IDENTIFICATION OF THE WOOD USED IN
THE CONSTRUCTION OF THE “SUNKEN
ROOM” AT SIDON.

During the 2002 excavations in Sidon, the charred remains
of a substantial piece of timber were discovered in a building
of which only the underground room, commonly called “The
Sunken Room”, has survived. The remains appeared to be those
of a beam supporting the roof. According to the available
calibrated radiocarbon dates the beams were grown c. 1390-1120
BC (seep. 15).

Historical texts often refer to the cedars of Lebanon and their use as building materials (see for example several papers in Archaeology and History in Lebanon, Volume 14, such as Hepper, 2001; Briquel-Chatonnet, 2001; and Bikai, 2001). There can be few firmer associations of a nation with a tree than the association of Lebanon with its eponymous cedar, Cedrus libani (Talhok et al., 2001). The discovery of a substantial piece of ancient charred timber in situ among the remains of the ancient port city of Sidon thus became cause of some excitement. In discussing the use of cedar to build Solomon’s Temple in Jerusalem, Hepper also notes that the woodcutters of Sidon were famed for their skill (Hepper 2001, 4). It was thus of considerable interest to establish whether this discovery of a roof timber in a 13th century BC archaeological context might provide a physical example to support the textual references indicating the use of cedar in building.

With understandable anticipation a small sample of the carbonized wood was removed from the beam for microscopic analysis at the Archaeobotany and Palaeoecology laboratory of the Institute of Archaeology, University College London, in order to identify the species of wood used to create the beam. It was hoped that the process of heating in an inadequate supply of oxygen, which transforms wood into inert carbon (charcoal) and so renders it resistant to fungal and
microbial attack, might have preserved the wood microstructure sufficiently to allow the identification of the tree species based on the specimen’s anatomical features. Some indication of the type of diagnostic microstructural features used in identifying wood and charcoal are given in Cartwright (2001), together with specific details on the microstructure of the cedar of Lebanon.

Although the charcoal specimen was very fragmented, its microstructure was preserved remarkably well. It was apparent that the wood had burned in a reductive environment (i.e. lacking free oxygen). The good preservation of the microstructure in the charcoal implies quite a slow burning process. The charcoal resulting from the pyrolysis (thermal breakdown) of the wood cannot be burnt away unless there is enough oxygen available for it to react with. If free oxygen is present at a temperature above about 500°C, the carbonized wood (charcoal) reacts with oxygen producing gaseous carbon monoxide or carbon dioxide and leaving only ash, the inorganic byproduct of charcoal combustion. Further details about the process of combustion and the chemical reactions occurring during the burning of wood can be found in Beall (1972) and Drysdale (1999, pp11-13 & 182-190).

Photographs taken by using a scanning electron microscope at the Institute of Archaeology (plates 1-6) show the microstructure of the carbonized wood specimen. The photographs (see p. 64-69) show the three anatomical planes (transverse, radial longitudinal and tangential longitudinal). Examination of the three different planes is necessary to reveal in a three-dimensional perspective the various anatomical features of the complex structure of the wood. The detailed description of the anatomical structure of the examined specimen.
is presented in the captions to
the figures, while the para-
graph below seeks to clarify
some relevant points for the
non-specialist reader.

The transverse sections (plates
1-4) are cut across the body of
the wood perpendicular to its
length. The zone free of large pores spreading in
an arc across the lower part of plate 1 indicates the
boundary between the annual growth rings (tree
colors, composed of ground tissue and pores, rep-resenting the vessels). The lines spreading out
radially from near the centre of the wood are the
rays. The same features, from different perspec-
tives, can be seen in the anatomical planes that
follow the axis of the trunk. The section shown in
plate 5 is a radial longitudinal section. The pho-to-
graph shows the face revealed by a split along the
length of the wood from the periphery of the trunk or branch towards its centre following the radius
of the trunk/branch and at 90 degrees to the trans-
verse section. Plate 6 shows a tangential longitudi-
nal section. This was taken at right angles to the
radial longitudinal section and is concentric with
the annual rings that were visible in the specimen.

Examination of these anatomical planes and their
comparison against reference samples and pub-
lished descriptions (reference material from the
Cecilia A. Western wood reference collection held
at the Institute of Archaeology and descriptions
available in Fahn et al. 1986) of the microstruc-
ture of known specimens taken from living trees
has shown that the Sidon beam wood belongs to
the Ericaceae (heath) family and in particular the
genus Arbutus. This is known in English as the
strawberry tree: certainly a far cry from the
renowned cedar of Lebanon but a very interesting
discovery in its own right.

The two species of strawberry tree,
Arbutus unedo and Arbutus andrachne, are both
native to the Eastern Mediterranean but cannot be
distinguished on the basis of their wood anatomy.
They are evergreen trees and shrubs, growing in
maquis and forest vegetation, sometimes in asso-
ciation with pine (Pinus brutia) and tree-heather
(Erica arborea) up to an altitude of 300-800
metres above sea level. It is interesting to note that
while today the strawberry tree is known as a
shrub or small tree, the archaeological evidence
shows that specimens of a considerably greater
stature, sufficient to provide structural building
timber, are likely to have been available in the past.
Plates 1-2
Transverse section: Wood diffuse porous, growth rings distinct. Pores mostly angular, solitary, but mainly in short radial multiples (2-4; occasionally more) or clustered, generally numerous.
Plates 3-4
Transverse section: Wood diffuse porous, growth rings distinct. Pores mostly angular, solitary, but mainly in short radial multiples (2-4; occasionally more) or clustered, generally numerous.
Plate 5
Radial longitudinal section: Perforation plates simple. Rays heterogeneous, with a central part of markedly procumbent cells and one row of upright marginal cells. Inter-vessel pits and vessel-ray pits with slit-like apertures. Fibres with bordered pits and (infrequent) septate fibres present. Conspicuous helical thickenings present on vessel members and fibres.

Plate 6
Tangential longitudinal section: Ray width: bi- to 3(4)-seriate.
REFERENCES


Bikai, P. M., 2001. “Ishtar (the cedar tree) and the defeat of Gilgamesh”. Archaeology & History in Lebanon, 14, 14-23.


