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Colour plates: *The Secret Visionary Autobiography* of the Fifth Dalai Lama (see pp. 54—65).

Front cover:

The *cakra* for the separation of the guardian deities from the person they are protecting.
A separate folio, 55×20 cm.

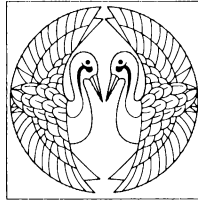
Back cover:

Plate 1. *Cakras* for summoning spirits of foes and for warding off evil spirits, as well as the articles used to perform the ritual for propitiating of the goddess lHa-mo. A separate folio, 55×20 cm.

Plate 2. The *cakra* for the suppression of the *dam-sri* spirits. A separate folio, 55×30 cm.

Plate 3. *Cakras* for calming illnesses and acquiring wealth, and the articles used to perform the corresponding ritual. A separate folio, 55×20 cm.

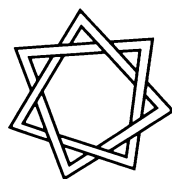
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ORIENTAL MANUSCRIPTS AND NEW INFORMATION TECHNOLOGIES

N. V. Vorobyov-Desyatovsky

THE ST. PETERSBURG BRANCH OF THE INSTITUTE OF ORIENTAL STUDIES AND THE INTERNATIONAL DUNHUANG PROJECT

Two years ago the St. Petersburg Branch of the Institute of Oriental Studies took part in the International Dunhuang Project. This Project was started on the initiative of the British Library by the efforts of Peter H. Lawson, chief conservation officer and manager of the Oriental conservation studio. Another participant of the Project is the Bibliothèque Nationale de Paris. The principal aim of the Project is the study and preservation of manuscripts from Dunhuang. These manuscripts and documents dating to the 4th—11th centuries were recovered in the first quarter of the 20th century by several European expeditions working in Dunhuang. The Dunhuang collection is now divided between the two above mentioned libraries and the Manuscript fund of the St. Petersburg Branch of the Institute of Oriental Studies (formerly the collection of the Asiatic Museum). The conservation and restoration of the Dunhuang manuscripts are among the most urgent and complicated problems standing before these three institutions.

One of the important parts of the Dunhuang Project is the chemical analysis of paper, ink and dyes used in China, especially in the Dunhuang region, in the early medieval period. New methods of studying the dyes used in the Dunhuang manuscripts have been suggested by Kenneth Seddon, Professor at the Queen's University of Belfast (Northern Ireland), who is in charge of this part of the Project*. The series of analyses developed by him and his colleagues includes liquid secondary ion mass spectrometry (L-SIMS S), fast atom bombardment mass spectrometry (FAB), high-effective liquid chromatography (HPLC), electronic spectroscopy (UV-VIS) "which allows the mass spectra of the dyes to be recorded directly from the surface of the paper"**.

To explain the reason for this kind of chemical investigation we would like to remind the reader that Chinese paper was dyed in the process of its manufacture with natural yellowish sap. Its tint could vary between light yellow and yellowish-brown. The dyeing of paper-pulp most probably served to protect paper from decay or from any possible

damage caused by bacteria, fungi and insects, *i. e.* the dye was used as a mordant. From the chemical point of view the dyes used in the process had to answer very strict demands. They had to resist air-oxidation and decomposition by light, to be water-proof and to retain conserving qualities for no less than a thousand years. If we take into account the traditional Oriental technology of making paper-pulp, the dyes added to it should be ionic water-soluble compounds. Most of the known organic substances, which in theory could have been used for this purpose, do not actually answer all these requirements. It may happen that our final data will only concern most stable compounds or the products of their partial decay. Even this kind of information may turn to be valuable if it helps us to solve a number of questions connected with the conservation and preservation of the Dunhuang manuscripts.

In collaboration with Prof. Seddon's laboratory the St. Petersburg Branch of the Institute of Oriental Studies undertook the investigation of the chemical structure of paper-dyes from Dunhuang. This program was sponsored by the INTAS (International Association for the Promotion of Co-operation with Scientists from the Independent States of the Former Soviet Union). The study of samples from the British Library collection of Dunhuang manuscripts allowed Prof. Seddon to identify berberine and palmatine among the components of paper-dye. It is proved also that it could contain jatrorrhizine. All these substances belong to the alkaloid group and may be found in different plants, for example in the roots of barberry (*Berberis vulgaris*), or in the tree well-known to the inhabitants of the Amur region under the name "Amur velvet" (*Phellodendron amurense*). The last one has long been used by the peoples of the Russian Far East as medicine. The study of berberine alkaloid present in "Amur velvet" shows that it affects the contraction of blood-vessels and that it can be used as a tonic or as a remedy against stomach-ailments.

The analyses carried by Prof. Seddon require special equipment available only in the best laboratories specialis-

* We were glad to learn that Prof. Kenneth Seddon had been elected an EPSRC and Royal Academy of Engineering Clean Technology Fellow (see *IDP News*, No. 4, January, 1996, p. 3). We consider it our pleasant duty to congratulate him on this occasion.

** See Prof. Seddon's paper in the Newsletter of the International Dunhuang Project, *IDP News*, No. 3, July 1995, p. 3.

ing in analytical chemistry. This kind of research is very expensive. Because all this equipment is not available in the St. Petersburg Branch of the Institute of Oriental Studies, Prof. Seddon suggested that the Institute should undertake only certain kinds of preliminary analyses, like the classification of water-extracts prepared from different samples of ancient paper on the basis of UV-spectroscopy. This work requires relatively simple and accessible equipment — SF-56 spectrometer. It does not need any special laboratory and can be installed in the Institute.

This work is basing upon the characteristics of alkaloids. Alkaloids in the form of hydrochlorides are dissolved

in water. Their structure is homogeneous, they contain condensed aromatic nuclei. These systems can absorb ultraviolet radiation of a source. By studying the UV-VIS region of the spectra of these extracts we are able to establish the presence or the absence of berberine or of related compounds of it in the solution. Further investigation of the samples we select will confirm (or disprove) the presence of berberine or its analogues in samples with similar UV-VIS spectra. The preliminary results of our recent investigations show that practically all samples of paper from Dunhuang contain substances related to the group of alkaloids in question.
