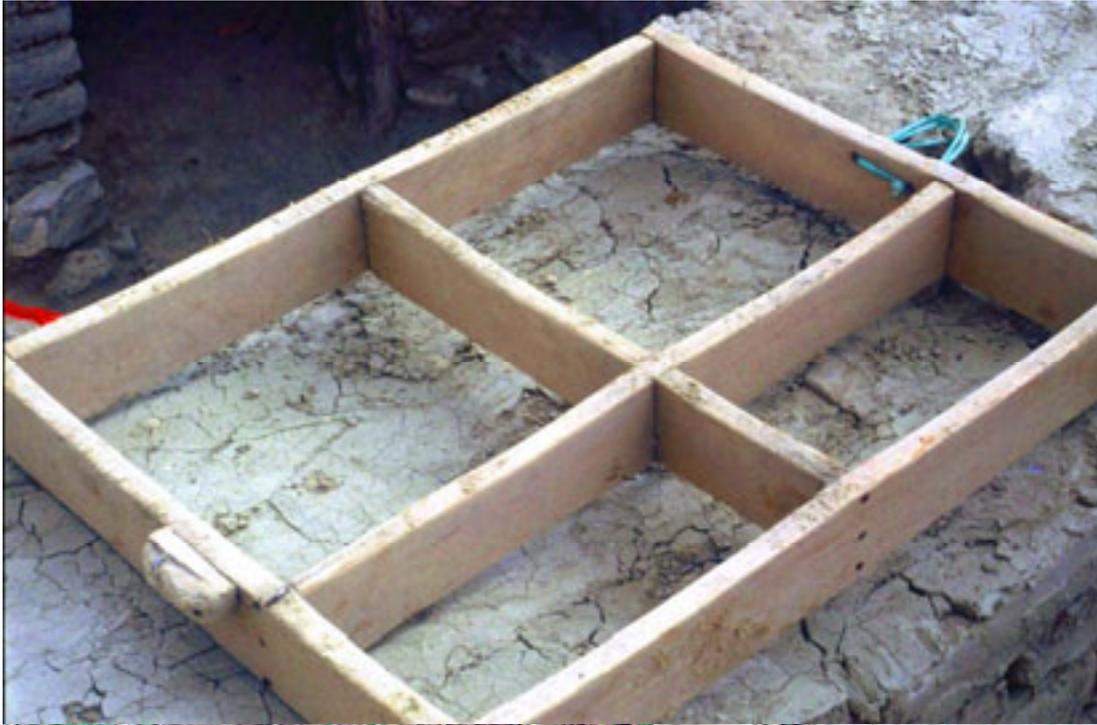
Kurdish mud bricks drying, Bagdere, East of Diyarbakir, Turkey

Miles Lewis



brick mould at Çavustepe, a Kurdish village on the Van-Hakkari road, eastern Turkey

Miles Lewis



brick mould at
Çavustepe



bricks from a
staggered mould
at Yalindamlar,
west of Malatya

Miles Lewis



bricks drying at a house site, Yalindamlar

Miles Lewis



How can you use a combination of square and oblong bricks (in equal numbers)?



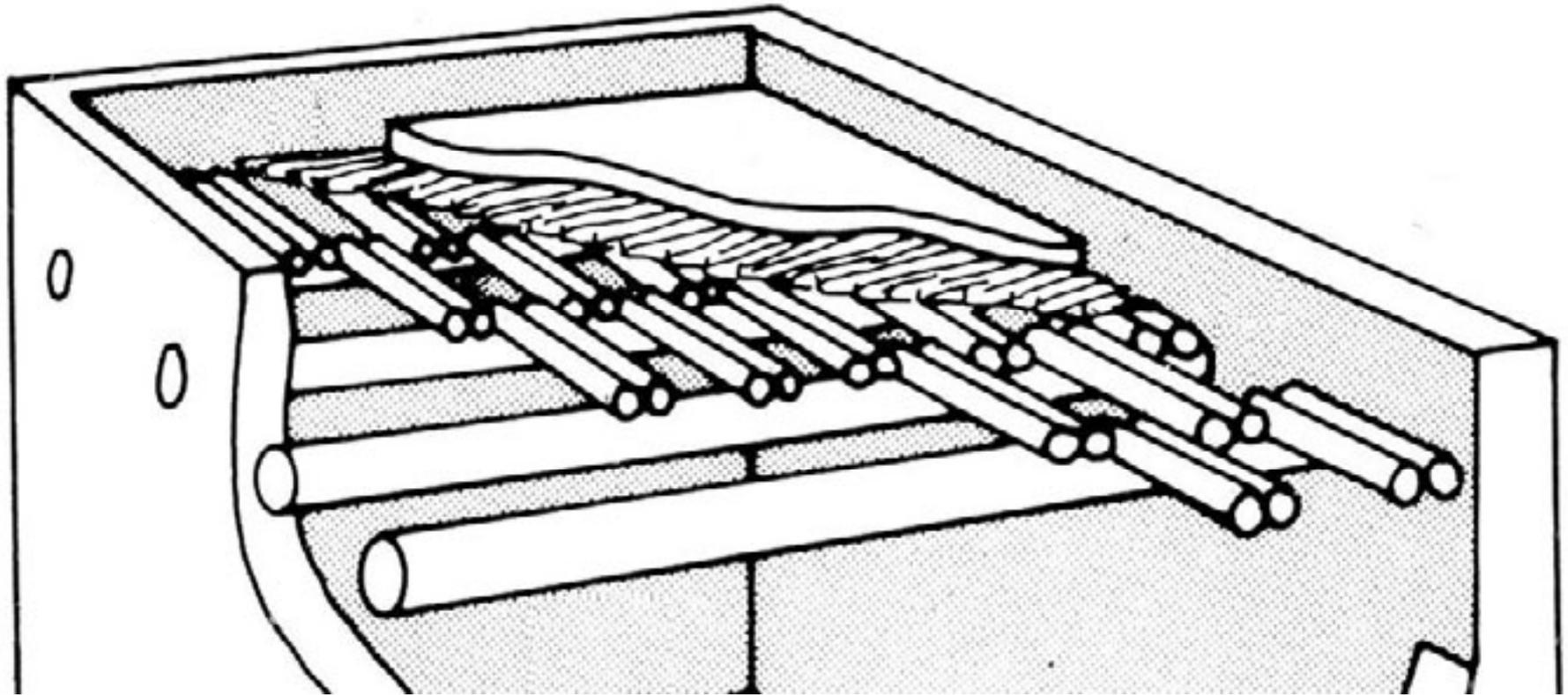
two-storey Kurdish house at Yalindamlar: detail of the wall showing the brick bonding pattern

Miles Lewis



brick bond described by Vitruvius, reconstructed by Reber

Marcus Vitruvius Pollio ['Vitruvius'] [translated M H Morgan], *The Ten Books on Architecture* (Dover, New York 1960 [1916]), p 44



the flat roof



construction of two storey house, Yalindamar

Miles Lewis



house at Yalindamlar: view of the construction of the upper floor
Miles Lewis



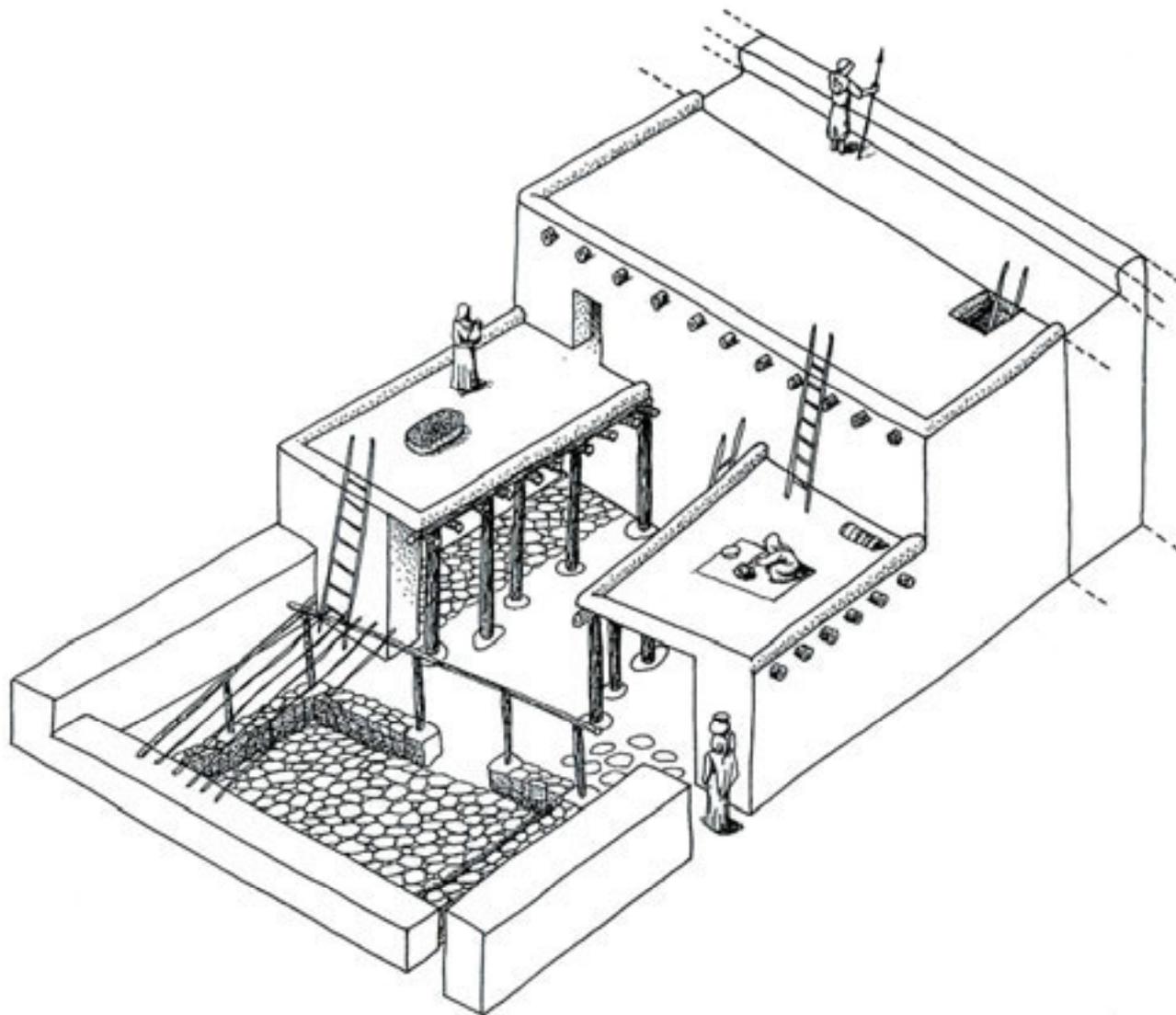
house at Yalindamlar, timbers of upper floor

Miles Lewis



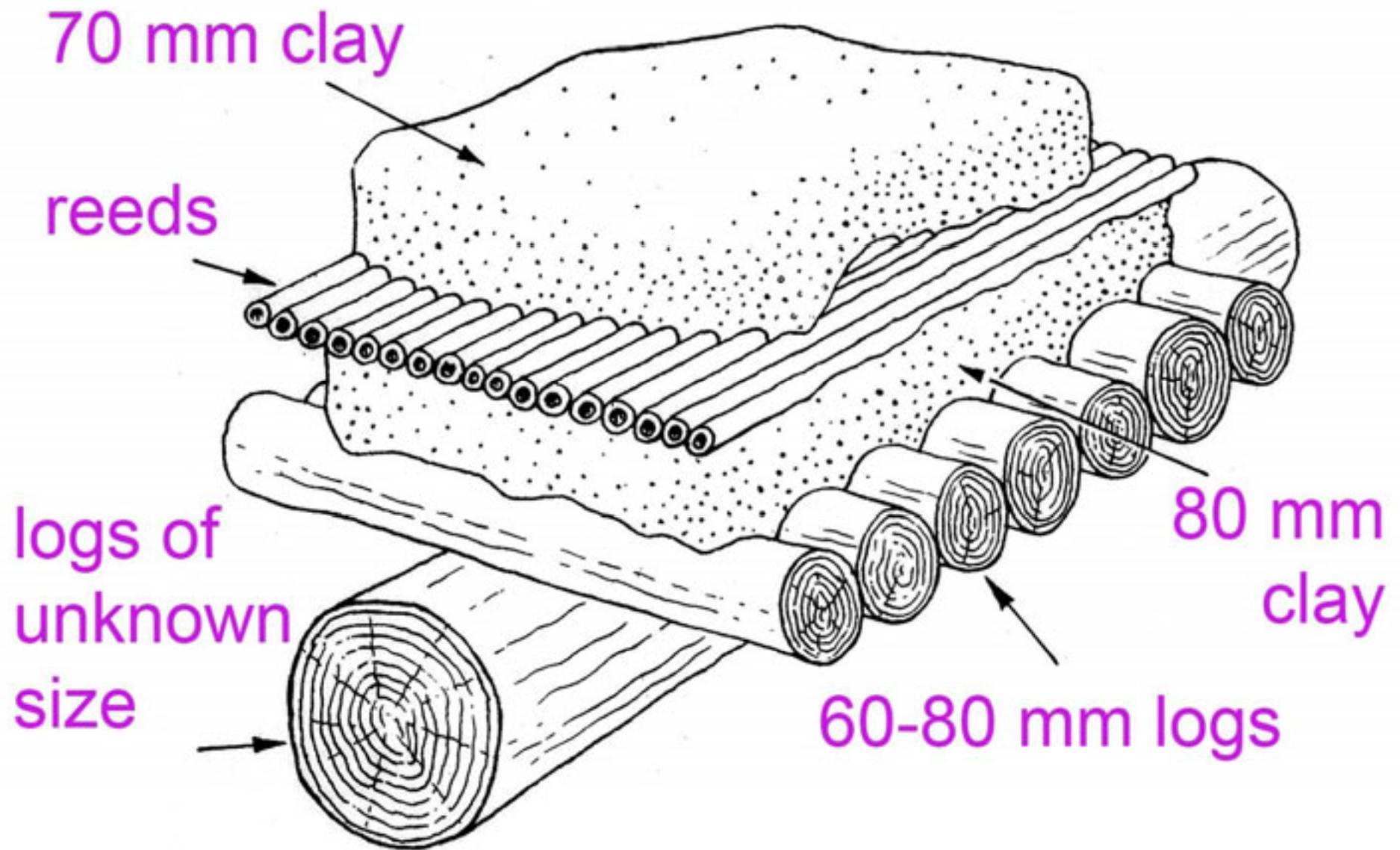
house at Yalindamlar, laying of upper floor

Miles Lewis



Late
Bronze/Iron I
transitional
four-room
house with flat
roof at Tall al-
'Umayri

Burton MacDonald,
Russell Adams &
Piotr Bienkowski
[eds], *The
Archaeology of
Jordan* (Sheffield
2001) p 327



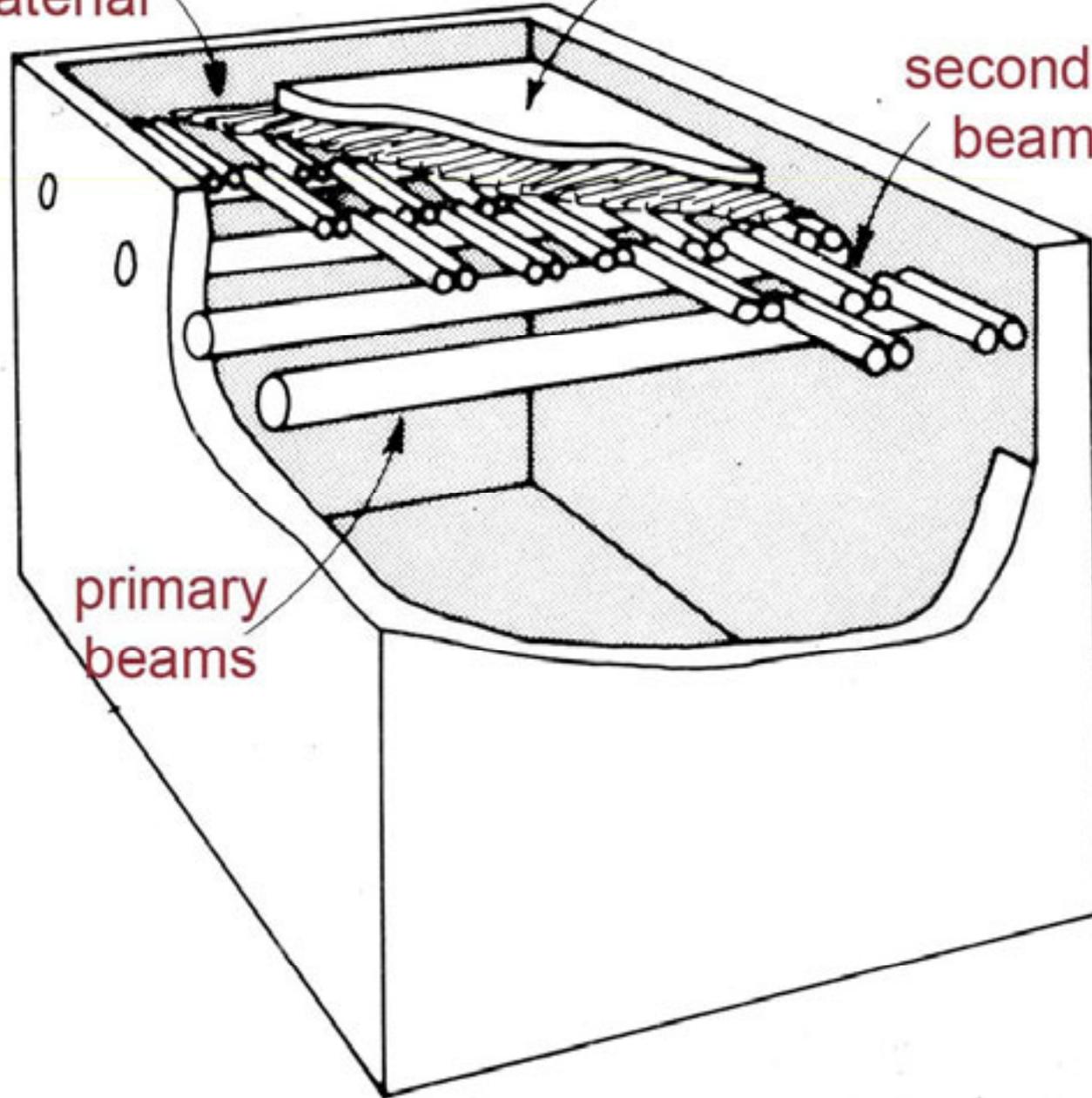
Middle Helladic [c 2000/1600 BC] house at Eutresis, reconstruction of ceiling structure

A W Lawrence [revised R A Tomlinson], *Greek Architecture* (5th ed, New Haven [Connecticut] 1996), p 5

closing
material

clay & sand

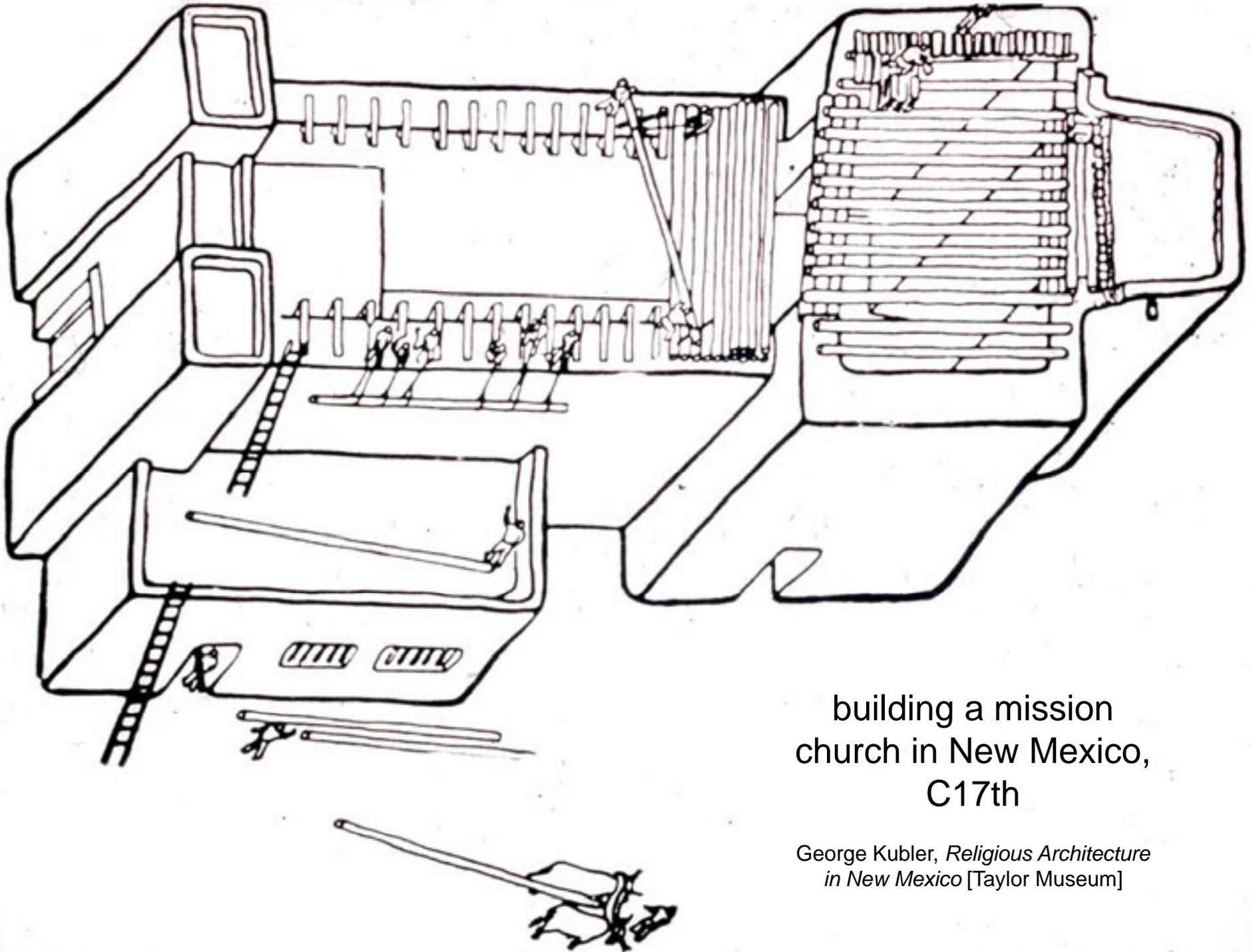
secondary
beams



primary
beams

Pueblo roof
construction,
Chaco Canyon
National Park,
New Mexico,
USA.

S H Leksen, *Great
Pueblo Architecture of
Chaco Canyon, New
Mexico* (Albuquerque
[New Mexico] 1987), p



building a mission
church in New Mexico,
C17th

George Kubler, *Religious Architecture
in New Mexico* [Taylor Museum]



pisé de terre
(rammed earth)



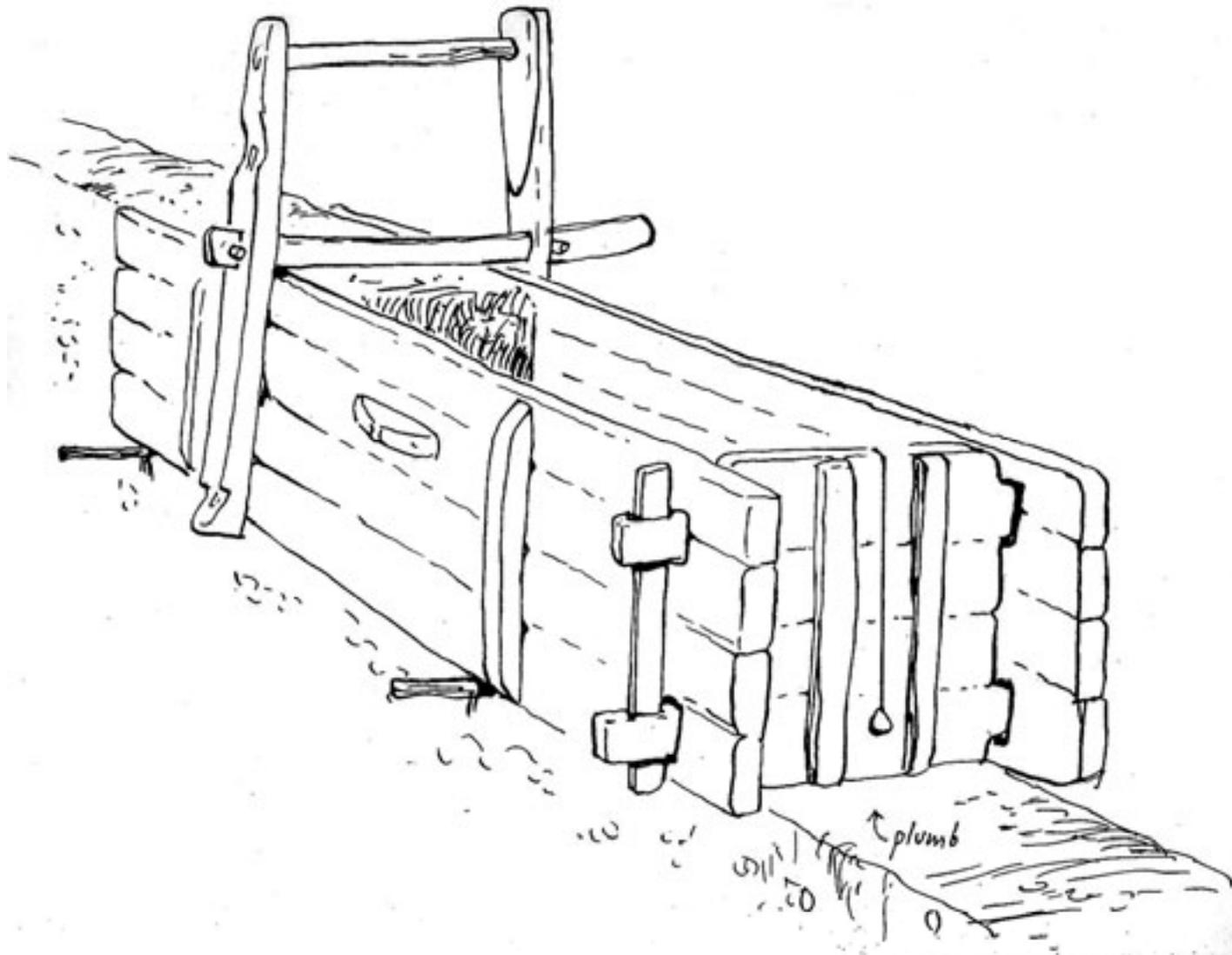
104

Banzhu Qiang, 'board formed earthen wall', or pisé, China

Guo Qinghua, *A Visual Dictionary of Chinese Architecture* (Melbourne 2002), p 18 (also 102)

Banzhu Qiang, 'board formed earthen wall', or pisé, China

Guo Qinghua, *A Visual Dictionary of Chinese Architecture* (Melbourne 2002), p 18



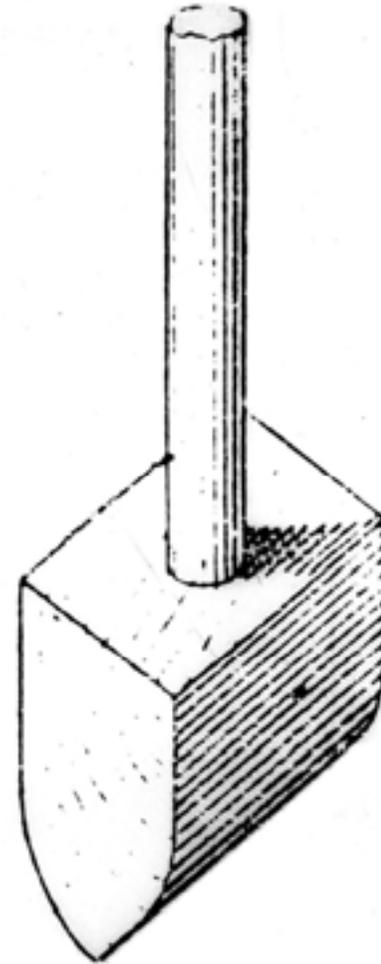
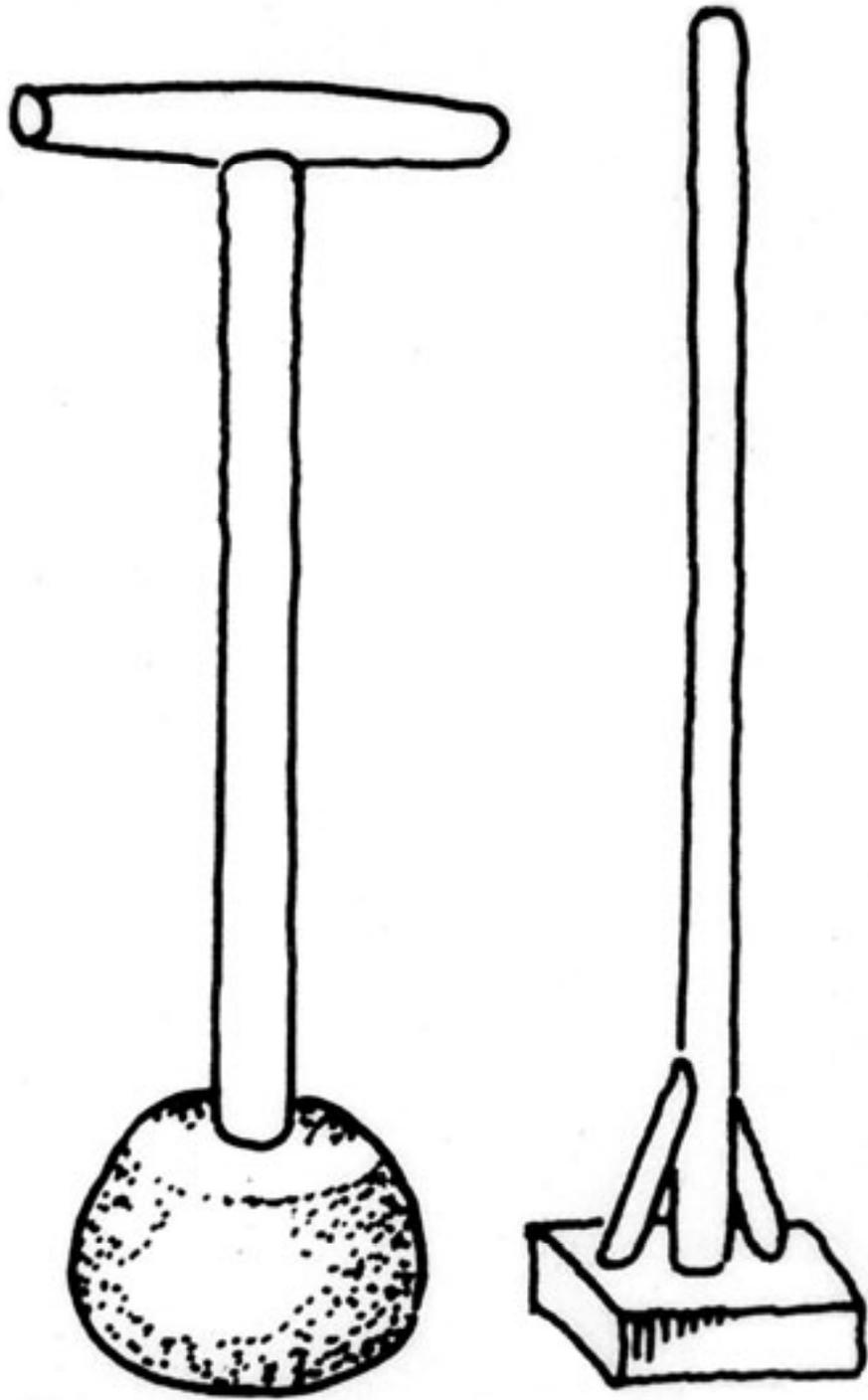
modern pisé form, Kunming, China

Edwards & Lin, *Mud Brick and Earth Building*, p 492



Hakka *tulou*, China

Lewis, *Architectura*, p 55



left: 'Gan' or pisor, China , China
right: Pisard, pisor or pizon, France

Pierre Chabat, *Dictionnaire des Termes Employés dans la Construction* (Paris 1875), p. 1029.
Guo, *Visual Dictionary of Chinese Architecture*, p 37



pisé building near
San Miguel de la
Escalada, Leon,
Spain

Miles Lewis

geographic spread





pisé wall under construction in Morocco

Paul Oliver, *Dwellings: the Vernacular House World Wide* (London 2003), p 99, pl 24



pisé based building with adobe above, Aït ben Haddov, Morocco

Country Life, CL, 3881 (28 October 1971), p 1121



Kasbah, or fortified
farm, Dades Valley,
Morocco

Jean Dethier et al, *Down to Earth*
(New York 1983 [1981]), p 37

***How would pisé de terre have got from
North Africa to Europe?***

the dissemination of pisé de terre

North African origins

Hannibal's invasion brings pisé to Spain and France

Spaniards bring pisé to Latin America

French rediscover pisé late C18th

French & British agricultural texts

English texts reach Australia c 1810

direct French influence at Pompallier house, NZ

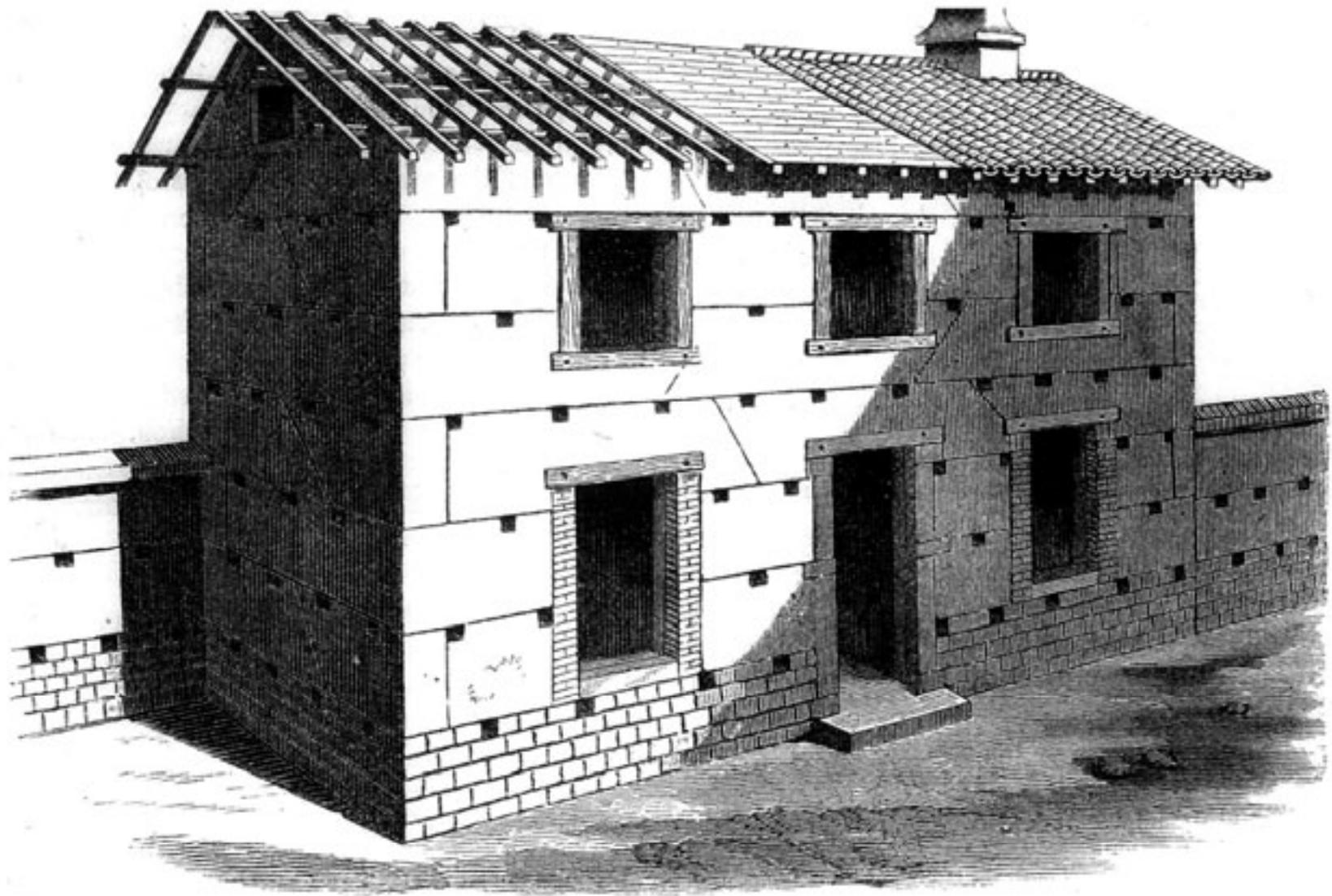
English emigrants' handbooks reach Australia

Ceuta and Barra, North Africa, attract English interest

Pisé published in the *Ecclesiologist*

pisé goes from Mexico to the Californian gold rush

Californian miners bring pisé to Australia



the literary tradition

pisé: the literary tradition

France

Georges-Claude Goiffon's *L'Art du Maçon Piseur*, 1772

Boulard's article in the *Cours d'Agriculture*, 1793-1800

Cointeraux, *École d'Architecture Rurale* of 1790-1, 1801

Rondelet, *Traité de l'Art de Bâtir*, 1812

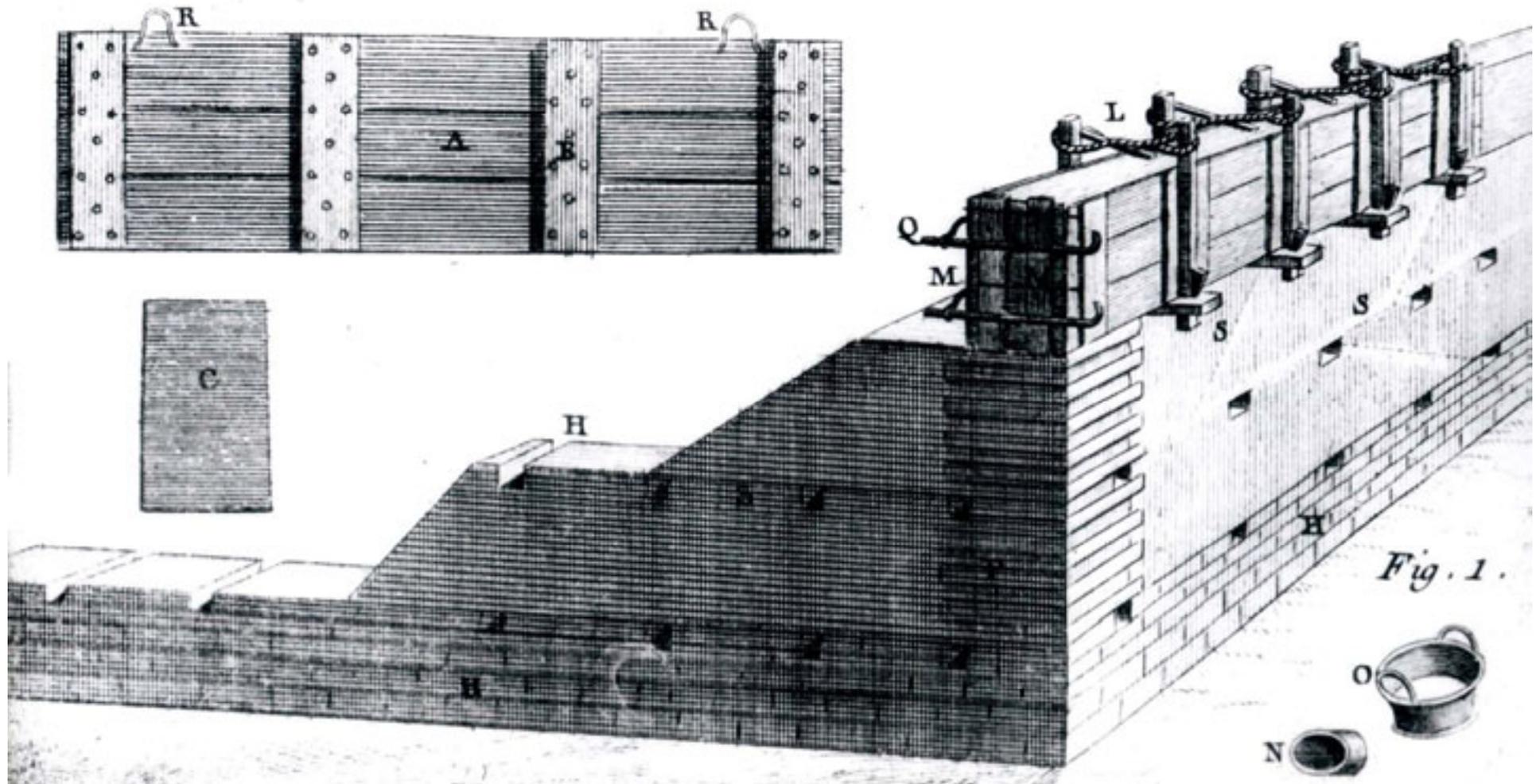
Britain (eg)

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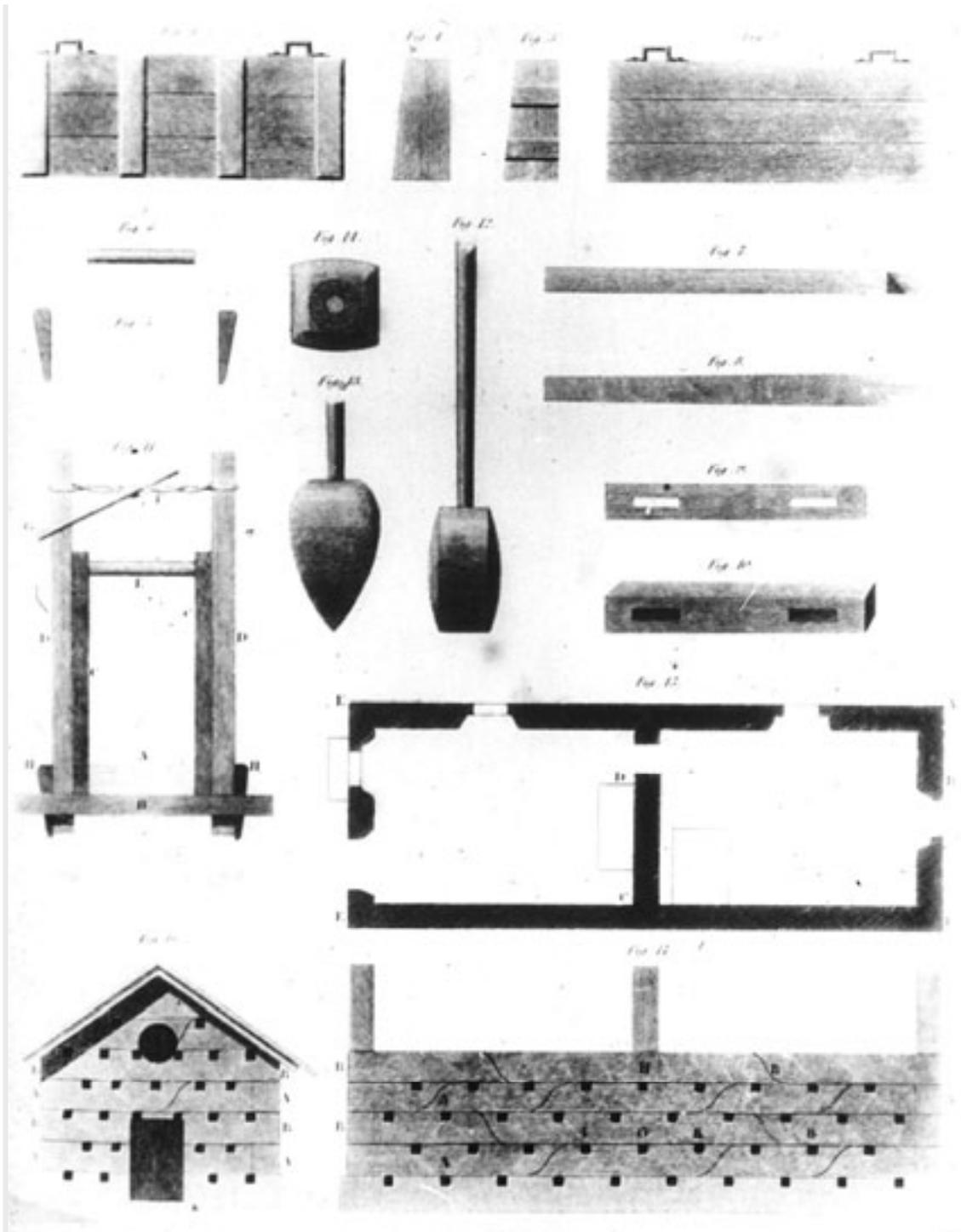
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