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## Materials Made of Plant Fibres: Ropes and Textile Fragment

Ropes and textile fragments, both from the Western Buddha, have been examined to understand their manufacturing technique and to identify the materials.

### Ropes

#### Manufacturing

Ropes were used as core of the fold ridges of the Western Buddha. Hundreds of meters of these ropes have been found in the rubble. 14 small fragments have been brought to Munich for investigation (fig. 1).

The ropes are made of durable, long-fibrous material. The colour varies between light brown and dark brown. Many ropes are still smooth and flexible. The diameter varies considerably, measuring between 0.6 and 1.3 cm. In most of the cases the fibres were drilled in Z-twist to form a string. Two strings were then plied into an S-twist.<sup>48</sup> Only rarely a drilling in S-twist and Z-ply was observed (fig. 2).<sup>49</sup> These ropes probably were produced by another person.

Two ropes were plied together (in S-twist) to form a double rope. The rope with Z-twist, S-ply was used as a single rope. To connect it to the pegs, the rope was split and the peg inserted between the strings.

A rope bought at Bāmiyān bazaar as reference material (fig. 1, right side) looks similar, but differs from the ancient ones as it is a ply of three instead of two. This technique was not known in Antiquity.

#### Identification of material

Six samples of ropes, samples GBL 096, GBL 097, GBL 089 and three others without numbers have been analysed to identify the material. As the ropes produced and sold in the bazaar in Bāmiyān today looked very similar to the ones from the Western Buddha, a rope was bought as reference material. According to local people the ropes are produced from a plant called *Dom-i-shutur* in Bāmiyān. The plant does not grow in Bamiyan, but frequently in the mountains in the direction of Band-I-Amir. Of the plant the stem of about 50 cm length is used for making ropes.<sup>50</sup> A specimen of *Dom-i-shutur* could also be sent to Munich (fig. 3). All samples were selected by E. Melzl.

The analysis was made on the basis of botanical characteristics.<sup>51</sup> For this method leaves, parts of flowers or seeds are required.

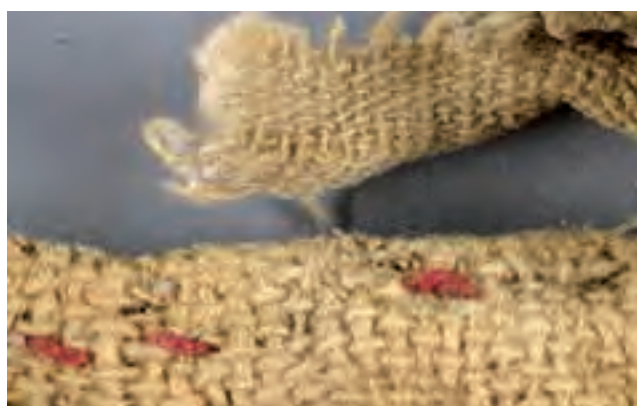
The plant called *Dom-i-shutur* in Farsi could be identified as *Astragalus cuneifolius* Bunge. *Astragalus* is a genus with many species. The identified species, however, only grows



Fig. 4. Textile fragment and sample ID 36, front and reverse



Fig. 5. Comparison of the two textiles



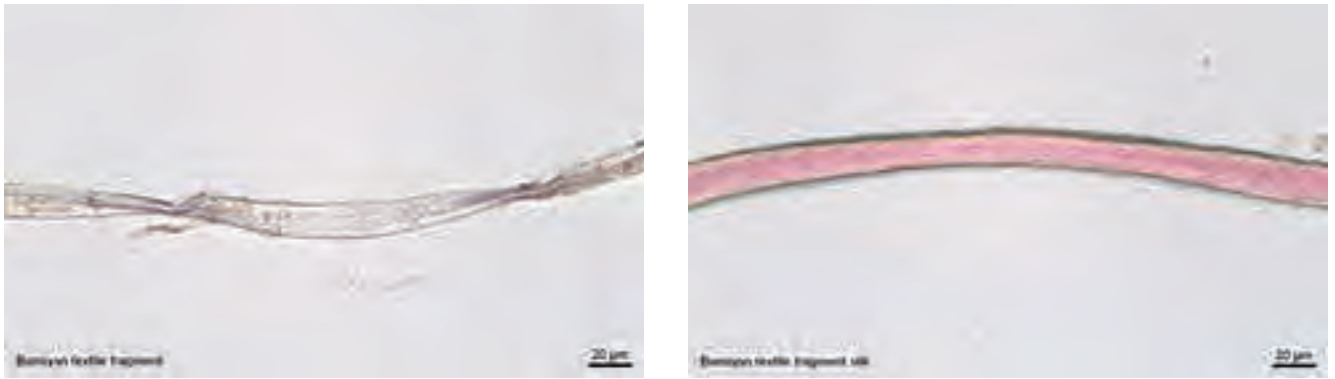


Fig. 6. Fibres of textile in transmitted light: cotton (left), red-dyed silk (right)

in a very small area. It is endemic in the area of Bāmiyān.<sup>52</sup> The plant is a shrub of up to 1.50 m in height.

A microscopic comparison between the plant fibres from the ropes of the Western Buddha and the *Dom-i-Shutur* specimen resulted in 100 percent consistency. The presence of the *Dom-i-Shutur* plant proved to be a lucky coincidence as the fibres microscopically are very similar to the type of hemp fibres which are very common and wide-spread in Central Asia.

*Astragalus cuneifolius* Bunge and a plant called Caragana have been described as material to make brooms and ropes in the area of Band-I-Amir (Central Afghanistan) today.<sup>53</sup> The identification of *Astragalus cuneifolius* Bunge is the first proof that this plant was already used in the past, as early as 550 AD.<sup>54</sup>

### Textile fragment

A small textile fragment was found in the rubble of the Western Buddha. Its origin and use are unknown, but somehow it became part of the Buddha statue. Another small strip of textile was discovered imbedded in the coarse layer of sample ID 36, a clay fragment from the Western Buddha (fig. 4).

The textile fragment measures c. 9 cm x 1.8 cm. It is an undyed light brown textile, woven as a rather coarse tabby of quite thick threads (8 threads of warp and 9–10 threads of weft per cm<sup>2</sup>). The threads show Z-twist. One edge is rolled in to form a hem which is stitched down with a red yarn, showing Z-twist and S-ply of two ends.

The textile strip inside sample ID 36 measures about 4 cm x 1.3 cm. It is light brown tabby as well, but it is finer than the other textile fragment. The warp is finer and denser than the weft (9–10 threads of warp and 17–20 threads of weft per cm<sup>2</sup>). The threads show Z-twist.

The analysis of the fibres showed that both textiles are made of cotton. The red yarn is made of silk, probably wild silk (fig. 6).<sup>55</sup> The use of silk yarn indicates that this fragment originally was part of a garment or a decorative textile.

### References

Dieterle, Alfred, *Vegetationskundliche Untersuchungen im Gebiet von Band-I-Amir (Zentralafghanistan)*, München 1973 (Dissertation thesis at the Ludwigs-Maximilians-Universität München)