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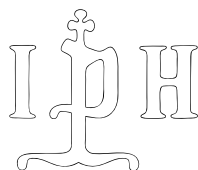
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President's biennial report

Dear members and friends of paper history

In 2008 the 29th IPH congress took place in Stockholm and Uppsala in the most wonderful Scandinavian spring with blue sky and warm sunshine. The congress was hosted and organized by the Nordic Association of Paper Historians NPH. I must congratulate and express my warmest admiration for the excellent cooperation between Finland, Sweden, Norway and Denmark. As a member for many years of both NPH and IPH I felt very happy for the excellent possibility of creating this contact at the congress between members of the two associations, because I know how important it is to meet each other and get new contacts.

As IPH congress coordinator together with Göran Wohlfahrt I learned how well the Finnish and Swedish teamwork functioned in organization of the congress and in obtaining the necessary financial support for the congress from three Swedish foundations within paper industry. All threads were gathered and connected, felted together as fibres in a vat to the IPH congress formation during intense correspondence, meetings in Stockholm and in Eupen, most kindly hosted here by Alphonse Radermecker. Guidelines and deadlines for contributions from the speakers were strictly organized by Jan-Erik Levlin in Finland and followed by the authors; therefore the IPH congress book 2008 was finished in spring 2009 at the same time as the IPH congress book 2006 from Spain. We could not have chosen a better way to start the celebration of the 50th IPH anniversary 2009 than with these two publications.

I was elected as new IPH president at the General Assembly 2008 in Stockholm and since then two council meetings have been held in Eupen. The planning of the IPH congress 2010 was one of the important topics at the agenda. At the first meeting Dr. Claire Bustarret participated as one of the two new congress coordinators from AFHEPP, Association Française pour l'Histoire et l'Étude du Papier et des Papeteries. The president of AFHEPP, Dr. Denis Peaucelle informed at the second council meeting 2009 in Eupen about the rich program and the continued planning of the congress. Today we know that all plans have successfully been effectuated.

Another subject of importance for the council in 2008 was the decision to revive the IPH periodical Paper History. The need for the periodical had already been clearly expressed by the IPH members at the General Assembly 2006 in Spain. The paper periodical is a crucial link between all IPH members, and all other people with interest in paper history can find the periodical at the libraries. With united support from all our delegates as co-editors the first issue appeared in spring 2009 – our jubilee year of IPH and electronically as well on our web-site. As the new editor of the periodical I am most grateful for all the contributions that I have received from authors of their articles and information from our co-editors of national activities. Together with the IPH web-site we have all possibilities for a fruitful communication and debate, but the best thing is of course to meet each other.

Many interesting meetings and exhibitions take place every year and it would be a full time job to cover them all. I did manage in 2009 to participate in the beginning of the German DAP meeting in Celle and Lachendorf, in the last part of the British BAPH meeting in Bath as well as the Scandinavian NPH meeting in Silkeborg. It is a fruitful experience to meet each other at national meetings, if possible.

In spite of the financial crisis and climate changes I feel a growing interest in paper history. Since 2008 two new associations have been born, and this year they have both organized their first international congress. As president of IPH I was invited in May 2010 to present a paper and open the congress in Budapest, organized by HPW, the association of Hungarian Paper and Watermark History. In October we are gathered in Angoulême at the 30th IPH congress, organized by AFHEPP, Association Française pour l'Histoire et l'Étude du Papier et des Papeteries.

During these two years we have received new members of IPH, some institutions have cancelled their membership and we have lost two members – Professor Conor Fahy from United Kingdom died early in 2009 and Õie Utter from Estonia died in February 2010. They will remain blessed in our memory and we will miss them.

The planning of the celebration of the 50 years' IPH jubilee in connection with the 30th congress in Angoulême took place during the council meetings in Eupen and it has been most successfully effectuated by our AFHEPP organizers. Martin Cuppen's creation of a jubilee watermark on handmade paper for this event illustrates the origin of papermaking as a still living craft. New Watermark studies and watermark history, new research in databases of watermarks continue together with the studies of the technological development of the papermaking craft and how to preserve our written heritage on

paper. Recent negotiations concerning proposals for the coming IPH congresses in 2012, 2014 and 2016 have not yet resulted in clear agreements, but in spite of the difficult financial situation everywhere it is my hope, that we soon will know where to meet each other again at the IPH congress 2012. I wish you all inspiring studies in your field of paper history and look forward to a continuation of interesting contribution to our periodical IPH Paper History.

Anna-Grethe Rischel

Rapport biennal de la Présidente

Chers membres et amis de Paper History.

En 2008, le 29ème congrès pris place à Stockholm et Uppsala dans le plus merveilleux printemps scandinave, avec un ciel bleu et un éclairage au soleil chaud. Le congrès était patronné et organisé par l'Association Nordique des Historiens du Papier NPH. Je dois féliciter et exprimer ma plus vive admiration à l'excellente coopération entre la Finlande, la Suède, la Norvège et le Danemark. Membre depuis de nombreuses années des deux associations NPH et IPH, je me sens très heureuse de l'excellente possibilité de créer ce contact au congrès entre les membres des deux associations, parce que je connais l'importance de se rencontrer et de créer de nouveaux contacts.

En ma qualité de coordinatrice du congrès de l'IPH avec Göran Wohlfart, j'appris à quel point les équipes de Finlande et de Suède fonctionnaient au bénéfice de l'organisation du congrès et pour obtenir des trois Fondations suédoises de l'industrie papetière le support financier nécessaire. Tous les essais de participation furent rassemblés et mis en contact, à la manière des fibres dans la cuve ils ont sympathisés pour la formation du congrès par la correspondance et au cours de réunions à Stockholm et à Eupen, très aimablement accueillis en ce lieu par Alphonse Radermecker. Les lignes directrices et les dates limites pour les présentations des intervenants furent strictement organisées par Jan-Erik Levlin de Finlande et par les auteurs, en conséquence le livre des actes du congrès 2008 fut édité au printemps 2009 en même temps que le fut celui du congrès 2006 en Espagne. Nous n'aurions pas pu choisir une

meilleure voie pour introduire le 50ème anniversaire de l'IPH en 2009 qu'avec ces deux publications!

Je fus élue nouvelle Présidente de l'IPH à l'Assemblée Générale 2008 à Stockholm et depuis lors deux réunions du conseil se sont tenues à Eupen. Le planning du Congrès IPH 2010 fut un des plus importants sujets de l'agenda. A la première réunion Dr. Claire Bustarret participa en qualité d'un des nouveaux coordinateurs de l'AFHEPP, Association Française pour l'Histoire et l'Étude du Papier et des Papeteries. Le président de l'AFHEPP, Dr. Denis Peaucelle informa à la seconde réunion en 2009 à Eupen concernant le riche programme et au sujet de la poursuite du planning du congrès. Aujourd'hui nous savons que tous les plans ont été réalisés avec succès.

Un autre sujet d'importance pour le Bureau en 2008 était la décision de faire revivre le périodique d'IPH : Paper History. La nécessité d'un périodique a déjà été clairement exprimée par les membres de l'IPH à l'Assemblée Générale de 2006 en Espagne. L'existence du périodique papier est un geste crucial entre tous les membres de l'IPH et de tout autre personne s'intéressant à l'histoire du papier et qui peut trouver le périodique en librairie. Avec un support unique de tous les délégués en qualité de coéditeurs, la première livraison apparût au printemps 2009 – notre année jubilaire de l'IPH - et par l'électronique autant que par le web-site. En qualité de nouvel éditeur du périodique, je remercie avec gratitude pour toutes les contributions que j'ai reçues des auteurs ainsi qu'au moyen de leurs articles et informations de nos coéditeurs des

activités nationales. Ensemble avec le web-site de l'IPH, nous avons toutes les possibilités d'une communication fructueuse et d'en débattre, toutefois la meilleure reste évidemment de se rencontrer.

De nombreuses expositions et de réunions intéressantes sont organisées chaque année et il serait un emploi à plein temps que de les présenter toutes. En 2009, je suis parvenue à participer, au début de la rencontre du DAP Allemand, à participer à Celle et à Lachendorf, à participer à la dernière réunion à Bath du British BAPH. J'ai également participé à la rencontre des scandinaves réunis dans la NPH à Silkeborg. C'est une expérience fructueuse de se rencontrer si possible l'un l'autre dans des réunions nationales.

Malgré les crises financières et les changements du climat, je sens grandir l'intérêt pour l'histoire du papier. Depuis 2008, deux associations sont nées et cette année, elles ont toutes les deux organisé leur premier congrès international. En ma qualité de présidente, je fus au mois de mai 2010 invitée à présenter un exposé et d'ouvrir le Congrès de Budapest, organisé par l'HPW, l'Association de l'Histoire hongroise du Papier et des Filigranes. En octobre, nous nous sommes rassemblés à Angoulême au 30ème Congrès de l'IPH, organisé par l'AFHEPP, Association française pour l'Histoire et l'Etude du Papier et des Papeteries. Au cours de ces deux ans, nous avons accueilli des nouveaux membres IPH, quelques institutions ont annulés leur adhésion. Nous avons perdu deux membres – le Professeur Conor Fahy de Grande Bretagne qui décéda au début

de l'an 2009 et Mrs. Õie Utter d'Estonie, décédée en février 2010. Ils resteront bénis dans notre mémoire et ils nous manqueront.

Le planning de la célébration du 50ème anniversaire de l'IPH fut fêté au cours des réunions à Eupen et commémorée avec succès à Angoulême à l'occasion du 30ème Congrès. En création de Martin Cuppen pour le Jubilé un filigrane dans une feuille levée à la main illustrant les origines de la fabrication du papier comme étant un artisanat toujours vivant.

Les nouvelles études des filigranes et l'histoire des filigranes, des nouvelles recherches de filigranes dans les databases continuent ensemble avec les études au sujet des développements technologiques de l'Art de fabriquer du papier ainsi que la manière de préserver notre l'héritage écrit sur papier. Des négociations récentes concernant des propositions relatives aux prochains congrès de l'IPH en 2012, 2014 et 2016 n'ont pas encore résultés dans des accords claires, toutefois malgré une situation financière difficile un peu partout, mon espoir est que nous connaîtrons prochainement où nous nous rencontrerons les uns les autres au congrès de l'IPH 2012.

A vous tous je souhaite de l'inspiration pour vos études dans votre domaine préféré de la l'histoire du papier et je reste dans l'espoir dans l'envoi d'articles destiné à notre périodique IPH PAPER HISTORY.

Anna-Grethe Rischel



Photo Inge van Wegens: Spring in Linnés' garden near Uppsala

Zweijahresbericht der Präsidentin

Liebe Mitglieder und Freunde der Papiergeschichte!

2008 fand in Stockholm und Uppsala der 29. IPH-Kongress im wunderbarsten skandinavischen Frühling bei blauem Himmel und warmem Sonnenschein statt. Gastgeber und Organisator des Kongresses war die Nordic Association of Paper Historians NPH. Ich möchte meine Glückwünsche und vollste Bewunderung für die ausgezeichnete Kooperation zwischen Finnland, Schweden, Norwegen und Dänemark zum Ausdruck bringen. Als langjähriges Mitglied sowohl der NPH als auch der IPH war ich sehr glücklich über die exzellenten Möglichkeiten, die der Kongress für das Entstehen von Kontakten zwischen Mitgliedern der beiden Organisationen bot, weil ich weiß, wie wichtig es ist, sich kennen zu lernen und neue Kontakte zu knüpfen.

Als Kongress-Koordinatorin neben Göran Wohlfahrt stellte ich fest, wie gut die finnische und schwedische Zusammenarbeit bei der Organisation des Kongresses und beim Einwerben der erforderlichen finanziellen Unterstützung von drei schwedischen Einrichtungen der Papierindustrie funktionierte. Durch intensive Korrespondenz und Treffen in Stockholm und Eupen, hier äußerst gastfreundlich ausgerichtet von Alphonse Radermecker, wurden alle Fäden zusammengehalten und verbanden sich - wie Fasern beim Papierschöpfen - zum Programm des IPH-Kongresses. Die von Jan-Erik Levlin aus Finnland vorgegebenen klaren Richtlinien und Termine für die Beiträge wurden von den Autoren befolgt; deshalb konnte der Kongressband 2008 bereits im Frühjahr 2009 erscheinen, zeitgleich mit dem Kongressband 2006 aus Spanien. Wir hätten keinen besseren Weg wählen können, um das 50jährige IPH-Jubiläum zu begehen, als mit diesen beiden Publikationen.

Bei der Generalversammlung 2008 in Stockholm wurde ich zur neuen IPH-Präsidentin gewählt, und seitdem haben zwei Vorstandssitzungen in Eupen stattgefunden. Die Planung des IPH-Kongresses 2010 war ein wichtiges Thema auf den Tagesordnungen. Am ersten Treffen nahm Dr. Claire Bustarret als eine der zwei neuen Kongress-Koordinatoren der AFHEPP, Association Française pour l'Histoire et l'Étude du Papier et des Papeteries,

teil. Beim zweiten Vorstandstreffen 2009 in Eupen gab der Präsident der AFHEPP, Dr. Denis Peaucelle, Informationen über das reichhaltige Programm und die weiteren Planungen für den Kongress. Heute wissen wir, dass alle Pläne erfolgreich umgesetzt wurden

Ein weiteres wichtiges Thema für den Vorstand war 2008 die Entscheidung, die IPH-Zeitschrift «Paper History» wieder zu beleben. Die Notwendigkeit einer Zeitschrift hatten die Mitglieder bereits bei der Generalversammlung 2006 in Spanien klar zum Ausdruck gebracht. Eine gedruckte Zeitschrift ist ein entscheidendes Verbindungsglied zwischen den IPH-Mitgliedern, und alle anderen an Papiergeschichte Interessierten finden die Zeitschrift in den Bibliotheken. Mit der vereinten Unterstützung von all unseren Delegierten, die als Mitherausgeber fungieren, erschien die erste Ausgabe - auch in digitaler Form auf unserer Website - im Frühjahr 2009, unserem Jubiläumsjahr. Als neue Herausgeberin der Zeitschrift bin ich für alle Beiträge, die mir Autoren von Artikeln zugesandt haben, und für Informationen über nationale Aktivitäten, die ich von unseren Mitherausgebern bekomme, sehr dankbar. In Verbindung mit der IPH-Webseite haben wir nun alle Möglichkeiten für eine fruchtbare Kommunikation und Diskussion, aber das beste ist es natürlich, sich persönlich zu treffen.

Viele interessante Tagungen und Ausstellungen finden jedes Jahr statt, und es wäre eine Vollzeitaufgabe, an allen teilzunehmen. 2009 konnte ich am ersten Teil der Tagung des deutschen Arbeitskreises für Papiergeschichte, DAP, in Celle und Lachendorf teilnehmen, am letzten Teil der Tagung der britischen BAPH in Bath sowie am Treffen der skandinavischen NPH in Silkeborg. Es ist eine fruchtbare Erfahrung, sich bei den nationalen Treffen zu begegnen, wenn dies möglich ist.

Finanzkrise und Klimawandel zum Trotz beobachte ich ein wachsendes Interesse an Papiergeschichte. Seit 2008 sind zwei neue Vereinigungen entstanden, und in diesem Jahr haben sie beide ihre ersten internationalen Kongresse organisiert. Als Präsidentin der IPH war ich eingeladen, im Mai 2010 den Kongress in Budapest, organisiert von der HPW, der ungarischen Vereinigung für Papier- und

Wasserzeichengeschichte, zu eröffnen und einen Vortrag zu halten. Im Oktober versammeln wir uns in Angoulême beim 30. IPH-Kongress, organisiert von der AFHEPP, Association Française pour l'Histoire et l'Étude du Papier et des Papeteries. Während dieser zwei Jahre haben wir neue Mitglieder für die IPH gewonnen, einige Institutionen haben ihre Mitgliedschaft gekündigt und wir haben zwei Mitglieder verloren - Professor Conor Fahy aus Großbritannien starb Anfang 2009 und Öie Utter aus Estland starb im Februar 2010. Wir werden ihnen ein ehrendes Andenken bewahren, und sie werden uns fehlen.

Die Planungen für die Feier zum 50jährigen IPH-Jubiläum in Verbindung mit dem 30. Kongress in Angoulême fanden bei den Vorstandstreffen in Eupen statt, und sie wurden äußerst erfolgreich von unseren AFHEPP-Organisatoren umgesetzt. Das für diesen Anlass von Martin Cuppen geschaffene Jubiläums-Wasserzeichen in handgeschöpftem Papier

verdeutlicht, dass die ursprüngliche Papiermacherei noch immer ein lebendiges Handwerk ist. Neue Untersuchungen von Wasserzeichen und zur Wasserzeichengeschichte sowie neue Forschungen in Wasserzeichen-Datenbanken werden fortgeführt, neben den Untersuchungen zur technischen Entwicklung der Papiermacherei und zur Erhaltung unseres auf Papier geschriebenen Erbes. In der letzten Zeit geführte Verhandlungen über Vorschläge für die kommenden IPH-Kongresse 2012, 2014 und 2016 haben noch zu keinen klaren Vereinbarungen geführt, aber trotz der schwierigen finanziellen Bedingungen überall habe ich die Hoffnung, dass wir bald wissen werden, wo wir uns beim IPH-Kongress 2012 wieder treffen werden. Ich wünsche Ihnen allen anregende Studien in Ihrem Gebiet der Papiergeschichte und freue mich auf weitere interessante Beiträge für unsere IPH-Zeitschrift Paper History.

Anna-Grethe Rischel



Photo: Inge van Wegens: Joyful exitements with white gloves before the study of the watermark exhibition in Stockholm

A Brief Account of Traditional Korean Papermaking

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Abstract

The origin of papermaking in Korea is not known due to the lack of written information on the subject. However, based on several hypotheses by domestic and foreign scholars, papermaking might have been initiated in Korea at any time between the 2nd and the 5th century. It is presumed that until the 7th century, papermaking skills in Korea were similar to the Chinese methods and from the 8th century on, papermakers in Korea started developing their own techniques. Throughout the Goryeo (918 – 1392) and the Joseon (1392 – 1910) periods, the flourishing publication industry had spurred further development of papermaking. Paper mulberry has been the main fibre source in papermaking, and another important ingredient has been mucilaginous substance from indigenous plants as a dispersion aid.

Introduction

The history of papermaking has attracted the attention of many scholars, and accordingly a great deal of research on the subject has been carried out by paper historians, archaeologists, and paper conservators. However, most of the previous research has focused either on its origins in China or its development in Europe. There are still many areas that are relatively neglected and, as a result, have not sufficiently been covered by previous studies. Traditional Korean papermaking is one such area.

Korea has a long history of papermaking. Historically, paper became an indispensable material of daily life in Korea, and the versatile use of paper has been well adapted in their culture. Koreans seem to be the only people who have been using paper for their floors as it works well with their unique heating system

This paper will review a brief history, the process, and the main materials for traditional Korean papermaking.

History of Korean Papermaking

Korea's geographical situation neighbouring China made it possible to adapt advanced Chinese culture from an early stage. It is not known when the Chinese papermaking technique arrived in Korea.

However, several domestic and foreign scholars have hypothesized that papermaking must have existed in ancient Korea some time between the 2nd and the 5th century.

It is presumed that papermaking skills in Korea were similar to the Chinese methods until the 7th century. However, from the 8th century on, Korean papermakers started developing their own techniques: paper mulberry became the main material in papermaking. There are a few old extant papers from the 8th century in Korea, and one of them is the earliest known extant printed Buddhist text, Dharani Sutra, which was found at the Bulguk Temple in Kyungju, Korea in 1966. During its conservation, it was proved that the paper had been made of paper mulberry and its fibres were finely cut and well pounded.

The Goryeo period (918 – 1392) was the golden age of publishing printed texts, especially during the 11th and 12th centuries. It appeared that movable metal type was already in use during the 13th century in Goryeo. Due to the highly advanced printing techniques, the demand for paper had grown rapidly and had spurred the further development of papermaking. It is during this period that other supplementary materials started to be used, such as bamboo and rice straw.

During the Joseon period (1392 – 1910), the papermaking industry became larger and more developed. Techniques of papermaking using mixed materials were well developed during this period and a wide range of materials was used. The industry thrived during the 15th century, but after two serious invasions from Japan and China in the 16th century, the industry did not recover until the 18th century. Then private paper mills started to increase along with the development of private markets all over the country.

Main Materials and Tools

The main fibre source for traditional papermaking in Korea has been paper mulberry (*Broussonetia*), which belongs to the Moraceae family and is a genus of four species of trees: *Broussonetia kaempferi*, *Broussonetia kazinoki*, *Broussonetia kurzii*, and *Broussonetia papyrifera*. Among them, *Broussonetia kazinoki* Sieb and *Broussonetia Papyrifera* Vent are frequently mentioned by other scholars, and it

seems as if they are the only two species used for traditional papermaking in the country. Both are known as native to Korea, and over time the species have been crossbred with each other. As a result, it is hard to distinguish one from the other. The Korean term for paper mulberry is ‘dak’ or ‘daknamu’, and it grows naturally throughout the country to a height of about three to five meters.

Another important ingredient in traditional papermaking in Korea is a mucilaginous substance as a dispersion aid. It is commonly called ‘dakpul’ in Korean. As mentioned above, ‘dak’ means paper mulberry tree and ‘pul’ means vegetable glue, and its name suggests that the use of a mucilaginous substance has been related to papermaking with paper mulberry.

Historically, extracts from several indigenous plants were used as dispersion aids until the mucilaginous substance from the root of *Hibiscus Manihot* (Hwangchokgyu in Korean) was exclusively used in the 19th century. As a result, *Hibiscus Manihot* became the most commonly known and perhaps most preferred as a dispersion aid. It is an annual plant – belonging to the Malvaceae family – sown between the beginning and the middle of May. It is usually harvested sometime between October and November before the frosts. For later use the roots can be dried and stored.

Regarding Korean papermaking screens and moulds, a mould without deckle has commonly been considered as a traditional papermaking mould. The screen is usually made with splints of bamboo or stems of plants laced with horse hair or silk thread; bamboo and stems of pampas-grass or other native

grasses have been used for a long time as the main materials for papermaking screens. A Korean screen has distinctive characteristics. Unlike most Asian papermaking screens, the Korean device has a length nearly twice that of its width with chain lines running the length of the mould. Another feature of a Korean screen is the way in which the terminations of stitches are staggered along the centre of the screen. Furthermore, the edges of the screen are wrapped with a piece of white cotton fabric.

Papermaking Process

One-year-old dak is harvested between November and February when the fibres of the inner bark are well formed. The harvested dak is placed in a large iron cauldron filled with water and covered with a thick piece of textile or straw mat in order to keep in the steam. Then the cauldron is heated for about seven hours. Traditionally oak wood is the preferred fuel for providing heat. When the dak has been sufficiently steamed, it is removed from the cauldron. The softened bark is stripped off by hand: the bottom part is held with one hand and the bark is peeled off with the other. The bark (‘heukpi’ in Korean) is made up of three layers: the outermost layer a dark brown, the middle green layer, and the inner whitish layer. In papermaking the inner, whitish part (‘baekpi’ in Korean) is needed alone. To obtain baekpi, the heukpi is soaked in water for about ten hours, and the two outer layers are scraped away with a knife. At this stage, it is important not to leave any dark spots, such as are formed near nodes or from damaged bark. Either heukpi or baekpi can be dried and stored for two or three years until required.



Fig. 1. Korean sheet forming with dipping mould technique at Jangjibang in Gapyeong

For cooking baekpi, an alkali solution is obtained from the ashes of plant stems, such as chilli and soybeans, or the husks of buckwheat. Sometimes lime is also used along with wood ash. Adding an alkali solution aids in turning the lignin and hemicelluloses in the bark into water-soluble substances and also increases the boiling point of the solution.

Before cooking, the dried baekpi needs to be soaked in water for a day or two in order to make it soft and to aid the cooking process. It is then roughly cut with a sickle to prevent it from becoming entangled during cooking. The shortened baekpi is put into a big cauldron with the prepared alkali and boiled for about three to six hours. Its readiness can be checked by pulling a strip of the cooked inner bark with both hands – if it is easily torn, then the cooking is complete.

The cooked baekpi is removed from the cauldron and placed in a stream. This will remove the excess alkali and any substances dissolved in the alkali solution. During rinsing, the baekpi is also bleached by sunlight. For even bleaching, it is turned regularly. It usually takes several days. After sun-bleaching in a stream, the baekpi is placed in a shallow basket filled with water, and any impurities and dark spots are removed by hand with the assistance of blunt knives used to scrape the surface of the bark.

Then the baekpi is lightly squeezed and placed on a flat stone or a wooden board and beaten with a mallet until it is well spread out and its texture looks like kneaded clay. The degree of fibrillation can be tested by dropping a small portion in water and mixing well. If the fibres disperse well in water, then the material is ready to be used in sheet forming.

To prepare the mucilaginous substance from Hwangchokgyu, the roots are thoroughly washed and placed in a stone mortar or on a wooden board and pounded. Then the well-crushed roots are put in water overnight as a viscous substance is secreted from them. Any solid parts or debris from the root are removed from the solution with a sieve, and then it is ready for use.

Well-beaten fibres of ‘baekpi’ are put into a rectangular wooden container filled with clean water, and the vat stock is well mixed with a bamboo stick

until all the fibres are evenly dispersed. Then, the prepared dakpul is added to the stock. The amount of dakpul added depends on the papermaker’s experience. Then the vat stock is well stirred again to give an even thickness.

The traditional papermaking technique is Webal sheet formation, which differentiates the Korean papermaking technique from other Asian methods. The middle of the far side (relative to the papermaker) rail of the mould frame is tied with a rope and hung from a horizontal wooden bar about one foot above the vat. Then the papermaking screen rests upon the mould frame. During the sheet forming process, the papermaker holds the screen and the mould together. There is no deckle on top of the screen to retain the stock. The papermaker scoops the pulp stock by pulling the mould towards him and quickly lets it flow towards the far side casting off the excess stock by elevating his side of the mould. This first dipping forms the ground of a sheet and is followed by several side-to-side dips until the desired thickness is achieved.

When a sheet is formed, the papermaker lifts the near side of the screen, which is then turned upside down and put on a prepared flat place. Before removing the screen from the pile, a round wooden log is lightly rolled over the screen to squeeze excess water from the sheet. The screen is then carefully lifted leaving the newly formed sheet smooth and unwrinkled. During the stacking of sheets in a pile, each paper is marked with a thread to make it easy to separate them later by placing a string or a thread (‘begae’ in Korean) along the near side, short edge of each sheet. The stack of sheets is covered with a thick wooden board and weighted with heavy stones overnight. Later the sheets are separated and put on wooden boards for drying in the sun.

Finally, in order to make the surface of sheets smooth and compact, the traditional finishing process, ‘dochim’ is carried out: ten dried sheets are piled and a liquid – a diluted solution of dakpul – is applied on the top sheet and another ten dried sheets are piled on and the solution is applied on the top sheet again. In the same manner, up to one hundred sheets can be piled. Then the whole pile is covered with a wooden board and weighted with stones. It is left overnight to allow the moisture to spread evenly throughout the whole stack. The stack is uncovered

and moved onto a flat stone board and beaten with a wooden club about a thousand times. After that, the sheets are separated and left in the shade to dry. Later they are piled together again and pressed with a stone board and left overnight. The whole beating process is repeated the following day. Through the process, the surface of each paper becomes smooth and the fibres closely packed together.

Conclusion

The main difficulty in studying traditional Korean papermaking is that there is lack of primary written sources for the subject. Although it is possible that there is old Korean literature that might have information related to papermaking skills, tools, and materials in ancient Korea, such scholarly works were commonly written in old Chinese and the majority of them have not been translated into Korean yet. Therefore, it is hard to access any possibly existing primary information in Chinese unless one is familiar with ancient Chinese.

Any written information on traditional papermaking in Korea is rare so further research should be approached with different methodology. Fortunately due to the chemical stability of traditional Korean paper, many traditional books and documents still exist. Examining their physical characteristics and identifying their fibre source can provide further valuable information about papermaking tools and materials in Korea.

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Origin of the difference in papermaking technologies between those transferred to the East and the West from the motherland China

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Abstract

Morphology and raw materials of paper from over 50 Chinese documents of the 6th to 8th centuries, mainly of Tang Dynasty in the Otani Collection, were analysed by high resolution digital microscope. Clear difference was found in paper quality and raw materials between the military documents of the Turfan brigade and the official ones of the local government. Most of the military documents, 23 of total 28 analysed were found to be written on rag origin paper, while most of documents used by the local government were recorded on usual hemp or mulberry paper in Tang Dynasty in that period. The fact was found that the rag paper was made inside the brigade. This finding suggests that the Turfan brigade organized the advanced logistics to their own local supply of the highly necessary material for the operation and management of the brigade. The fact that old fashioned rag paper of the primitive papermaking craft was found in the military documents of the Turfan brigade would give important and decisive information of the origin of the papermaking craft that was spread westwards. The story is widely accepted among historians of the transferring of paper craft from China to the West at the battle between Chinese army and Arab army in 751 at Talas. However the real reason why Arabs and then later Europeans had continued the primitive papermaking craft using cloth rag until the 19th century is yet unclear, in spite of the fact that sophisticated papermaking technology using tree bark, shrub or other plant fibre had been widely spread in China, Central Asian oases kingdoms and Asian countries already in the 8th century. The present results would give an answer to this question. The papermaking craft, obtained by Chinese craftsmen captured by the Arab army at the battle, was not the sophisticated technology using plant fibres, but the primitive craft using cloth rag adopted by the Turfan brigade logistics.

Introduction

It is now widely recognized that papermaking was initiated in China in the 2nd century B.C., the former Han Dynasty, at least 200 years earlier than

the record in the official history (後漢書 : Hou-han-shu) in which the invention of the papermaking craft in 105 A.D. by Tshai Lun was mentioned [1~3]. It is also revealed [1, 2] that the early paper was made of hemp or ramie fibres taken from rags, fishing net and others. During 200 years, since the first primitive papermaking craft using rags, a slow, but steady progress in papermaking crafts seemed to be made. In the above mentioned Hou-han-shu(後漢書) it is recorded that Tshai Lun invented papermaking using new materials of tree bark and hemp ends. The invention of papermaking technique using tree bark (in other words raw plant fibres) is the real technical innovation which determined the afterwards rise of Chinese cultural society [2,3]. The sophisticated new papermaking technique was then accepted inside China and spread gradually to the colonies of China and neighbouring countries during the next 300 years after the invention, and to the east and to Japan by the beginning of the 7th century.

In sharp contrast to the above situation in Asian regions, it was not the sophisticated papermaking craft, but the primitive craft using cloth rags that was transferred westwards by Chinese craftsmen, captured by the Arabs at the battle between the troops of Tang Empire and Arabs at the Talas River in 751. History of papermaking revealed already that Arabs had kept their papermaking 400 or more years after the first encounter with the papermaking craft at the Talas river [5].

When European countries accepted the papermaking craft from Arab in Spain in the 12th century and then in Italy in the 13th century, Europeans accepted the primitive papermaking craft using cloth rags. Not until the beginning of the 18th century did Europeans begin to try papermaking with use of plant fibres, faced to the deficit in rags for papermaking with increasing demand for paper after printing technique was started by Gutenberg in Europa in 1450, [5]

Why had such old fashioned primitive craft continued in the Western countries for more than 1700 years since the invention of papermaking by tree bark in China? Studies of the history of paper did not give any clear answer to this simple question until now, [1~6].

In the present study we will try to present a possible answer to this problem through the microscopic analysis of several papers in the Otani Collection, especially of the military documents, used by the Turfan brigade of Tang Dynasty, that were collected by Japanese expedition to the Central Asia.

Experimental

In the present experiment, mainly microscopic analysis of the morphology of the surface of paper specimens and fibres was carried out. High resolution digital microscope Keyence VHX-500 was used. In the microscopic analysis of paper material, usually fine fibres extracted from the specimen were observed by the standard optical microscope. The digital microscope used in the present study has an optical system with long working distance; a distance of a few centimetres to the surface of the paper specimens from the top surface of the objective lens is available, from the low magnification $\times 100$ to large $\times 1000$ in one optical lens system. Therefore it is able to observe large scrolls or wide documents directly without causing any damage, if the specimen is set on the wide stage of the microscope carefully. By this way not only the microstructure of single fibres can be observed and recorded, but also the morphology of the surface and plant remains, threads, debris of cloth and traces of ink spot on/in the paper specimens. Taking photographs, just focused at the same place successively along the optical axis, and composing them into a single image, well focused photograph in the wide range is easily obtained.

In the Otani Collection we have a total of 59 documents classified as military ones and most of these were written in Tang Dynasty [7–9]. Among

them paper specimens of 28 military documents were analysed. Along with the military documents several official documents of the local government, secular documents of the same period and some Buddhists' Sutras, found in Dunhuang, were also analysed for comparison. Most of them were found in the Turfan region by the Otani expedition.

Early examples of old Chinese and Asian paper

First we trace the brief history of propagation of the papermaking inside China, to its colonies and to Japan through observations of concrete examples of paper specimens, collected by Europeans and Japanese expeditions to the Central Asia.

Although novel papermaking technique using plant fibre was invented in the 2nd century A.D. as mentioned above, spreading of the new technique in China seemed to be uneven. Along with the new technique, primitive papermaking had been continued for more than 200 years in the frontier regions. Li Bo documents of the Otani Collection, obtained in Lou-lan, is the famous old example of paper made of hemp cloth rag dated 328 A.D. [10]. Fig.1(a) shows the Li Bo document of the Otani Collection MS00538A in the IDP number. Fragment of hemp cloth seen at the edge of the paper proves that the paper was made of hemp cloth rag, (b). In addition to cloth rag, pieces of hemp thread were found to exist everywhere both on front and back sides of the paper. This observation tells us that the primitive papermaking had still been kept in the Oasis kingdom of the frontier of China Empire 200 years

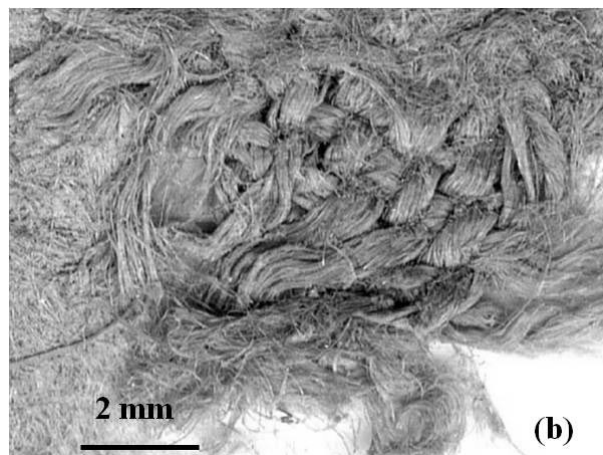


Fig.1 (a) Li Bo document of early 4th century (from analysis of contents and the writer of the letter; the date is known to be 328 A.D.) found in Lo-lan, MS00538A. (b) Hemp cloth rag on the document proves that the paper was made of rags.

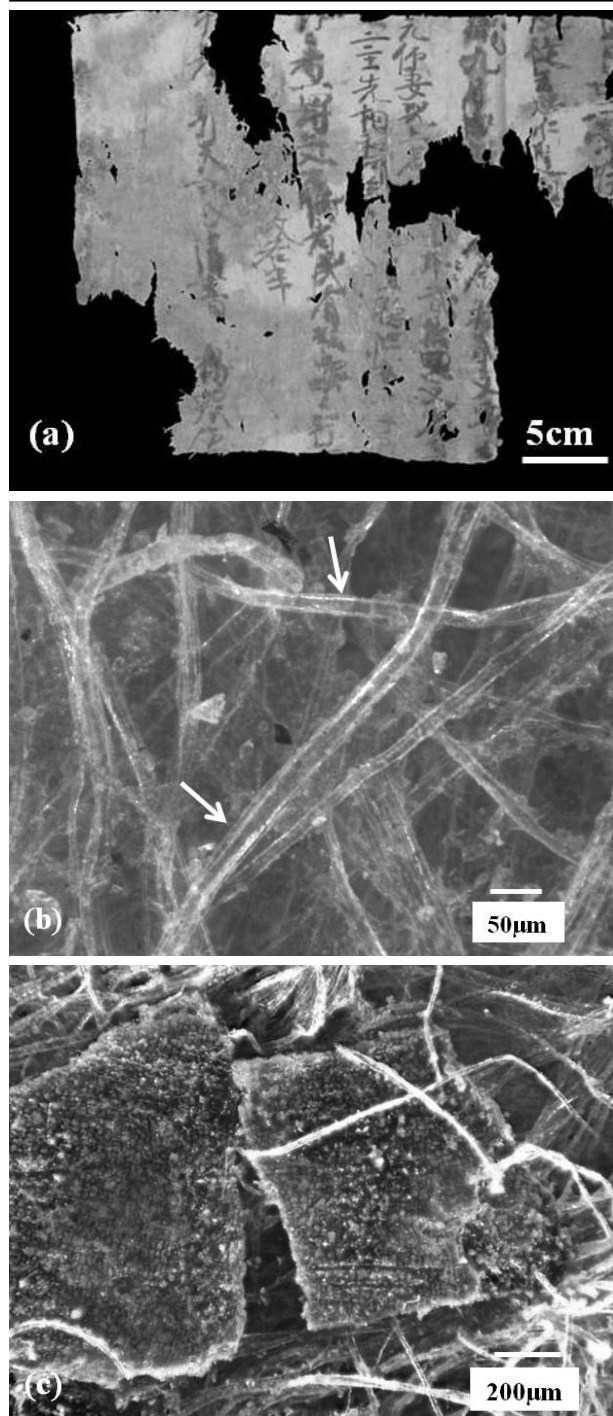


Fig 2 (a) Document of contract paper of the Gaochang kingdom dated 538 A.D., MS04886. (b) Microscopy of the morphology of paper. Sheath characterizing mulberry fibre is seen (arrowed). (c) Bark of silk mulberry, *Morus alba* indicating the silk mulberry paper.

after the invention of the sophisticated papermaking technique using tree bark.

In the 3rd century A.D. in Jin Dynasty, according to [4], mulberry (*Broussonetia papyrifera*) paper began to appear. As reported in [11], paper of the Buddhists' Sutra of the Stein Collection of the British Library, OR.8219/S.2106 dated 6 of April 500 (維摩義記景明原) was found to be mulberry paper. This result

showed that mulberry paper was already popular in the 5th century at the latest. Since then mulberry paper occupied the first place of Asian paper production. The real example of old paper in that period made from mulberry (*Broussonetia papyrifera*) bark, however, is quite rare. It is known that several plants which belong to the mulberry family are also useful for the making of paper from their bast bark fibres. In Korea and Japan another mulberry *Kozo* (*Broussonetia kazinoki*) has been widely used for papermaking for more than 1300 years until now. Silk mulberry tree, which is another genus of the mulberry family, was also used for papermaking in the Central Asian Oasis kingdom associated with spreading of silk production in the area. Fig.2 is the document of contract paper, MS04886, of Gaochang kingdom dated 583, an old Oasis kingdom that dominated the Turfan region from 450 to 640 A.D. (a). The characteristic membrane besides the fibre seen in the microscopy shows that the paper is mulberry paper, (b). On the same surface fragments of plant bark are seen, (c). Analysis of the microstructure of the bark revealed that the plant is silk mulberry, *Morus alba*, [12]. In the 6th century, silk production was popular in the Central Asian region and therefore silk mulberry bark was used in stead of paper mulberry (*Broussonetia papyrifera*) in this region, as mentioned in [4].

According to official Japanese history, papermaking was introduced by Korean Buddhists' priest 610 A.D. and soon after Japan began to produce their own Japanese paper. From the beginning, Japan accepted the sophisticated papermaking technique of using the tree bark. And in addition, owing to rich plant resources suitable for papermaking, the Japanese easily found their own mulberry plant *Kozo* (*Broussonetia kazinoki*) for papermaking. Fig. 3 is the Japanese Buddhists' Sutra, (a) one of the Million Charms produced during 764 to 770 under the order of Empress Shotoku. It is known to be the oldest printed (really stamped) documents survived in the world. Several studies had been done already by several researchers. Here we show the case of the collection of Ryukoku University. It was found that the paper is Japanese *Kozo* paper as seen in the microscopy (b), (c). By X-ray fluorescent analysis less iron content was found on the paper surface compared to old Chinese paper. It was reported in [13] that the smaller iron content is the characteristic properties of Japanese paper, while quite rich iron was found to exist in old Chinese paper. It can therefore be said,

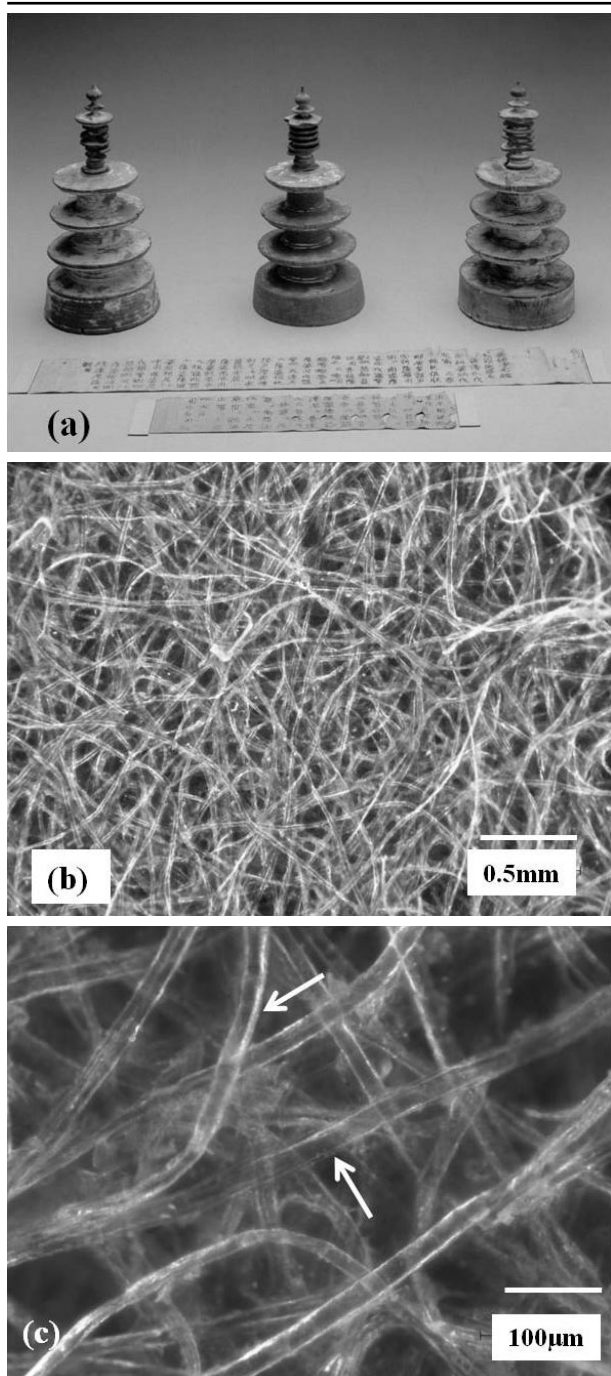


Fig.3 (a) Million Charm pagoda and sutras of Empress Shotoku of Japan, 764 to 770 A.D. (b) Microscopy of the sutra, upper one in (a). Typical morphology of mulberry paper; fine and equal size fibres, is seen. (c) Enlarged photograph showing clear membrane of mulberry fibre, arrowed.

that in the 8th century the Japanese really produced their own paper using their own plant resources in the sophisticated papermaking technique of Chinese origin.

All the above observations show that the novel papermaking technique using plant bark began in the 2nd century A.D. It had commonly been used not only in China mainland, but also in Central Asian

Oasis kingdoms and neighbouring Asian countries by the beginning of the 7th century.

Tang Dynasty is known to be the most brilliant period in the long Chinese history. Owing to its prosperity and rich socio-economic condition, sophisticated papermaking technique had been established by the end of the 7th century. It is no exaggeration to say that the paper quality of some Sutras of Tang Dynasty, found in Dunhuang by European and Japanese expeditions, is the best Chinese paper in the long history of Chinese papermaking. During Tang Dynasty, hemp paper production was gradually decreasing and instead of that high quality mulberry paper production became popular. The following observation proves this suggestion.

Fig.4 shows the concrete paper examples of the Dunhuang document, Bencao jizhu xulu (本草集注序錄, MS00540), which contains a colophon dated 716. On the backside of the Sutra Biqu hanzhu jieben (比丘含注戒本, MS00530) was written and in the final part another Sutra Da zhi dulun (大智度論 MS00529) was added Fig.4 (a) shows the microscopy of the top cover of MS00530. The paper was found to be typical hemp paper of Tang Dynasty. The width of fibres is uneven and micro fibril and typical bundle of hemp fibres are seen. While in (b), taken from the first page of the Sutra MS00530, the width of fibre is homogeneous and each fibre is well separated, and characteristic sheath of mulberry fibre is seen as indicated by arrows. The paper seems to be typical good quality mulberry paper of Tang Dynasty.

Military documents of the brigade of Turfan in Tang Dynasty: origin of papermaking craft transferred westwards

Turfan, the large fortified city at that time in the western region, is located in the west frontier of the vast territory of Tang Empire 1000km apart from Dunhuang. Therefore it is supposed that material supply including paper to this region was not sufficient compared to Dunhuang. Though the sophisticated papermaking technique had been established in Tang Dynasty as seen above, it is natural to consider that production of paper was not equally distributed among the vast territory of the Empire. For papermaking, rich water and proper plant resources are necessarily required. Although

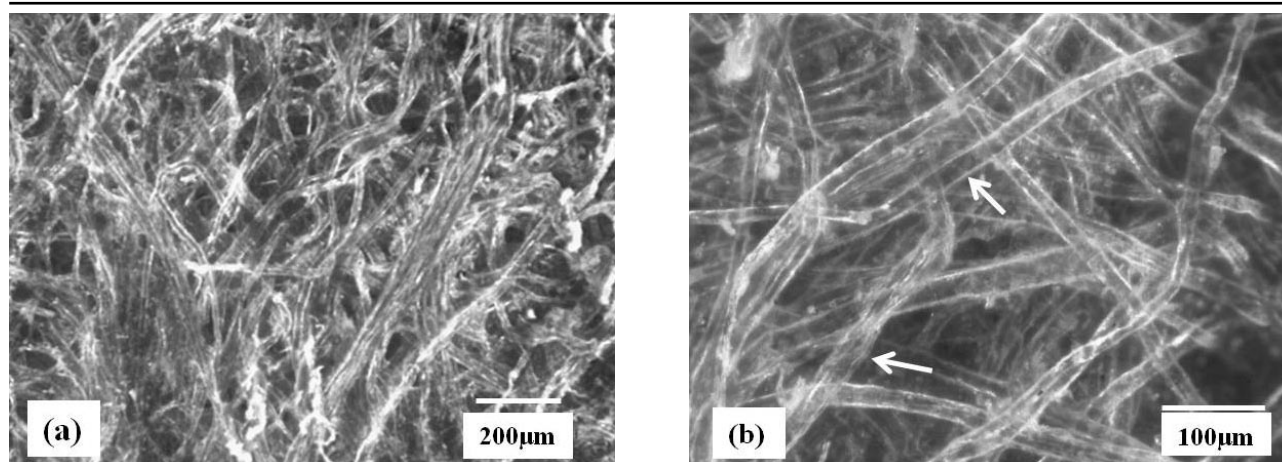


Fig.4 (a) Morphology of top cover of Dunhuang Buddhists' Sutra, MS00530 of Tang Dynasty, with a colophon dated 716, on the backside written another document of Chinese old medicine, MS00540. Typical hemp paper morphology is seen. (b) Morphology of the paper of first page of Sutra MS00530 showing membrane characterizing mulberry fibre.

Turfan was accompanied by rich oases in the desert of East Turkistan, it is impossible to suppose that they could obtain enough good paper by themselves.

In fact a lot of documents in the Otani Collection, written on the quite poor paper were found in the Turfan region. First we show the results in Table 1 of the present analysis of military documents on the An-xi brigade of Turfan including some documents of Dunhuang origin in the Otani collection. As seen in the Table, 23 of 28 military documents observed were found to be rag paper including a few rag-mixed papers. Three documents written on mulberry paper were found to be of Dunhuang origin.

The above observation suggests that the condition of materials supply between Dunhuang and the western front was different, and at the military base they should prepare necessary materials for the military operation by themselves.

Next we show the concrete results of the present analysis by microscopy.

Fig.5 shows the military documents on the non commissioned officer of the Turfan brigade dated 687, (a), the oldest military document dated in the Otani collection. Clear evidence of remained hemp cloth rag and thread were found to exist, (b) and

Table 1 Result of analysis of raw materials of the paper of documents of Tang Dynasty in the Otani collection: Military Documents of the An-xi Brigade of Turfan

IDP number	Contents	Date or Era	Material	IDP number	Contents	Date or Era	Material
MS01014	A	A.D.745	hemp rag	MS03128	A	Tang	rag, grass stalk?
MS01035	B	767	hemp rag	MS03153	A	Tang	grass stalk?
MS01417	C	741	hemp rag	MS03491,92	H	687	hemp rag
MS02377	D	743	hemp rag	MS03357	G	Tang	hemp rag
MS02849,50	A	Tang*	hemp rag	MS03358	G	Tang	hemp rag
MS02999	D	742~755	hemp rag	MS03362	G	Tang	hemp rag
MS03017	E	Tang	hemp rag	MS03370	I	670~705	rag + millet?
MS03019	E	Tang	hemp rag	MS03379	D	Tang	hemp rag
MS03021	F	Tang	soldier's blue rag	MS03381	A	Tang	soldier's blue rag
MS03022	G	Tang	hemp rag	MS01041	J	Tang	hemp, no rag
MS03025	G	Tang	hemp rag	MS03354	K	Tang	grass stalk(millet)
MS03027	G	Tang	hemp rag	MS02840	I	702	mulberry
MS03028	G	Tang	soldier's blue rag	MS03366	I	670~705	mulberry
MS03030	G	Tang	hemp rag	MS03369	I	Tang	mulberry

A: Document on non commissioned army officers. B: Document of administration. C: Record on punishment for a soldier. D: Record of runaway of soldiers. E: Document of the management of military office. F: List of soldiers. G: List of watch guards. H: Document of a lieutenant. I: Document of the garrison (Dou-lou jun: 豆廬軍) in Dunhuang. J: Local government paper on military service. K: Document of provisions for military camp. * From the analysis of contents and calligraphy documents denoted by Tang were proved those of the middle of Tang Dynasty in [7~9].

(c). The paper quality of these documents is poor compared to the standard hemp paper of Tang Dynasty, Fig.4 (a). Analysis of the morphology of paper showed that the paper was almost entirely made of hemp cloth rag, not from hemp plant raw fibre, except for a piece of fine silk thread that was found to exist, (d). It was known already at that age that silk could not result in any kind of paper. Therefore this finding only suggests that everything was tried to mix as additives increasing the apparent amount of products for military use. It should be noted here that rag origin paper began to be used in the Turfan brigade already by the end of the 7th century, over 60 years before the war at Talas.

In the present study, several paper specimens are found to contain blue color cloth rags. Fig. 6 is one of the examples of such documents with written names of watch guards. Cloth dyed by indigo blue is seen at the centre of the photograph in dark color in this B&W print. In Tang Dynasty, blue wear was the wear for rank and files and also lower class local officers. Blue wear rags found here then seem to

be rags taken from worn out soldiers wear inside the army. This fact suggests strongly that the paper was made inside the brigade at the western front of Tang Empire. That means that the brigade had prepared logistics supplying advanced material for the intelligence of the military operation by themselves.

Fig.7 is another example of military documents of the brigade of Turfan containing colophon of the name of era Tian-bao (742~755 A.D.). The paper was also confirmed to be hemp rag paper as seen in the microscopy,(b). Tian-bao era is the period when the commander Gao Xian-zi directed the An-xi brigade in Turfan. The document thus seems to be really the one used in the Gao Xian-zi's brigade.

Next we show the clear difference in paper supply to the armies between Turfan and Dunhuang. As shown in Table 1, military documents of the garrison in Dunhuang were written on mulberry paper. Fig.8 is one of the concrete examples. As seen in

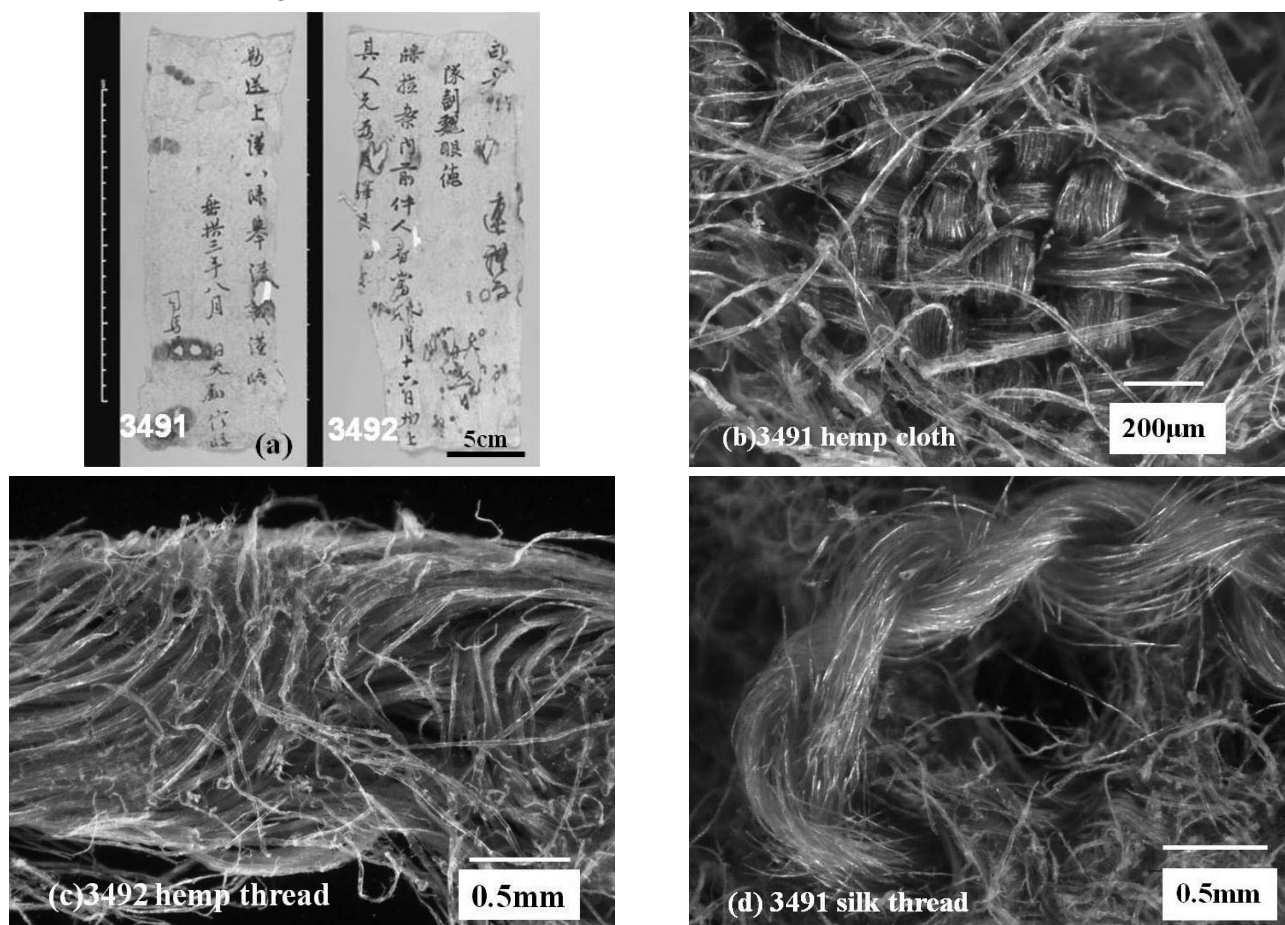


Fig.5 (a) Military documents of Turfan brigade dated 687, MS03491 and 3492. (b) Hemp cloth fragment embedded in the paper of MS03491. (c) Hemp thread found on the paper of MS03492. (d) Silk thread found on the paper of MS03491. Oldest military use rag paper in the present study.

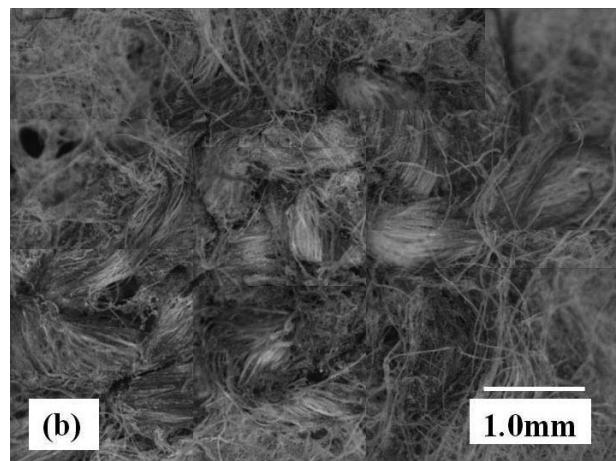


Fig. 6 (a) Document of Turfan brigade, list of watch guards, MS03028. (b) Rag of blue wear, commonly used for rank and files in Tang dynasty, found on the paper.

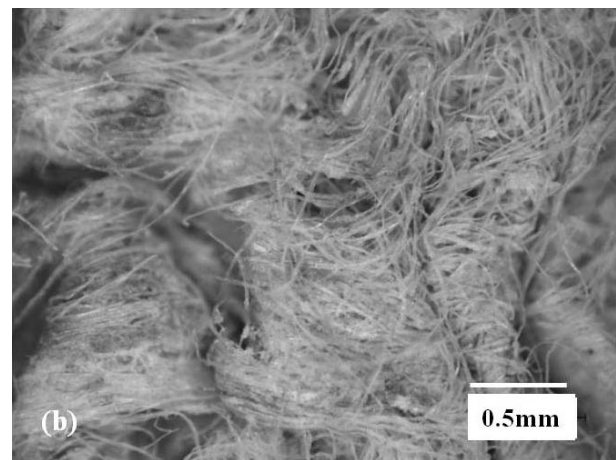


Fig. 7 (a) Military document of Turfan brigade with a colophon of the name of the era Tianbao (742~755), MS02999. (b) Hemp cloth rag found on the paper of the document.

the microscopy, fibres are well separated and clear membrane is seen around fibre (arrowed). The paper is confirmed to be mulberry paper. This observation suggests that even for military use, mulberry paper was supplied to the garrison in Dunhuang.

What does the result of the present observation mean? The above observation proves that in Turfan, the brigade of the western front of Tang Empire adopted logistics preparing highly necessary material paper for military operation and management inside the brigade. The craft applied for papermaking under the poor condition at the front was the primitive craft using cloth rags.

Official documents of local government and others of the 7th ~8th centuries found in Turfan

To understand the circumstances of papermaking in the Turfan military base, documents for other use in Turfan society should be analysed and be compared

to the military documents. Table 2 is the results of the present observations of various documents used in Turfan and Dunhuang of other than military use. As seen in Table 2, most of the official and secular documents used in the Turfan society of the same period as the military ones above are found to be written on usual hemp or mulberry paper. Several rag paper or rag mixed paper specimens were found to exist also. This fact suggests that deficit in paper supply not only for the military use, but also for the ordinary use should exist in Turfan, the front of the western limit located 1000km from Dunhuang .

The administration of farmers or peasants families was one of the most important works of the local government and it is therefore supposed that family registration should be recorded using good paper.

Fig.9 is an example of paper used for a book of poems dated 703 of Dunhuang origin. Paper was found to be mulberry paper. This observation tells

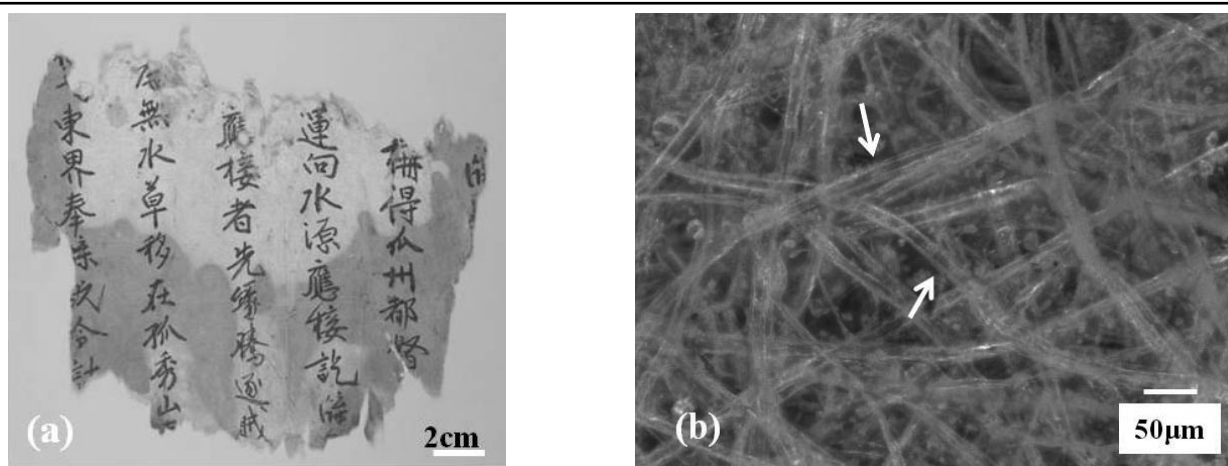


Fig.8 (a) Military document of Dunhuang garrison Dou-lou stationed during the 7th–8th century, MS03369. (b) Note mulberry paper was used as seen in this photograph (membrane was seen, arrowed).

us that in Dunhuang good mulberry paper was supplied even for the cultural society.

The present observation of the official and secular documents in Turfan and Dunhuang regions showed that quite large difference existed in the situation of paper use between paper for the military use and for the local government and ordinary use among people.

From the point of view of the history of paper, the difference found in papers between the military use in the Turfan brigade and the local government use is quite important, because both were used under

the control of Chinese officials. Papers for the local government or for cultural society use were written on good paper. Official documents are the one of basic instruments governing people and for this purpose enough strong and high quality paper for keeping the records is needed. Paper for the cultural society in the middle of Tang Dynasty should also adopt higher demand in quality. While paper for military use, although it was highly necessary material, was one of the expendables especially at the battle front and there was no need to use high quality paper. This is another reason that so many military documents, written on rag paper were found in the present study, along with the poor condition

Table 2 Result of analysis of raw materials of the paper of documents of Tang Dynasty in the Otani collection: Local government official documents in Turfan, Secular documents, documents of Oasis kingdom Gao chang guo

IDP number	Contents	Date or Era	Material	IDP number	Contents	Date or Era	Material
MS01003,1259	L	Tang	mulberry, rag	MS04882	W	728	hemp
MS01421	L	677	hemp	MS05796	X	761	grass, millet?
MS01422	L	677	mulberry	MS05797	X	760	as above
MS02830	M	704	mulberry	MS05798	X	760	as above
MS02835recto	N	703	mulberry	MS05799	X	761	as above
MS02835verso	P	703	mulberry	MS05827	X	763	as above
MS03106	Q	Tang	hemp rag	MS05832	X	762	as above
MS03122	R	749	hemp	MS05833	X	762	as above
MS03134	S	Tang	hemp rag	MS05834	X	741	as above
MS03137	T	743	hemp rag	MS04884	Y	632	silk mulberry
MS03141	U	743	hemp	MS04886	Y	583	silk mulberry
MS03154	V	Tang	hemp	MS01310	Y	634	hemp & rag
MS03162	L	Tang	hemp	MS01311	Y	634	hemp & silk mulberry

L: Document of local government (North Office of Turfan). M: Poem book of Dunhuang origin. N: Document of runaway family.

P: Document of cultivated land in Dunhuang. Q: List of officers of local government in Dunhuang. R: Document of a local government branch in Turfan. S: Document of Gaochang prefecture in Turfan. T: Local government document of lieutenant Yin Shan-lin. U: Local government document of Captain Li Zhun-you. V: Document on the local town Bo-shui. W: Local government document on non commissioned army officer. X: Certificates of tax payment of Zhou family in Turfan. Y: Documents of the Oasis kingdom Gaochang* in the 6–7th centuries (*see the analysis of the documents of Gaochang kingdom, Fig.3).

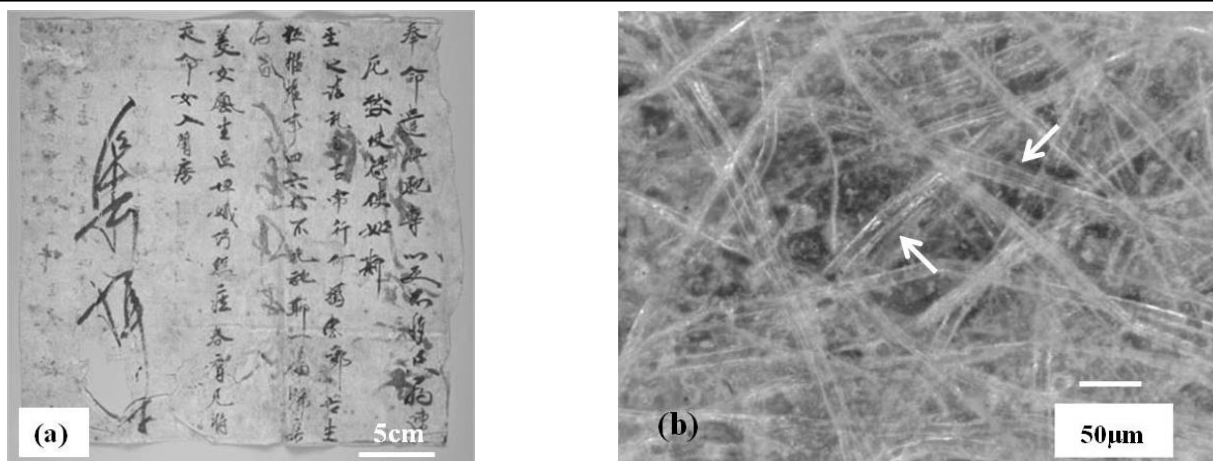


Fig.9 (a) Book of pems of Dunhuang dated 704, MS02830. (b) Ordinary mulberry paper of Tang Dynasty used in the Dunhuang cultural society. Arrows indicate membrane of mulberry fibre.

in preparing materials at the western front of Tang Dynasty.

Discussion

As mentioned above, the story was widely accepted about the spread of papermaking craft from China to Arab at the battle between Chinese and Arab armies at the Talas River in 751. There are, however, several arguments yet doubting the famous legendary story among western paper historians. In [6] the author described that “It seems likely that Central Asian papermakers were the first to discover (or rediscover) that waste from textiles that were themselves made from plant fiber, including linen and cotton---, could also make good paper.” In [6] it is also mentioned that “It is often said that Muslim armies captured Chinese papermakers following the battle of Talas in 751, but this anecdote is without factual basis and paper had been known and made in Central Asia for centuries.”

In [6], however, the author misunderstood essentially the history of distributing papermaking craft in China and its surroundings. Firstly, Central Asian papermakers were not the first makers of rag paper. The fact that papermaking using rag started in the 2nd century B.C. in the former Han Dynasty is now widely known. The case of Li Bo document of the early 4th century shown in Fig.1 was already known in the famous report by Fujieda (although written in Japanese) [10] which corrected early misunderstanding by European historians on the history of rag origin paper. The paper of Li Bo document is really rag paper made by Chinese craftsmen in Central Asia, Lou-lan. In Central Asia (where Arabs had not yet established their

domination until the middle of the 10th century) people did not need to develop “a new technique” using rag. Paper written in Chinese proves that Chinese craftsmen, living in the region already produced rag paper. Secondly, the fact that most of the military documents used in the Turfan brigade, from that the troop dispatched was defeated by Arab army at the Talas River, was rag origin paper seen here gives enough factual basis to answer the question on “the anecdote” in [6].

Dard Hunter described in his book [5] that “The Arabs learned the craft of papermaking, A.D.751, from Chinese prisoners in Samarkand. In their own country China at this date used the bark of mulberry trees for their paper, but this material not being readily available in Samarkand, the Arabs employed linen as substitute.”

Hunter’s comment on Arabian papermaking technique has also some misunderstandings. It is known that in Samarkand cultivating hemp and flax or even silk mulberry, all useful for papermaking (see Fig.2) was popular at that time as written by Hunter himself in another chapter of [5]. The real reason for the above situation is not due to lack in plants, but to lack in their knowledge of papermaking technique using plant bark.

The above all observations of the military documents of the middle of Tang Dynasty found in Turfan are quite important, when considering the origin of transferring of papermaking to Arab. According to the official History of Tang Dynasty, Hsin Tang Shu, Chinese army lead by the commander Gao Xian-zi was defeated by Arab army at the battle between

China and Arab at Talas (Taraz) about 500km from Samarkand, 1200km from Turfan.

It is reasonable to suppose that supplying paper, the highly necessary material of the intelligence, for long distance from Turfan to Talas is quite ineffective and difficult for Chinese side. To solve this problem for the Chinese army, which already adopted logistics preparing paper inside the brigade more than 60 years before, it seems to be better to accompany paper craftsmen with the troop. It is also easily understood that to make paper within a short time during marching to the battle front, the sophisticated technology using much plant bark, much water and longer time to extract fibres is quite ineffective. Instead, the Chinese army should adopt the primitive papermaking using rags accustomed for long time inside the brigade. It is reasonable to suppose that Gao Xian-zi troop organized the logistics composed of craftsmen accustomed to make paper from rags.

It was believed as referred in [1~4] that among prisoners, captured at the battle by the Arab army, there were paper craftsmen and from them Arab could get papermaking craft. As a result the papermaking transferred to Arab by prisoners of the battle was only a primitive craft using rags. In fact just after the battle papermaking using rags began at Samarkand. Arab could not obtain sophisticated papermaking technology from the prisoners. The papermaking craft transferred to Arab was the old-fashioned primitive one using rags, adopted by the logistics of the Chinese army, the Turfan brigade at the western front.

Conclusions

- (1) Most paper specimens used for the military documents of the Turfan brigade in the middle of Tang Dynasty were not made from plant bark, but of hemp rags.
- (2) The brigade of Tang Dynasty at the western front of Turfan organized the highly advanced intelligence using paper, the high-tech material at that age. To keep paper resources the brigade organized craftsmen of papermaking inside the brigade.
- (3) Most of paper resources were hemp or mulberry paper, used for the official documents of the local government of Turfan and for ordinary use and also those in Dunhuang.

- (4) Above all results well explain the question why the troop lead by Commander Gao Xian-zi to the battle field from Turfan to the Talas River were accompanied by paper craftsmen. By the present observation also the legendary story is well explained that Arab could get papermaking craft from craftsmen captured at the battle.
- (5) The logistics adopted by the Turfan brigade making paper inside the brigade by the primitive method using rags is the real reason why the papermaking that spread westwards was the primitive craft only using rags.

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Martin Cuppen a 80 ans

Alphonse Radermecker

Notre membre néerlandais, Martin Cuppen, a fêté ses 80 ans le 25 mars 2010.

De formation ingénieur chimiste, Martin a démarré sa vie professionnelle dans les laboratoires de la papeterie Page à Gennep (NL) en 1955. En 1958, il est chef de production et en charge des nouveaux développements et des habillages (Papiermaschine Bespannungen, PM Clothing).

De 1972 à 1983, Martin fut, au titre de conseiller technique et commercial, en charge de la représentation des toiles de formation et des rouleaux égoutteurs de fabricants allemands.

Devenu représentant indépendant pour des fabricants d'habillages jusqu'à sa retraite en 1993, Martin découvre le plaisir de lever la feuille de papier à la main et de créer des filigranes.

Devenu membre de l'I.P.H. en 1998, il participe à tous nos congrès. Pour la période 2003 à 2009, avec notre membre slovène Darko Cafuta, ils assurèrent annuellement la vérification de la comptabilité de notre Association. Il est également membre de la DAP et de la « Nederlandse Papiergeschiedenis ».

Nous adressons à Martin Cuppen des vœux de longue vie dans la satisfaction et la joie de faire connaître et aimer le papier et les filigranes aux enfants et au public des conférences et des démonstrations de la fabrication de papier artisanal aux Pays-Bas et en Belgique.

Sign up to support the Papermuseum in Silkeborg

Dear friends of paper

The town of Silkeborg was founded due to the papermill, which was the first real settlement here in 1844 – before that there were ruins of a medieval castle of the same name.

Silkeborg was later known for its very high quality of paper, as well as production of security paper and the finest of them all were the banknotes. The banknotes had to be made by hand, and for almost 100 years Silkeborg had therefore one of the biggest hand papermaking environments in Scandinavia – with altogether 125 people working in that department, which was running 10 double vats.

Silkeborg papermill was closed down in 2000, and the papermuseum Bikuben (the Bee hive) keeps telling the story since 2004 and most important keeps the craft alive in the best possible tradition. The

papermuseum has also arranged several exhibitions and workshops with paper art.

This museum is now in danger of being closed – the City of Silkeborg has to make big budget cuts, which means that the museum loses its financial support from the town.

Please go to our website www.papirmuseet.dk and sign our protest list against this closing.

Our website is only in Danish

Thanks and best regards

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Obituary

In memoriam Conor Fahy

Anna-Grethe Rischel

One of IPH's dear members in United Kingdom died last year. Professor Conor Fahy had been a member of IPH since 1994 and as one of the leading scholars of early modern Italian culture he was awarded with the British Academy's Serena Medal in 2007 for his eminent services towards the furtherance of the study of Italian history, literature and art.

With his unique expertise in the techniques of hand-press printing and papermaking combined with his breadth in understanding of Italian literary and linguistic history his academic career took him from a lectureship at the University of Edinburgh to London to University College and to a chair of Italian at Birkbeck College in London.

Professor Fahy's articles, collected in *Saggi di bibliografia testuale* (1988) became the starting point for the study of the printing of texts in Italy up to the early nineteenth century. Since then he

published meticulous studies of the printing of specific editions, notably Ariosto's *Orlando furioso* of 1532, and he edited the oldest known Italian manual on the running of a printing house.

Through his many writings and his teaching in Britain and in Italy, Professor Fahy revolutionized the study of the transmission of printed literature in early modern Italy. He introduced almost single-handedly awareness into Italian studies of how Anglo-American textual bibliography could be applied in the Italian context with necessary modifications. Professor Fahy brought furthermore awareness to the English-speaking world of Italian printing history and the achievements of Italian bibliographical scholarship. A new generation of scholars in Italy and elsewhere is now building on the foundations laid by his research.



Some Notes from a British Attendee at IPH2010

Alan Crocker

It was very impressive that AFHEPP (l'Association Française pour l'Histoire et l'Étude du Papier et des Papeteries) was able to organise this Congress only two years after it was founded in 2008. The papers presented covered a wide range of topics and all appeared to have been well researched. The visits were to very interesting mills and museums, the documentation issued was very helpful and interesting and the meals provided were enjoyable. However, as usual, the main value of these meetings is the opportunity that they provide to interact with paper historians from other countries.

The book of abstracts gives the names of 78 attendees coming from 16 countries, although the only one from Russia was unable to come and several names are missing, perhaps because they were accompanying persons. Of the 78 people named, 40 came from France. Again this indicates the impressive work that AFHEPP have been doing but it puts the rest of the world to shame. In particular I felt that it was very unfortunate that I was one of only three from Britain and one of these was an American working in England. However the only countries that had more were Spain with six and France. A further seven countries had three attendees, two had two and four had one. This is probably not a new phenomenon but I feel that IPH and national paper history organisations clearly need to try to ensure that future IPH Congresses have a better-balanced attendance.

Not surprisingly about half of the papers were presented in French, which is of course with German and English one of the three acceptable IPH languages. In practice very few if any were given in German so that almost half of the speakers used English. Also in many cases a couple of the French organisers gave brief translated summaries and these were very useful. However they were not helped by many of the speakers. Too often it appeared that attempts were made to read the complete texts of written papers so that it must have been difficult for even fluent speakers of the language to absorb the information. In addition large numbers of slides were shown, each one staying on the screen for a very short time so that again there was no time to read them, particularly as the text was often much

too small. It should be obvious that all one can do in 20 minutes is to tell the audience the topic on which you have been working with a brief account of the methods used, a few important results obtained, idea for future work that is needed and to finish with some conclusions. Members can then question the speaker at the end of the talk or later and look forward to receiving the full text in the Congress publication.

Personally, I know some French and was even said to have 'oral proficiency' when I was examined at school, but that was a long time ago. However, regrettably, I understood very little of the papers delivered in French and perhaps many French attendees felt the same about English presentations. Therefore, I recommend that before future congresses IPH should ensure that speakers are provided with much firmer recommendations about how they should present their papers to an international audience.

One of the fascinating French things that I did learn was that the AFHEPP logo is based on a watermark used in Angoulême. It looks rather like a waterwheel but actually represents the type of firework known as a Catherine wheel, which turns rapidly around a pin when it is lit. It made me feel that the paper which Glenys and I presented at the Congress on quarrels between papermakers and gunpowder makers was a very appropriate choice.

Publications and exhibitions

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testi di *M. Bicchieri, L. R. de Bella, S. Iannuccelli,*
Y. Ma, P.F. Munafò, V.E. Nicoletti, M. L. Riccardi, S.
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26/10 2010 – 20/2 2011

Der Codex Manesse und die Entdeckung der Liebe,
Ausstellung der Universitätsbibliothek Heidelberg,
www.manesse2010.uni-hd.de

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PTS Fachseminar: Energieeffizienz und
Produktivität steigern bei Entwässerung,
Presse und Trocknung, PTS München, Hess-Strasse 134.
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for conservation, Ottawa, Canada
www.cci-icc.gc.ca/symposium/2011/index-eng.aspx

April 2011

A Chinese TV documentary (HD, 37 min. x 5) about
the history of papermaking will be broadcasted on
Chinese National TV Channel 10 in April 2011. Our
IPH member, Mrs Juhua Wang of China Technical
Association of Pulp and Paper Industry has
recommended Liao Ye to contact to IPH for possible
shooting in Europe,
yeliaochna@gmail.com

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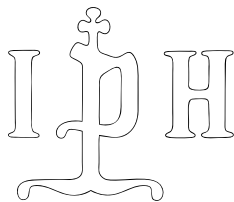
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