ORIENTAL MANUSCRIPTS AND NEW INFORMATION TECHNOLOGIES

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DIGITIZATION OF TOCHARIAN MANUSCRIPTS FROM THE BERLIN TURFAN COLLECTION

The starting point of the project to be reported about here [1] was the conference dedicated to the fulfilment of "100 Years of Tocharian Studies" which took place in Saarbrücken (Germany) on 13—15 October, 1995 [2]. Within a panel session, the participants of the conference discussed the necessity of digitizing the Tocharian manuscripts that are preserved in several European museums with a view to two major aims. One of these consists in preserving the data the manuscripts contain for eternity. This is an aim of high priority, at least as far as the Berlin collection is concerned, because here, many manuscripts, albeit preserved in glass frames, have suffered great damages during World War II (when the collection had to be evacuated), and there are hardly any means of protecting them from further erosion.

The second aim consists in making the contents of the manuscripts more easily accessible to the scholarly world. This is a high priority aim as well, given that studies concerning the spread of Buddhist thought along the Silk Road are facing steadily increasing interest these days, digitization of original documents playing an important role [3].

As a result of the Saarbrücken discussions, the digitization of Tocharian manuscripts as preserved in the Stiftung Preußischer Kulturbesitz in Berlin (*ca.* 4,300 items) has meanwhile begun (since autumn 1996). At present, work is proceeding in a joint effort by Berlin-Brandenburgische Akademie der Wissenschaften and Berlin Staatsbibliothek, Institut für Vergleichende Sprachwissenschaft of Frankfurt University, and Tamai Foundation. Means and procedures as developed for the running project will be briefly demonstrated here using the Berlin Tocharian manuscript THT, fol. 50r, and others as examples [4].

The first task consists in photographing the manuscripts. For the time being, this is being done using high-resolution colour slide films [5] because "classical" photographing still has several advantages as against using digital cameras. It still yields much better results with respect to orthochromaticity and resolution, and slides can be stored as multi-purpose reference copies of the documents. Not depending on the availability of digital equipments, they are easily at hand for copying, presentation, etc.

In the course of the developing project, several attempts have been made as to finding the most suitable background for the photographing. It turned out that using a bright-coloured paper (white or grey) has to be preferred as against any dark-coloured (dark blue or black) background. The reason is that the Berlin manuscripts are stored in glass frames throughout and must not be taken out because this would lead to damages in many cases. When photographed through a glass frame, however, the manuscripts, lit from above, cause some shading so that writing elements on their edges may become hardly distinguishable from a dark background, especially where edges are damaged. Cf. *Plates 1* and *2* (see p. 49) where this effect is demonstrated with manuscript THT, fol. 50r, on a dark blue background; also *Plate 3* (see p. 49) and *Plate 4* (see p. 52) where two pictures of the fragments THT 301 and 303 are contrasted with different backgrounds; and *Plate 5* (see p. 52) where a greyish background showing the effect of shading is used with manuscript THT, fol. 508r.

When photographing the manuscripts in their frames, some further problems have been encountered. One of them consists in the labels that are usually fixed on the frames and which may sometimes cause a loss of readability, covering parts of the manuscripts, as in THT, fol. 508r (cf. *Plate 5* on p. 52). A similar problem may arise when the glass frame is broken (cf., for example, *fig. 1*, manuscript THT, fol. 252v, on a dark blue background). In these latter cases, a restoration of the frame may be inevitable. In every case, a ruler should be added to the item being photographed in order its original measurements to remain calculable.

The digitization of the colour slides thus produced requires a special high-resolution colour slide scanner with a scanning resolution of at least 2 500 dpi (slide adapters that can be fixed to flat bed scanners do not yield a sufficient resolution) [6]. For the purposes of the present project, scanning is being done in at least two steps.

The first one consists in a total scan of the picture, comprising the manuscript within the complete glass frame and the ruler for measuring. Doing this at a medium resolution of 1 000 to 1 300 dpi, this yields digital images that fill